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## Agricultural Science, Geography & Economics

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### ***The Impact of Accounting Ethics in Improving Managers' Behavior and Decision Making in the Jordanian Companies***

#### **ABSTRACT**

The key to maintaining confidence of clients and the public is a professional and ethical conduct that make accountant act with integrity, objectivity, and independently, even to the sacrifice of personal benefit. The current study aims to examine the impact of accounting ethics in improving manager's behavior and decision making, and to examine the factors affecting accountants and managers' ethical behavior. A questionnaire has been designed for this purpose, and it was distributed to selected accounting employees working in different business environments. The number of questionnaires analyzed were (92) questionnaires. Resolution data were analyzed using the statistical program Smart PLS, (Partial Least Square). The study concluded that there is a significant influence of accounting ethics on improving managers' behavior and on decision making. Accountants must understand how factors such as values, norms, convictions, integrity, choices and courage interact with each other to impact managers' behaviors and decision making, and every company should have a code of ethics that can minimize risk, and ensure reliable financial statements, and the best ethics guide that staff can follow is their manager's real behavior, and a strong ethical values that reinforce the norms of ethical decision-making.



**Keywords:** accounting ethics; managers' behaviors; ethical conduct; ethical standards.

## 1. INTRODUCTION

The nature of this study aims to examine the impact of accounting ethics in improving managers' behavior and decision making. As we are all now realize that most of the financial crisis and business failures is due to unethical behavior of employees, employers, or management. The ethical dilemma is too wide to be covered in a research paper, but we will try to figure at least some parts of this problem and its consequences.

Ethics is a code of conduct that applies to everyday life. It addresses the question of whether actions are right or wrong. Ethical actions are the product of individual decisions. When an organization is said to act ethically or unethically, it means that individuals within the organization have made a decision to act ethically or unethically. When a company uses false advertising, cheats customers, pollutes the environment, treats employees poorly, or misleads investors by presenting false financial statements, members of management and other employees have made a conscious decision to act unethically. In the same way, ethical behavior within a company is a direct result of the actions and decisions of the company's employees [1].

Ethical decision-making arises from two levels of moral reasoning: (1) the intuitive level consisting of one's personal feelings and ideas as to the right and wrong of a particular situation feelings derived from beliefs formulated out of personal knowledge and experiences; and (2) the critical evaluative level consisting of reasoned judgments and evaluations of the situation. As to the application of moral reasoning to a given situation, one's intuitive response is always immediate and personal; it is our initial impression or gut-feeling. It simply comes to us that this is correct or incorrect, right or wrong. The critical evaluation level, on the other hand, is a decision we arrive at by applying ethical theory, moral principles, and professional rules, standards, codes and laws to the specific situation which must be decided. Critical evaluation is seasoned thought. Relevant to the application of moral reasoning is the fact that while ethical rules and standards are helpful to critical thinking, they can be inadequate for some situations. Similarly, theory can be too abstract making it difficult for one to derive practical and specific applications.

Therefore, people place a heavy reliance on ethical principles for the resolution of their problems [2].

Business ethics formulates now the main part of industry growth especially after the financial scandals that hit many famous industries. Most of these scandals embodied illegal actions, bribes, misuse of power, financial corruption and embezzlement. As a result of these actions, the necessity to ethical standards has raised. Generally, Ethical standards work as a framework that determines its relations with employees, customers, business and public. It also works as a guideline to firm's objectives and future plans [3].

The core of accounting or auditing job is ethics. An accountant has to perform his duties with utmost care and honesty. The accuracy of the financial statement does not mean it is reliable and faithful. A reliable financial statement means that it is verifiable, is a faithful representation, and is reasonably free of error and bias. Faithfulness means that the numbers and descriptions represent what really existed or happened. The accounting numbers and descriptions agree with the resources and events that these numbers and descriptions purport to represent [4]. In Other words, financial accountants in the performance of their professional duties are called on for moral discernment and ethical decision making. The decision is more difficult because a public consensus has not emerged to formulate a comprehensive ethical system that provides guidelines in making ethical judgments.

Recent studies indicated that nearly all accounting textbooks have focused on ethics and its importance, in 1988, Stephen E. Loeb proposed that accounting students need to be educated so that they attain the following objectives: [5].

1. Understand both the composition of and the mechanism for enforcing the various codes of ethics that exist within accounting.
2. Understand the social control mechanism that society can use to assure itself that the public accounting profession regulates itself and, also, to sanction a public accountant who does not comply with professional standards.
3. Are able to respond effectively to ethical dilemmas that arise in accounting.
4. Are able to deal with the dynamic nature of the ethics environment that exist today in accounting.

One of the main audit failures from the 1980s up to now is due to improper ethical values. As we mentioned earlier in the introduction that the accounting profession is very critical to society, both, the internal and external users are

benefited from the accountant outcomes. Accordingly, the information they provides helps in making critical decisions, but at the same time these decisions may cause disruption to the capital market and the society at the same time. So the presence of a code of ethics will work on organizing the financial outcomes and accordingly organizing the capital market and the society as a whole.

Importance of the current study can be derived through management practices and behavior. Unethical behavior of accountant will lead to harmful consequences to both managers and auditors. An effective code of ethics will regulate the profession and its outcomes, and control the fraudulent actions. It's important that every company should have a code of ethics that can minimize risk, and ensure reliable financial statements.

The current study aims to examine the impact of accounting ethics in improving managers behavior and decision making. The environment of accounting profession has a dynamic nature, so every step in performing the accounting cycle should be executed in top ethical care. As Unethical behavior will lead to harmful consequences to all users of financial information, the need to have reliable and ethical financial outcomes is the aim of this research study.

## **2. LITERATURE REVIEW**

Ethics, sometimes known as philosophical ethics, ethical theory, moral theory, and moral philosophy, is a branch of philosophy that involves systematizing, defending and recommending concepts of right and wrong conduct, often addressing disputes of moral diversity. The term comes from the Greek word *ethos*, which means character. Philosophical ethics investigates what is the best way for humans to live, and what kinds of actions are right or wrong in particular circumstances [6].

Professional ethics is a code of conduct that applies to the practice of a profession. Like the ethical conduct of a company, the ethical actions of a profession are a collection of individual actions. As members of a profession, accountants have a responsibility, not only to their employers and clients but to society as a whole, to uphold the highest ethical standards.

Historically, accountants have been held in high regard. For example, a survey of over one thousand prominent people in business, education, and government ranked the accounting profession second only to the clergy as having the highest ethical standards [7]. It is the responsibility of every person who becomes an

accountant to uphold the high standards of the profession, regardless of the field of accounting the individual enters [8].

Every accounting board should adopt codes of professional conduct, in order to ensure that its members understand the responsibilities of being professional accountants. Fundamental to these codes is responsibility to the public, including clients, creditors, investors, and anyone else who relies on the work of the certified public accountant. In resolving conflicts among these groups, the accountant must act with integrity, objectivity, and independently, even to the sacrifice of personal benefit.

Jackling, Philomena & Steven, in their article Professional Accounting Bodies' Perceptions of Ethical issues, Causes of Ethical Failure and Ethics Education determined the top nine factors that contributed to ethical failures for accountants based on a survey of 66 members of the International federation of Accountants IFA. The factors include: [9].

1. Self Interest Self Interest.
2. Failure to maintain objectivity and independence.
3. Inappropriate professional judgment.
4. Lack of ethical sensitivity.
5. Improper leadership and ill-culture.
6. Failure to withstand advocacy threats.
7. Lack of competence.
8. Lack of organizational and peer support.
9. Lack of professional body support.

The interest of the public is the primary ethical objective which should be taken into consideration when an accountant or an auditor performs his job. There job should be performed according to the accounting standards and according to a code of ethics. Codes of ethics are suggested means for institutionalizing ethical behavior. Top management demonstrates its commitment to the code through its daily behavior. In addition, the organization reinforces ethical behavior through punishment and e rewarded consistently. The performance evaluation system can be a very important mechanism for demonstrating management's commitment to ethical behavior [10].

There are many stakeholders in many countries who report several concerns in the usage of rules-based accounting. According to recent studies, many believe that the principles-based approach in financial reporting would not only improve but would also support an auditor upon dealing with client's pressure. As a result, financial reports could be viewed with fairness and transparency. So many countries have switched to International Accounting Standards IAS, as they are composed that this would bring changes especially to accounting ethics. Recently most countries have adopted the International Financial Reporting Standards IFRS as these standards are based on understandability, relevance, materiality, reliability, and comparability.

The accurate application of a code of accounting ethics will protect accountant, investors, and the firm from all kinds of manipulation, fraud, and embezzlement. Many accounting bodies have sanctioned several rules in order to support higher ethical behavior. The code of conduct is used by many companies in order to express the company's values and obligations to its stakeholders. The code of conduct also contains a detailed plan of implementing its activities, values and mission. In addition, it has all the restricted and forbidden behaviors [11].

IFAC recognizes that the accountancy profession throughout the world operates in environments with different cultures and regulatory requirements. The International Ethics Standards Board for Accountants has, nevertheless, established an international Code of Ethics for Professional Accountants. Professional values and ethics relate directly to IFAC's mission to develop and enhance the profession to enable it to provide services of consistently high quality in the public interest. It mentioned that, the program of professional accounting education should provide potential professional accountants with a framework of professional values, ethics and attitudes for exercising professional judgment and for acting in an ethical manner that is in the best interest of society and the profession. The required values, ethics and attitudes of professional accountants include a commitment to comply with the relevant local codes of ethics which should be in conformity with the International Ethics Standards Board for Accountants Code [12].



## **2.1 Factors that Influence the Ethical Environment of an Organization**

### **2.1.1 Mission and values**

Mission and values help the organization to create a clear common sets of beliefs that guide the decision-making process [13]. Where these are built around strong moral values that can enhance the standards of ethical decision-making. In addition, the increase of ethical decisions will identify strong managers and eventually strong organization.

### **2.1.2 Leadership and management influence**

Superior staffs are always the example to junior staff, not the ethics policy. Juniors always imitate their superior in actions and behavior, so enforcing good attitude through seniors will create best behavior among juniors resulting in more ethical decisions.

### **2.1.3 Peer group influence**

Individuals will adhere to group norms even though this may be against what they would do as individuals [14]. Peer groups influence attitudes because individuals want to be accepted by others. Juniors seek approval by sharing similar attitudes or by modifying attitudes to comply with those of group.

### **2.1.4 Procedures, rules and codes of ethics**

A defined code of ethics and procedures will result in a high ethical behavior; it will create better perception about the organization and its objectives. Rewards and sanctions will make the code of ethics more effective.

### **2.1.5 Ethics training**

Appropriately focused ethics training, particularly that focus on a practical training rather than philosophical emphasis. This kind of training can assist in encouraging ethical decision-making, and can make codes of ethics concrete, but should be consistent with the other factors.

### **2.1.6 Rewards and sanctions**

Rewards power is often used to back up the use of legitimate power. Reward power works best when employees understand how they can achieve rewards and

are kept abreast of their status toward earning the reward. Accordingly, ethical behavior will increase if it is connected to reward, and vice versa [15].

#### **2.1.7 Religion and ethics**

Religion plays an important role in influencing an individual ethics. Generally, a religious employee has a self-motivation to act ethically compared to an employee with low level of religiosity [16].

### **2.2 Factors that Influence Ethical Decision Making**

When a decision involves an ethical conflict, managers have to counter a real problem. Managers in such situations face difficult alternatives the sweetest of them is bitter. Values pervade the decision-making process, encompassing not only the individual's economic and legal responsibilities but his ethical responsibilities as well. When managers make a choice to act unethically, the consequences are felt by the organization, its shareholders, employees, and customers. When managers make a wrong decision, they are likely reluctant to admit that they have made a wrong decision, then they will try to reduce their dissonance by using many excuses such as; seeking information to support the wisdom of their decision, or adopt a less favorable view of the forgone alternatives, or trying to minimize the importance of the negative aspect of the decision and exaggerate the importance of the positive aspect, eventually, a great deal of such behavior could easily harm organizational effectiveness [17].

### **2.3 Factors that Influence Managers' Behavior**

Ethical behavior cannot be legislated. It is a combination of strong values and the impact of the example set by peers and superiors. To better appreciate ethics, individuals must understand how factors such as values, norms, convictions, integrity, choices and courage interact with each other to impact managers' behaviors and decisions. Together they provide the guidelines that define managers' behavior [18].

## **3. METHODS**

The primary data needed for the study objectives were collected through a survey conducted among Different Jordanian companies. A questionnaire has been

designed for this purpose, and it was employed from different literature in order to cover the purpose of the study, then it was distributed randomly to the working employees taking part in actions and activities on carrying out business in their companies in November 2013, and to different management levels. The number of questionnaires analyzed were (100) questionnaires. Resolution data were analyzed using the statistical program Smart PLS. The questionnaire contents can be seen in the appendix.

Quantitative data were collected using a self-administered questionnaire, in which the employees were asked to state the likelihood (on a 5-point scale: [5] strongly agree; [4] agree; [3] neutral; [2] disagree; [1] strongly disagree), 100 copies of the questionnaire were delivered by hand on the respondents, 92 copies were returned (percentage of 92%); these 92 copies were accepted and used in the actual analysis (percentage of 92%) of the original distributed copies. The numbers of questionnaire used as a pilot study were 20 copies.

Other Data is collected from secondary sources. Secondary data is collected from articles published by the well-known periodicals, books, and dissertations.

#### **4. Statistical Analysis**

The Statistical Package for Social Sciences Smart PLS was applied in analyzing the data received; Statistical Analysis tools include the followings:

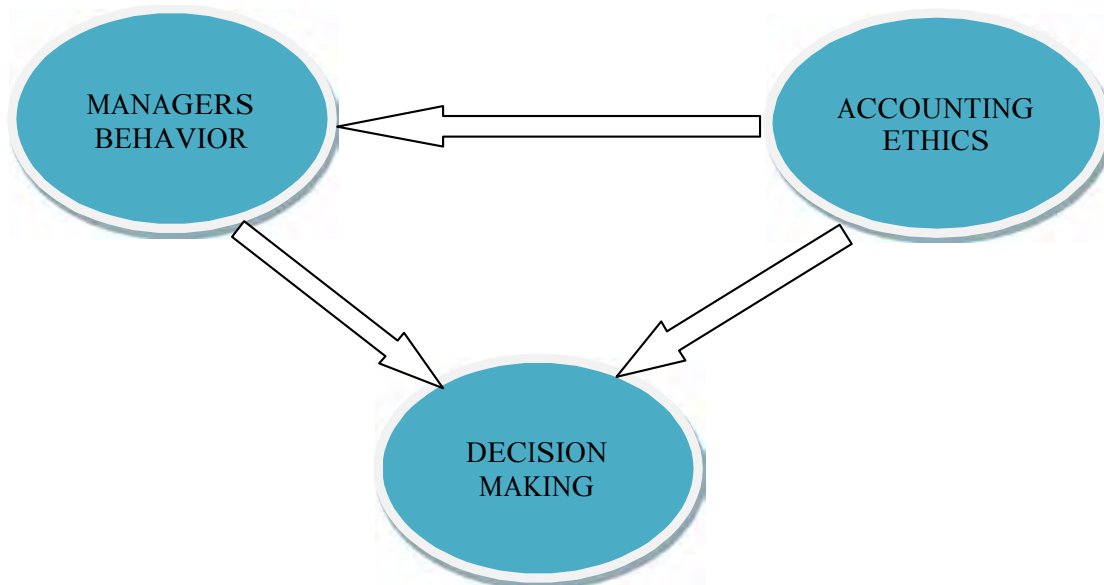
1. Descriptive Statistics, mainly frequencies and percentages, were used to analyze sample characteristics according to job, educational level, professional certificates, and experience.

2. Correlation, Inter-correlation, and Path Coefficient were used to analyze and describe study variables from a statistical point.

3. Reliability Test using Cronbach's Alpha was used to test the reliability of the scale.

Research design is formed out of three main elements which constitute the research design. The Model in Exhibit-1 shows the effect of accounting ethics on managers' behavior and decision making, and the effect of managers' behavior on decision making.

#### 4.1 Research Design (Exhibit-1)



#### 4.2 Study Hypothesis

H1: There is impact of accounting ethics in improving managers' behavior and decision making.

The subordinate hypothesis from the H1 can be made as follows: There is impact of accounting ethics in improving managers' behavior.

The first subordinate hypothesis inquire whether accounting ethics embodied in a form of code of ethics can make managers' behavior characterized by honesty, integrity, trustworthiness, fairness and a sense of justice.

There is impact of accounting ethics in improving decision making.

The second subordinate hypothesis inquire whether accounting ethics embodied in a form of code of ethics can make decision making more accurate, more valuable, and without bias.

H2: There is impact of managers' behavior in improving decision making.

The second hypothesis inquire whether managers' behavior characterized by honesty, integrity, trustworthiness, fairness and a sense of justice can make decision making more accurate, more valuable, and without bias.

#### 4.3 Data Analysis and Findings

##### 4.3.1 Reliability test

Cronbach s alpha was used to test the internal reliability of the measurement instrument. In this study 0.60 or higher is considered acceptance [19]. As shown in

Table (2) the Cronbach's Alphas (D) ranged from 0.779 to .965, thus establishing the reliability of the survey questionnaire. It is obvious that all values of alpha are high. This indicates that for each measurement of a variable, the items are highly correlated and hence highly consistent. Table (1) shows the Cronbach's alpha for each scale:

**Table 1. Cronbachs Alpha**

	<b>Cronbachs alpha</b>
Accounting Ethics	0.965982
Decision Making	0.900804
Managers Behavior	0.779072

#### **4.3.2 Sample characteristics**

The respondents were 67.4% male and 32.6% female; most of them were between the age of 25 years and 45 years. Most respondents had average experience more than 5 years. The Job title of 46.7% of the respondents were Accountants, 23.9% Accounting officer, Head of accounting department 14.1% and finally 15.2% were Chief financial officers CFO. Most of respondents 70.7% had Accounting degree, JCPA 19.6%, and 9.8% having CPA degree. Demographic data is shown in Table 2.

#### **4.3.3 Smart PLS results**

The structural model results are shown in Exhibit 2. Examining the path coefficients; the numbers on the screen enables us to determine, that Accounting ethics has the strongest effect on Decision making (0.806), followed by Managers' Behavior (0.803), and the effect between Managers' Behavior and Decision making was (0.175). Moreover, the three constructs explain 63.3 percent of the variance of the endogenous latent construct Managers' Behavior ( $R^2=0.633$ ), and endogenous latent construct Decision making ( $R^2=0.904$ ). Table 3 illustrates the r square results.

The results show that the relationship between the three variables is statistically significant. Based on their path coefficient scores, it would appear that the influence of Accounting Ethics and Managers' Behavior on Decision Making is significant. However, it seems very unlikely that the hypothesized path relationship between Managers' Behavior and Decision Making (0.175) is relatively weak compared to path relationship between Accounting Ethics and managers' Behavior (0.796),



and Accounting Ethics and Decision Making (0.806) but still significant, as the findings of Smart PLS rule explains that the path Coefficient is significant if it is above 0.015.

**Table 2. Demographics data for the pivot study**

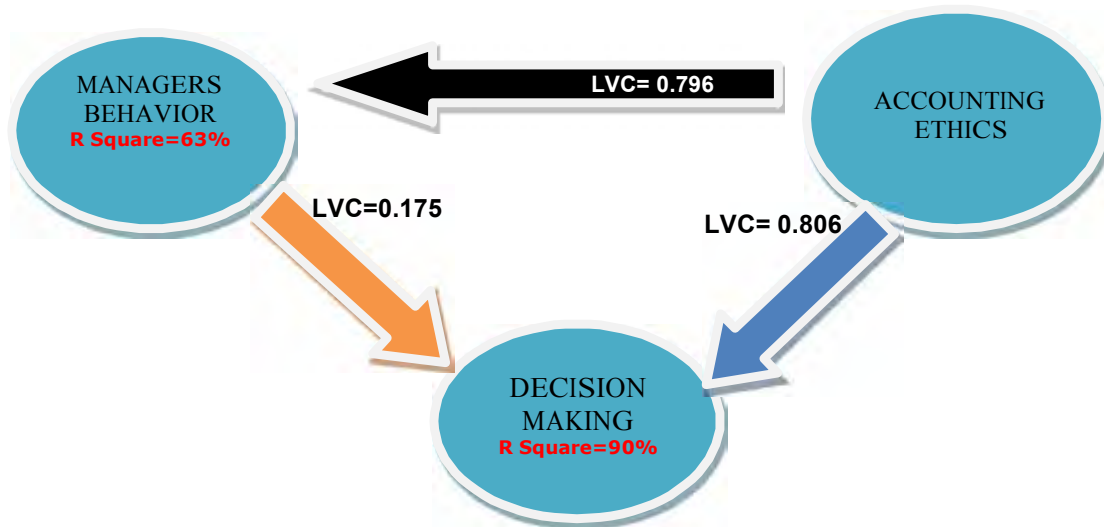
Variable	Group	Frequencies	%
Sex	Male	62	67.4
	Female	30	32.6
<b>Total</b>		92	100%
Age	Less than 25 years	13	14.1
	From 26 years — 35 years	29	31.5
	More than 36 years — 45 years	29	31.5
	More than 46 years	21	22.8
<b>Total</b>		92	100%
Professional Certificate	JCPA	18	19.6
	CPA	9	9.8
	Accounting Degree	65	70.7
<b>Total</b>		92	100%
Job Title	Accountant	43	46.7
	Accounting officer	22	23.9
	Head of Accounting Dept.	13	14.1
	CFO	14	15.2
<b>Total</b>		92	100%
Experiences	Less than 5 years	16	17.4
	From 6 years — 10 years		39.1
	More than 11 years — 15 years		23.9
		18	19.6
<b>Total</b>	More than 16 years	92	100%

**Table 3. The R square of the variables**

	R Square
Accounting Ethics	
Decision Making	0.903925
Managers Behavior	0.633198

The convergent validity assessment is associated with the Average Variance Estimated (AVE) value. The evaluation of validity criterion in Table 4 illustrates that the AVE values of Accounting Ethics (0.565) and Decision Making (0.528) are above the cutoff point of 0.50.

Therefore, these two reflective constructs demonstrate high levels of convergent validity. As for the Managers' Behavior construct, although its AVE values is relatively lower than the threshold (.42), this construct has a high composite reliability score (.82), as composite reliability scores could be used as another approach to assess a constructs' convergent validity, and thus demonstrating a valid construct [20].

**Model Results: Exhibit-2****Table 4. Quality Criteria**

	AVE	Composite Reliability	R Square	Cronbachs Alpha
Accounting Ethics	0.565723	0.972605		0.965982
Decision Making	0.528384	0.921204	0.903925	0.900804
Managers Behavior	0.423595	0.822338	0.633198	0.779072

**Table 5. AVE Root Square**

	AVE	Accounting Ethics	Decision Making	Managers Behavior
Accounting Ethics	0.565723	0.752145		
Decision Making	0.528384	0.749743	0.726900	
Managers Behavior	0.423595	0.603433	0.625016	0.650841

Discriminant validity is established through examining the cross-loadings comparisons between constructs. Specifically, the AVE of each latent construct should be higher than the construct's highest squared correlation with any other latent construct [21]. This notion is identical to comparing the square root of the AVE with the correlations between the latent constructs. The square roots of the AVE values of all constructs were calculated, and compared with correlations between constructs, as in Table 5. The results in Table 5 indicate that all the three constructs in the research model (accounting ethics, decision making, and managers' behaviour) achieved this criterion as none of the off-diagonal elements exceeded the respective diagonal element [22]. Thus, discriminant validity was demonstrated.

**Table 6. Path Coefficients**

	<b>Accounting Ethics</b>	<b>Decision Making</b>	<b>Managers' Behavior</b>
Accounting Ethics		0.749743	
Decision Making			0.625016
Managers' Behavior			

The path coefficient is illustrated in Table 6. The path coefficient between accounting ethics and decision making equals 0.749, and path coefficient between decision making and managers' behaviour equals 0.625, which means that, there is a linkage between the construct variables in the research model.

#### **4.4 Conclusion and Recommendation**

##### **4.4.1 Conclusion**

The results show that the relationship between the three variables is statistically significant. Based on their path coefficient scores The path coefficients results shows that accounting ethics has the strongest effect on decision making followed by managers' behavior, and there is less effect of path coefficient on managers' behavior and decision making. The analysis also shows that there is a significant influence of accounting ethics on managers' behavior and on decision making. The results also confirm the first sub research hypothesis stating that, there is impact of accounting ethics in improving managers' behavior, also the results confirm the second sub research hypothesis stating that, there is impact of accounting ethics in improving decision making. The results also confirm the second hypothesis, which stating that, there is impact of managers' behavior in improving decision making.

We can conclude that, the factors influence ethics, managers' behavior, and decision making should be deeply investigated. Accountants must understand how factors such as values, norms, convictions, integrity, choices and courage interact with each other to impact managers' behaviors and decision making. Also a clear mission and values help create the shared sets of beliefs that guide decision-making. The study concluded that, every company should have a code of ethics that can minimize risk, and ensure reliable financial statements, and the best ethics guide that staff can follow is their manager's real behavior, and a strong ethical values that reinforce the norms of ethical decision-making. Rewards and sanctions affect ethical behavior, either by increase or decrease effect depending on type of rewards or

punishment. Generally they work as an essential approach in responding to positive and negative behavior.

#### **4.4.2 Recommendation**

According to the study conclusions the researchers recommend the following:

As accountant's ethics affect managers' behavior and the process of decision making, management should Promote care, courtesy and respect for others, Promote self-esteem, self-discipline, honesty and positive relationships, and Ensure there is fair treatment for all regardless of position, gender, race, ability and disability. In other words management should ensure the highest ethical standards embodied in a strong code of conduct that can maintain high ethical performance by current and future employees.

Finally, Management should ensure that the company's expectations of behavior are clear and understood by employees, and stakeholders.

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## APPENDIX

**Table 1. Elements of mission and values**

No.	Elements of mission and values
1	The company clearly identify the purpose of its existence
2	All employees clearly know the reason for being exist
3	All employees clearly know for whose benefit does the company exist
4	All employees clearly know how does the company pursue its strategic objectives
5	All employees clearly identify the commercial rationale for the business
6	All employees clearly know what does the company believe in
7	All employees clearly know how the company set its priorities and basic beliefs
8	The company had established the moral rationale for business
9	The company had established its aspirations plans, and philosophical priorities
10	The company had established its standards of behavior. How does the company act or behave?
	Total

**Table 2. Rewards and sanctions**

No.	Elements of rewards and sanctions
11	Ensure a consistent approach in responding to positive and negative behavior
12	Promote care, courtesy and respect for others
13	Promote self-esteem, self-discipline, honesty and positive relationships
14	Encourage a whole company and management involvement in the implementation of this policy
15	Ensure that the company's expectations of behavior are clear and understood by employees, stakeholders, and management
16	Ensure there is fair treatment for all regardless of position, gender, race, ability and disability
	Total

**Table 3. Ethics training**

No.	Elements of ethics training
17	Management is involved in the process of identifying training content
18	Management makes independent suggestions to identify appropriate training content
19	Commitment and action by management is the keystone for ensuring the integrity of an agency's ethical culture
20	Management provides in-house training or hires a specialized ethics training company for seminars or online training of employees
21	There is continuous development of ethics training programs
	Total

**Table 4. Leadership influence in improving the ethical environment**

No.	Elements of Information & Communications
22	Leaders make clear through their words and actions that ethics is a priority
23	Leaders communicate clear expectations for ethical practice
24	Leaders practice ethical decision making
25	Leaders support their facility's ethics program
	Total

**Table 5. Procedures, rules and codes of ethics**

<b>No.</b>	<b>Elements of procedures, rules and codes of ethics</b>
26	Practice their profession with integrity, honesty, truthfulness and adherence to the absolute obligation to safeguard the public trust
27	Act according to the highest goals and visions of their organizations, professions, clients and consciences
28	Inspire others through their own sense of dedication and high purpose
29	Improve their professional knowledge and skills, so that their performance will better serve others
30	Value the privacy, freedom of choice and interests of all those affected by their actions
31	Adhere to the spirit as well as the letter of all applicable laws and regulations
32	Avoid even the appearance of any criminal offense or professional misconduct
33	Encourage colleagues to embrace and practice these ethical principles and standards
	Total

**Table 6. Elements of Peer group influence**

<b>No.</b>	<b>Elements of Peer group influence</b>
34	Employees learn to develop relationships with others in the social system, particularly teaching other employees customs, social norms, and different ideologies
35	Employees can serve as a venue for teaching members
36	Employees influence individual members' attitudes and behaviors on many cultural and social issues, such as: fraud, violence, and academic achievement
37	Employees provide an influential social setting in which group norms are developed and enforced through socialization processes that promote in-group similarity
38	Employees within the organization help other employees form their own identity
	Total

**Table 7. Impact of religion and ethics**

<b>No.</b>	<b>Elements of religion and ethics</b>
39	Your religion is your guide which control your moral and behavior
40	Job performance can suffer if a worker's religious practices is neglected
41	Employees are protected from discrimination or harassment according to their religion in the workplace
42	Employees who are religious were significantly more likely to be trustful
	Total



**Table 8. Impact of ethics on decision making**

<b>No.</b>	<b>Impact of ethics on decision making</b>
43	Employees have the right to safe working conditions
44	Employees have the right to a minimum wage
45	Employees are treated with respect and dignity according to human rights
46	Managers put the interest of the organization over their personal interest
47	Managers, before making a decision put into their consideration, who will be affected by the decision and to what extent will the various parties affected by this decision be harmed or benefited?
48	Managers, before making a decision put into their consideration, whether the decisions are according to law, and how does this decision square with the canons of justice?
	Total

**Table 9. Impact of ethics on managers' behavior**

<b>No.</b>	<b>Impact of ethics on managers' behavior</b>
49	Managers behavior should be characterized by honesty, integrity, trustworthiness, fairness and a sense of justice.
50	Managers should always do the right things
51	Managers should always act unbiased by self-interest and within the framework of one's values and norms
52	Managers put the interest of the organization over their personal interest
53	Managers, before making a decision put into their consideration, who will be affected by the decision and to what extent will the various parties affected by this decision be harmed or benefited?
	Total

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## ***The Economic Survey of Walnut Production in Iran***

### **ABSTRACT**

This paper assessed the comparative advantage of walnut production in Iran and determined that how far the current set of policies is consistent with the comparative advantage. The domestic resource cost (DRC) has been applied. DRC method relies on production cost data to compare efficiency. Distortions may require the estimation of shadow prices to reflect true social opportunity costs but, when adjusted, the country that has the lowest DRC has a comparative advantage. The DRC method is dynamic, providing useful information to decision-makers. However, DRC were used for the analysis of data for the five harvesting years, 2007-2008 to 2011-2012. The analysis was carried out in the context of Policy Analysis Matrix (PAM). The Domestic Resource Cost (DRC) analysis for Iran concluded that Iran had comparative advantage in producing walnut for the study period.

**Keywords:** domestic resource cost; comparative advantage; Iran; walnut.

### **1. INTRODUCTION**

Walnuts are part of the tree nut family. This food family includes hazelnuts (filberts), pistachios, pecans, pine nuts and walnuts [1,2]. Walnuts are a rich source of heart-healthy monounsaturated fats and an excellent source of those hard to find omega-3 fatty acids, walnut seeds are high density source of nutrients, particularly proteins and essential fatty acids. 100 grams of walnuts contain 15.2 gram protein, 65.2 gram fat, and 6.7 gram dietary fiber. The protein in walnuts provides many essential amino acids. Like most nuts, they can easily be added to your Healthiest Way of Eating [3,4].

There are two major varieties of walnuts grown for its seeds, the English walnut and the Black walnut, the English walnut originated in Persia. The commercially produced walnut varieties are nearly all hybrids of the English walnut. Various species of walnuts are economically important trees for both their wood and their

edible fruits which may be gathered in the wild but are now mostly grown in plantations. In Iran, walnut is one of the most valuable tree species based on price per board foot. It has long been in high demand throughout the world for wood products because of its beautiful color, strength, durability, dimensional stability after drying, and excellent machining qualities. Besides wood products, walnut trees produce edible nuts, wildlife food, and beauty, while protecting soil and water resources. When you plant and care for walnut trees, you are making an investment that may pay off handsomely in future years [1].

Production of walnuts in Iran has oscillated over the last two decades but has also followed an increasing trend (Fig.1). Much of the variability in production is due to the alternate bearing nature of walnut trees. Of course, yields per acre have also been variable over the years and also have shown more significant decreases in the last decade. Walnut yields have generally decreased from about 5.5 tons per acre in the early 1983s to around 2.9 tons per acre in 2010. According to government policies regarding the development of walnut cultivation in Iran, two new varieties of Persian walnuts Jamal and Damavand in Iran is growing. The two new varieties yield more than five tons per hectare [5] (Fig. 2).

The value of production of walnuts in Iran has followed a clear upward trend for decades, although sometimes notably. The Iran values of walnut production in 2009 totaled a record \$ 1734 million, which made walnuts the 4th highest valued fruit and treenut, crop in Iran [6].

Bearing acreage of walnuts increased from 1983 into the early 2010s. Acreage increases were noticeable after 1995; when each subsequent year acreage remained either at present levels or increased. In 2010, bearing acreage reached a record 122000 acres [5] (Fig.3).

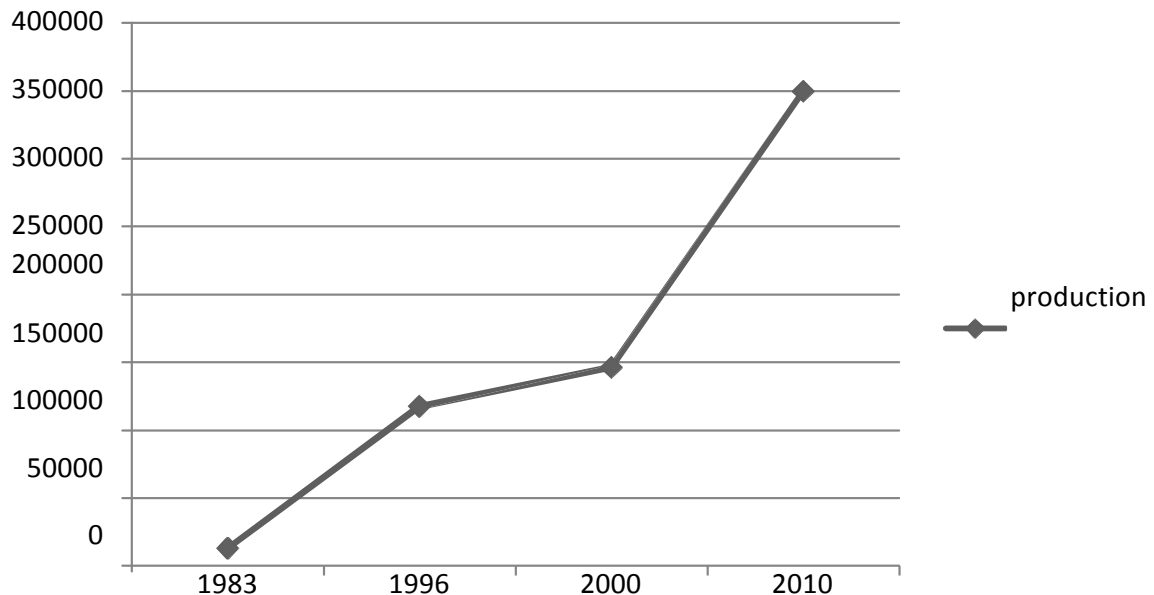
Roughly 99.99 percent of Iran walnut production is utilized domestically, with an additional .01 percent kept for export market [6] (Table 1).

**Table 1. The export of shelled walnuts and walnuts with shell**

1961		1980		2000		2010	
Ton	Percent	Ton	Percent	Ton	Percent	Ton	Percent
0	0	0	0	23.5	3.18	62	0.4
2952	7.03	850	2.71	21	0.018	217	0.171

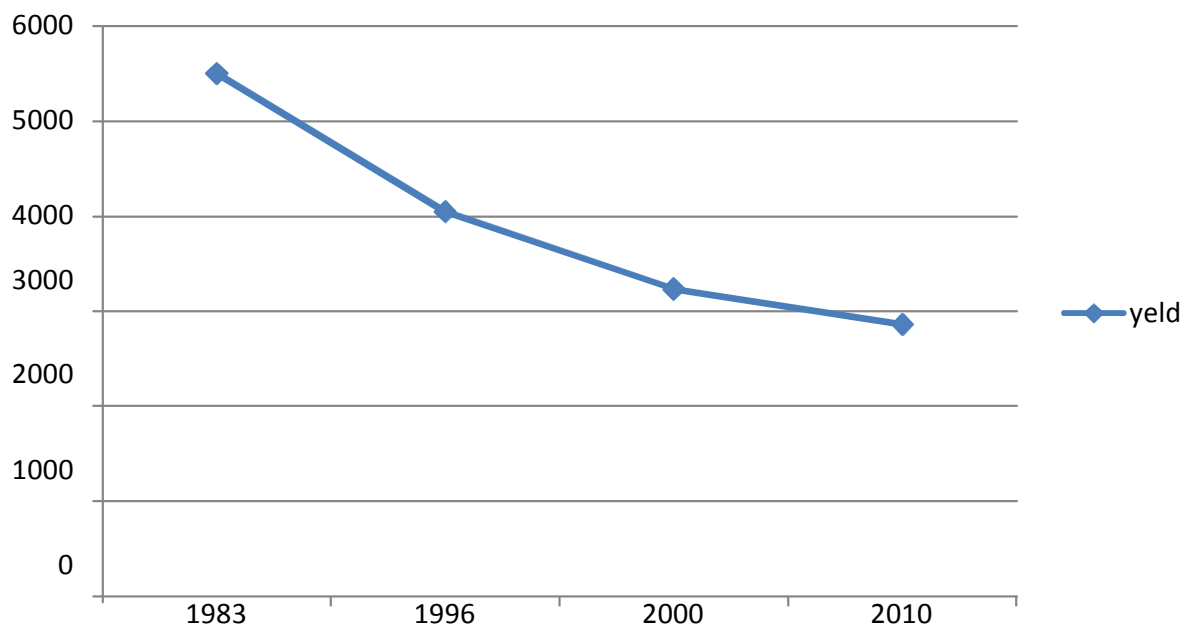
*\*Source: Trade promotion organization of Iran*

Despite the significance of walnut in the economy of Iran, walnut production has been subject to instability due to fluctuating weather, changing government policies, rising cost of production (particularly because of high prices of fertilizers, insecticides and pesticides) and year to year variability in output prices.



**Fig. 1. The trend of production**

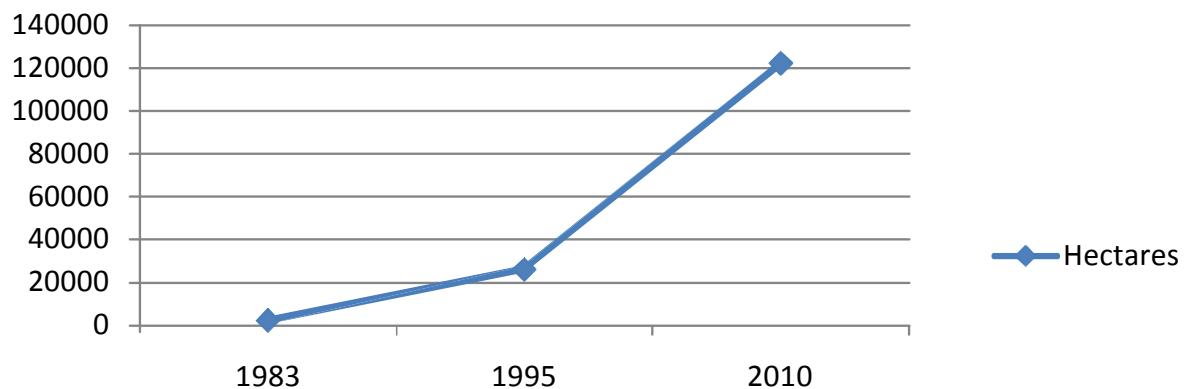
*\*Source: Ministry of agriculture of Iran*



**Fig. 2. The trend of yield per hectare**

*\*Source: Ministry of agriculture of Iran*

This has adversely affected the profitability of walnut growers as well as the welfare of Gardening sector. It has been generally believed that Iran has an overwhelming competitive advantage in the production of walnut, even without additional technological change but it does not specialize as much as would have been profitable.



**Fig. 3. The trend of harvested area in Iran**

*\*Source: Ministry of agriculture of Iran*

However, trade liberalization under WTO regime, increasing competition and relative competitiveness of different countries poses a challenge to the competitiveness to the Iran walnut. One of the most important questions that arise is, should we specialize in walnut production or should we diversify our cropping system and produce several crops so that total gains from the production of many crops are maximized. It necessitates that the allocation of limited resources to different crops should be guided by some economic performance criteria of which the international competitiveness stand out to be the most critical [7]. It brings in the principle of comparative advantage to use it as a guiding factor in the allocation of scarce resources. So comparative advantage and policy analysis are of crucial importance for planners, policymakers, administrators, price fixing authorities and others concerned with the farming sector, to know whether or not current set of policies are consistent with the comparative advantage [8,9,10].

In economics, the law of comparative advantage refers to the ability of a party (an individual, a firm, or a country) to produce a particular good or service at a lower opportunity cost than another party. It is the ability to produce a product with the

highest relative efficiency given all the other products that could be produced. It can be contrasted with absolute advantage which refers to the ability of a party to produce a particular good at a lower absolute cost than another. Comparative advantage explains how trade can create value for both parties even when one can produce all goods with fewer resources than the other. The net benefits of such an outcome are called gains from trade [11]. It is the main concept of the pure theory of international trade (Pearson et al.) [12,13]. Here, after Bruno [14]. Leontief. [15] Heley [16]. Tweeten [17]. Hook [18]. Memedovic [19]. Winter [20]. Fang et al. [21]. Shahabuddin and Dorosh [22]. Huang [23]. Lagos and Mardones [24]. Khan et al. [25]. investigated the comparative advantage of agricultural and industrial products in different countries; Haji Rahimi [7]. Hadrady [26]. Dehghani [27]. Mahanta [28]. Karbassi et al. [29]. Azizi and Yazdani [30]. Mehdipour and Nejad [31]. Shahnvshy et al. [32]. Daneshvar et al. [33]. Zhu X., Demeter R. and Oude Lansink A. [12]. and Ahmed. [13]. Quddus [34]. Reviewed the policy and comparative advantage.

The objective of this study is to develop a basic, yet systematic framework for assessing country comparative advantages in competing walnut production activities, discuss how this framework can help entrepreneurial and policy decision-making in walnut development, and illustrate the practical application of the framework. The study was conducted to determine international competitiveness of Iran walnut and to assess that how far the current sets of policies are consistent with existing pattern of comparative advantage.

**Table 2. Policy analysis matrix**

Value of input		Value of input		profit
		Tradable	Domestic cost	
Private profit	A	B	c	N
Social profit	D	E	F	O
Output transfer	G	H	I	P
Private profit	$N = A - (B+C)$	Input transfer	$H = B - E$	
Social profit	$O = D - (E+F)$	Factor transfer	$I = C - F$	
Output transfer	$G = A - D$	Net policy transfer	$P = N - O$	

*Developed by Monke and Pearson [35,41]*

## 2. MATERIALS AND METHODS

The PAM is a computational framework, developed by Monke and Pearson (1989) and augmented by Masters and Winter-Nelson (1995), for measuring input use

efficiency in production, comparative advantage among commodities, and the degree of government intervention. The basis of the PAM is a set of profit and loss identities that are familiar to any businessman (Nelson and Panggabean, 1991). The basic format of the PAM is a matrix of two-way accounting identities (Table 2) [13,35].

The data in the first row provide a measure of private profitability (N), defined as the difference between observed revenue (A) and costs (B+C). Private profitability demonstrates the competitiveness of the agricultural system, given current technology, prices for input and outputs, and policy. The second row of the matrix calculates the social profit that reflects social opportunity costs. Social profits measure efficiency and provide a measure of comparative advantage. In addition, comparison of private and social profits provides a measure of efficiency. A positive social profit indicates that the country uses scarce resources efficiently and has a static comparative advantage in the production of that commodity at the margin. Similarly, negative social profits suggest that the sector is wasting resources that could have been utilized more efficiently in some other sector. In other words, the cost of domestic production exceeds the cost of imports, which indicates the sector cannot survive without government support at the margin. The third row of the matrix estimates the difference between the first and the second rows. The difference between private and social values of revenues, costs, and profits can be explained by policy intervention [36].

The PAM framework can be used to calculate important indicators for policy analysis [35]. The nominal protection coefficient (NPC), a simple indicator of the incentives or disincentives in place, is defined as the ratio of domestic price to a comparable world (social) price. The other two indicators that can be calculated from the PAM include the effective protection coefficient (EPC) and domestic resource cost (DRC) [2,15,23].

Domestic resource cost, the most useful indicator of the three, is used to compare the relative efficiency or comparative advantage between agricultural commodities, and is defined as the shadow value of non-tradable factor input used in an activity per unit of tradable value added ( $F / (D-E)$ ) [37]. The DRC indicates whether the use of domestic factors is socially profitable ( $DRC < 1$ ) or not ( $DRC > 1$ ) [31,38,39].

The study covers the analysis of three major producing regions i.e. Hamadan, Fars and Semnan provinces of Iran, for the period of five years from 2008-2012. The provinces were selected on the basis of their contribution to total walnut production.



The Hamadan, Fars and Semnan accounts for 56 percent in production. In our study, production cost estimates were based on data obtained from Ministry of Agricultural. The data were also supplemented by domestic and international prices of inputs and outputs to get representative budgets for walnut crop. The data collected were analyzed by using the Domestic Resource Cost analysis (DRC), through the Policy Analysis Matrix (PAM) approach given in Table 1. Empirically, the policy analysis matrix (PAM) is a convenient tool for the DRC analysis [32,40].

The approach was used to determine international competitiveness of Iran Walnut and the effect of current set of policies on the existing pattern of comparative advantage of Iran Walnut.

### 3. RESULTS AND DISCUSSION

In this study, financial processes, including costs and revenues is reviewed from walnut producer in the province of Hamadan, Fars and Semnan. Costs include rent, labor, land, equipment, water, machinery, fertilizer and etc. Income includes income from product sales a year. Clearly after the shadow price of production and raw materials, possible indicators of comparative advantage comes from providing walnut production. Tables 3 show the results of policy analysis matrix. DRC in Table 3 is less than one. This means that there is comparative advantage in walnut production.

**Table 3. Domestic resource cost (DRC) coefficients of walnut**

Year	Hamadan	Fars	Semnan
2007 - 2008	0.28	0.34	0.39
2008 - 2009	0.29	0.36	0.40
2009 - 2010	0.31	0.38	0.42
2010 - 2011	0.35	0.38	0.45
2011 - 2012	0.37	0.39	0.47
Average	0.32	0.37	0.43

*Source: Author's computation*

Historically Hamadan has been the leading province in walnut production due to its natural and geographic location.

### 4. CONCLUSION

This study is an application of policy analysis matrix (PAM) to measures the international competitiveness of walnut in Iran, and determines whether or not the

existing policies are consistent with the existing pattern of production and export. Overall results of the study depict that Iran under WTO regime has comparative advantage in producing walnut as export crop. However, agricultural policies are not consistent with the existing comparative advantage [41]. The findings of the paper suggest exploiting available potential in the cultivation of walnut to cater the local needs as well as for the earning of foreign exchange.

Concerted efforts are needed to improve performance of walnut production and processing sectors. In the face of emerging WTO challenges macroeconomic policies need to be conducive, for which following are suggested.

As one percent of walnut production in Iran is exported at the present time, and this amount does not match to the walnut production in Iran. It is necessary to stabilize the prices in order to increase the export of this product [10,42]. Moreover, the government should subsidize the required things for the walnut production such as chemical fertilizers and pesticides to increase the walnut export [2]. At par with reform of factor markets, the efficiency of input delivery system should also be improved. Black marketing, under invoicing and sale of substandard fertilizers and pesticides should be eradicated through strict punitive actions, open market sales and breaking the grading and standardization of the products to bring them at par with international standards must be ensured [32]. Iran should invest heavily in packaging, grading and procurement and delivery system technologies for an effective entry to export market. Along with other factors the total productivity of the crop depends on the quality of walnut. Therefore, production and provision of quality seed must be ensured indirect tax regime should be revisited in order to reduce cost of production. Reduction in indirect tax will help reduce cost of production. However the benefits of trade reforms accruing to Iran are heavily dependent on the response of developed countries to reform measures especially in terms of opening up of their markets.

### **COMPETING INTERESTS**

Author has declared that no competing interests exist.

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## ***Determinants of Agricultural Export Trade: Case of Fresh Pineapple Exports from Ghana***

### **ABSTRACT**

**Aims:** This study is purposed on informing future trade policy decisions on how the fresh pineapple export industry of Ghana can be revitalized following declines in both volumes and value of exports since the year 2004. To achieve this, effort is made to identify and assess the magnitude and effects of key determinants of fresh pineapple exports from Ghana for the period 1984-2009.

**Study Design:** The study involves separate consideration of value and volume of exports as explained variables, and sourcing of ways by which beneficial implications noted could be maximized for both variables, while minimizing adverse ones in the process.

**Place and Duration of Study:** This study solely involves the use of secondary data and own-computations on volume and value of pineapple exports, production, domestic demand, export price faced by exporters, terms of trade index of exports, real effective exchange rate, comparative export performance index and net inflow of foreign direct investment.

**Methodology:** Separate regression with value and volumes of exports as explained variables were estimated with the Ordinary Least Squares estimator, and tested for appropriate standard Gaussian assumptions, appropriateness of specification and stability of coefficients.

**Results:** The results show that Ghana's fresh pineapple export industry has competitive advantage and is more price-driven than volume driven. Both volume and value of exports have positive association with production, openness to trade, and the index of competitiveness. Both however have an inverse association with



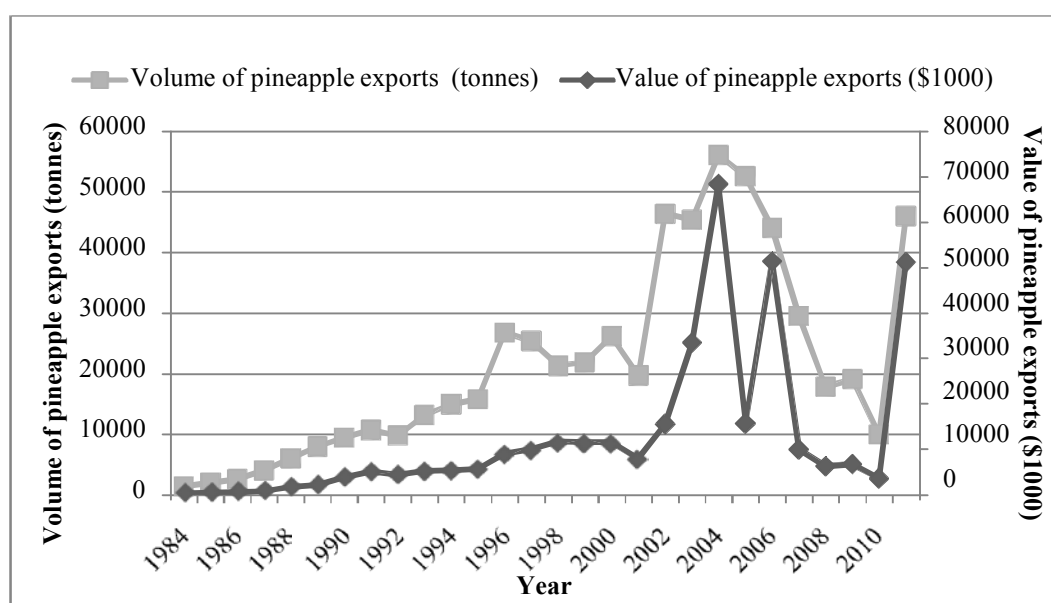
domestic demand and net inflow of foreign direct investment. In as much as the value of exports increases with export price faced by exporters, the response for volumes exported is not significant. The effect of lagged volume of exports on both explained variables is as well not significant. Conclusion: Reviving the fresh pineapple export industry requires increasing production (to be achieved through creation of favorable production conditions), improvement in quality of produce exported, improvement in the country's openness to trade, and minimization or avoidance of domestic market capturing and tariff jumping types of foreign direct investments.

**Keywords:** Competitive advantage; determinants; export growth; Ghana; pineapples.

## 1. INTRODUCTION

The extreme reliance of Ghana's agriculture sector and the economy on the cocoa subsector cost the country a period of great depression during the mid-1960s to mid-1970s following the collapse of world cocoa prices (and other marketing and fiscal inefficiencies in the domestic environment). In effort to revive the agriculture sector and promote economic development, the then government introduced various initiatives to help shield the country from future shocks on the international market due to the highly volatile and fragile nature of agricultural trade. Among the numerous initiatives introduced was the agricultural diversification project (1991-1999), with a primary aim of promoting production and export expansion of non-cocoa tree and horticultural crops. This initiative did contribute effectively to improving export performance of the agriculture sector as a whole, although subsector performances did differ. Among the subsectors that responded positively to the initiative and has for over two decades now been perceived to have steered growth of the horticulture industry is the pineapple subsector. From virtual non-existence in the early 1980s, pineapple exports from the country increased to approximately 56,000 tonnes (by FAO estimate) yielding a value of \$68,340 (000) by the year 2004. Following shifts in market demand and other relevant economic and policy indicators, as well as the country's slow adaptation to changes on the market however, the fresh pineapple export industry has experienced a steep decline in volume and value of exports since the year 2005.

Export of pineapples as shown in Fig. 1 declined in terms of volume (based on FAQ data) from 56,094 tonnes in 2004 to 9,971 tonnes in 2010, increasing thereafter to 45,999 tonnes in 2011. These figures correspond to values of 68,343 (\$1000), 3,531 (\$1000) and 51,144 (\$1000) respectively. With the country's slow adaptation to developments on the international market by virtue of persisting local policy, structural and biophysical constraints, Ghana's share in European pineapple imports is quoted to have fallen by 18 percent between 2003 and 2007 [1]. In effort to revitalize the pineapple subsector (and other non-traditional crops) in terms of export, the government has since the year 2010 introduced concessions on income-tax to exports, thereby taxing exporters of pineapples at the company tax rate of 8 percent instead of the standard 35 percent regardless of export performance [2]. In another scheme, exporters are provided direct export incentives through company income tax rebates according to export performance. Effective revitalization of the pineapple subsector in spite of all these efforts and incentives, may require improvement in quality of exports (in terms of MD2 and the other three existing varieties namely Smooth cayenne, Sugar loaf and Queen Victoria), as well as increases in volume and value of exports. Achieving these however requires identification of existing associations between value and volume of pineapple exports and key determinants of export trade, capturing the effect of quality through a competitiveness index (Primarily the CEP).



**Fig. 1. Developments in pineapple exports from Ghana**

*Data Source: Agricultural Trade Database of FAO (FAOSTAT)*

By this, the present study is purposed on informing future trade policy prescriptions on how the pineapple exports dimension of the subsector can be revitalized through identification and assessment of the magnitude and effects of key determinants of fresh pineapple exports from Ghana for the period 1984 to 2009.

## 2. LITERATURE REVIEW

Historically, the share of trade in gross domestic product (GDP) of many nations has been an important ingredient for growth and development. In developing countries however, the export of primary commodities and import of finished products may define the basic structure of the economy. In an attempt to explain or predict the type of goods and services exported and imported by nations, their market destinations, and the underlying economic and political conditions, several theories have been formulated.

According to the scholarly review by [3], notable theories justifying free trade include classical tenets of absolute advantage and comparative advantage espoused by Smith and Ricardo respectively, and neo-classical models such as the Heckscher-Ohlin and New Trade Theory (NTT). Although free trade policies have been heavily criticized in literature, they are still utilized to advance trade liberalization especially in developing countries [4]. Thus, it is within the ambit of the free trade paradigm that trade liberalization policies were instituted in many developing countries as an alternative to the import-substitution economies in the 1980s.

Ghana represents an interesting model country that could offer empirical evidence for the corollaries of trade liberalization regime. The striking decline in economic growth recorded in post mid-1960s led to the implementation of trade policy reforms to salvage the economy from collapse. Specifically, Ghana implemented the Structural Adjustment Programme (SAP) in 1983 geared towards repositioning the economy on the path of desired economic growth. As noted by [5], Ghana's trade reform in 1983 and its later fortification in 2005 resulted in diversification and growth of the agricultural sector. The main objective of the current economic policy reforms of Ghana is to promote export-led growth through agriculture and to enhance international competitiveness.

In many sub-Sahara African countries, exports of non-traditional commodities including fruits and vegetables have increased [6] with Europe serving as the primary export destination for most horticultural exports. The situation is not different in

Ghana as adoption of the SAP and other economic policy reforms stimulated export-growth of fruits and vegetables as new addition to traditional export crops like cocoa. Following the wave of trade reforms especially in developing countries, many empirical scholarships have emerged. We generally review some of such studies, and place emphasis on areas that are particularly pivotal to our paper. Various authors have studied the determinants of cross-country agricultural commodity exports and recommended plausible variables accordingly. We take a look at some of these variables to inform our empirical study.

Deemed a key supply side determinant of export growth, output (production) of primary agricultural commodities has been noted to yield beneficial implications for exports in several studies. In as much as increments in production is deemed bad for trade in a closed economy due to the downward pressure such increments induce on prices, in open economies however, increased production offers a great opportunity for export expansion through surpluses. For example, in assessing the competitiveness and determinants of cocoa exports from Nigeria, [7] discovered a strong positive impact of increments in cocoa production on volumes exported. Similarly, [8] discovered a significant positive association between output of cocoa and volume of exports from Ghana. In assessing the determinants of agricultural exports through OLS estimation of export supply regressions with primary emphasis on cocoa and rubber from Nigeria, [9] discovered a significant positive effect of production on exports of both cocoa and rubber from Nigeria. In a similar study for India but on tomato exports, [10] discovered a significant negative association between production and export growth for tomato in India. Being against their initial expectation however, the authors attributed this discovery to a possible coincidence between domestic and international production of the commodity.

In contrast to the general positive association expected and mostly observed between production and exports however, a general 'pulling (negative) association has been noted in literature between domestic demand and export growth. In as much as domestic production creates surplus by which foreign exchange is earned through exports, higher level of domestic demand as proposed by [11] reduces the resources devoted to exports. This consequently reduces the volume exported, and possibly value in case of minor exporting nations (as minor exporters are mostly price takers). In their analysis on the determinants of cocoa and rubber exports from Nigeria, [9] discovered a significant negative association between domestic consum-

ption and export growth for both cocoa and rubber. Similarly, in assessing the competitiveness and determinants of cocoa exports, [8] found a significant negative association between domestic consumption and cocoa export growth for Ghana.

Generally, a fair share of the studies investigating the determinants of agricultural export performance shows that in many least developed countries (LDCs), commodity price variables are very important drivers of exports. As proposed by [12], prices generally serve as a conduit through which relevant economic policies affect agricultural variables such as production, supply, exports and income. In affirming the importance of commodity prices for export growth, [13] noted a strong impact of foreign prices on export performance for South Africa's manufacturing sector. Although observing a negative effect of foreign price on export growth for Uganda in the long-run (which was deemed a mixed signal), [14] discovered a significant positive association between the second and third lags of foreign price and export growth for the country in the short-run. The short-run association observed conforms to proposition by [15]. Similarly, in accessing cloves export response to trade liberalization in Tanzania, [16] discovered a significant positive association between foreign price and export growth in both the short and long-run. In contrast to these significant associations however, [7] found no significant effect of export price on volume of cocoa exports from Nigeria. Similarly, [9] found no significant effect of world price on volumes of cocoa and rubber exports from Nigeria.

Although several drivers of export have been proposed in literature, one amongst the lot that has from the early 1990s till date received much attention in export supply response studies is the terms of trade index of exports. Openness to trade as suggested by [17] presents countries not only with market and trade opportunities, but also introduces exporters to competition from other competing countries, thereby promoting efficiency in the process. Efficiency as noted in production, trade and development economics is a stimulator of competitiveness and hence export performance and growth. In a study to assess the effect of agricultural and financial sector reforms on export growth of cotton lint from Pakistan, [18] found that export of cotton lint from the country is stimulated by increasing world demand for the commodity, export competitiveness of the country, and by increase in trade openness. In affirming the positive association between openness to trade and exports, [17] discovered a significant positive effect of terms of trade index on exports from Cameroon for the period 1970-2008. In a study on 'Rethinking policy options for

export earnings, [19] discovered that deterioration in terms of trade index is associated with contraction of export earnings. Similarly, [14] found a significant positive association between the index of trade openness and export growth for Uganda in both the short- and long-run. This discovery by [14] affirms earlier results from [20] of a positive effect of terms of trade on exports from Uganda. In addition to the terms of trade index, [20] also found a significant positive association between lagged export growth and current export growth.

From the extant literature, quite interesting views have been expressed on the impact of exchange rate on agricultural exports. In as much as some analysts estimate the effect of changes in nominal exchange rate on exports, others with policy interest mostly use the real exchange rate due to the latter's ability to adjust for purchasing power differences in currency of trading partners. In contrast to the nominal exchange rate where increments in the rate reflect currency depreciation, increments in real exchange rate reflect currency appreciation, the two consequently yielding contrasting implications for exports. In as much as currency depreciation according to economic and trade theory makes exports cheaper and demand generally higher, currency appreciation usually dampen export-growth. In a study to assess the determinants of export growth rate in Uganda for the period 1987-2006 however, [14] found a mixed signal (positive effect) for the association between real exchange rate and export growth in the long-run. The short-run association was however not significant. The latter observation conforms to proposition by [20] that real exchange rate has insignificant effect on export growth rate. In contrast to the insignificant association and mixed signal discovered by [14,20] however, [21] noted a significant negative association between real exchange rate and export growth for India. Upon this outcome, he appropriately inferred that a fall in domestic prices due to exchange rate depreciation makes exports cheaper in the global market, and this consequent stimulates demand. In affirming the discovery by [21,22,23] found a positive association between depreciation in real exchange rate and export growth. On the nominal side of this rate, [24] found a significant positive association between nominal exchange rate and exports of rubber from Nigeria. Although a priori expecting a positive association between the nominal exchange rate of Nigeria and cocoa exports from the country, [7] rather observed a significant negative association between these two indicators. This unexpected outcome was attributed to declining

productivity of the Nigerian economy and a corresponding weak currency of the country.

Under favorable domestic production and marketing conditions, foreign direct investment (FDI) stands fueling export growth in less developed economies. This claim is made on grounds that, such investment have the potential to advance technological process, and improve efficiency and quality of exports. Besides creting favorable trading relationship between the recipient (host) country and its investing partners, foreign direct investments do strengthen capital formation, innovation capacity and organizational and managerial practices. In spite of these general beneficial implications of FDI noted worldwide, quite controversial implications of FDI on exports have been found in economic, business and trade literature. Although some researchers including [25] affirm a significant negative relationship between FDI and export growth, [21,26] found no significant effect of FDI on export growth. Others, including [27,28] found a significant positive association between FDI and export performance. In countries where domestic demand for some agricultural commodities is generally high, most of the investments (FDI) made in such commodities purpose on capturing domestic markets instead of stimulating export growth, while others capture not only domestic markets, but also use that as a means to jump tariffs. Whenever investments are made with a domestic market capturing or tariff jumping motive, they usual yield detrimental implications for export growth [26]. Investments however with export promotion motive usually yield beneficial implications for exports.

### **3. PINEAPPLE SUPPLY AND EXPORT CHAIN FOR GHANA**

Ghana produces four main varieties of pineapples, namely the Smooth cayenne (SC), MD2, Sugar loaf and Queen Victoria. Production and exports are however dominated by the Smooth cayenne and MD2 varieties. Exports of the Smooth cayenne variety of fresh pineapples to Europe commenced in 1984, marking the beginning of pineapple exports from Ghana based on available data from FAO. In the development phase of pineapple exports, small-holders accounted for at least 50% of volumes of pineapple exported from the shores of Ghana [29]. Following a decrease in profitability of fresh pineapples production due to unexpected shifts in demand by foreign consumers toward the MD2 variety and the inability of most small-holders to quickly adapt to the situation, the number of small-holder pineapple producers has



decreased from 1600 to less than 200 engaged in commercial production. As of the year 2004, the country had a total number of 50 exporters. This number has decreased to 14 recently, with about eight of the exporting firms being responsible for 93% of fresh pineapple exports from Ghana [29]. The number of processing firms engaged in juice production is reported by [29] to have increased following the growth of the sector between the years 1999 and 2004. Most of the processing factories however have for over five years now been out of operation due to lack of pineapples for processing. This is due to drifting of majority of the producers from the pineapple sub-sector based on the transition challenge from smooth cayenne and the other varieties to MD2 and the resulting decrease in profitability. In spite of this however, firms and producers that were able to convert production from the smooth cayenne variety to MD2 pineapples are reported to have had heterogeneous impact on export volumes, with most of them witnessing major increases in their export shares [29]. By this, growth of the pineapple sub-sector is believed to be inhibited by production and productivity challenges, slow adaptation to market shifts and inability of majority of the producers to transit to new varieties of the pineapple fruit to help meet demands in primary and secondary destinations. With a total of 14 export destinations as of the year 2007, the number of destination countries for pineapple exports from Ghana decreased to 8 by the year 2010, primarily due to import diversion toward MD2 varieties by such countries (see Table 1).

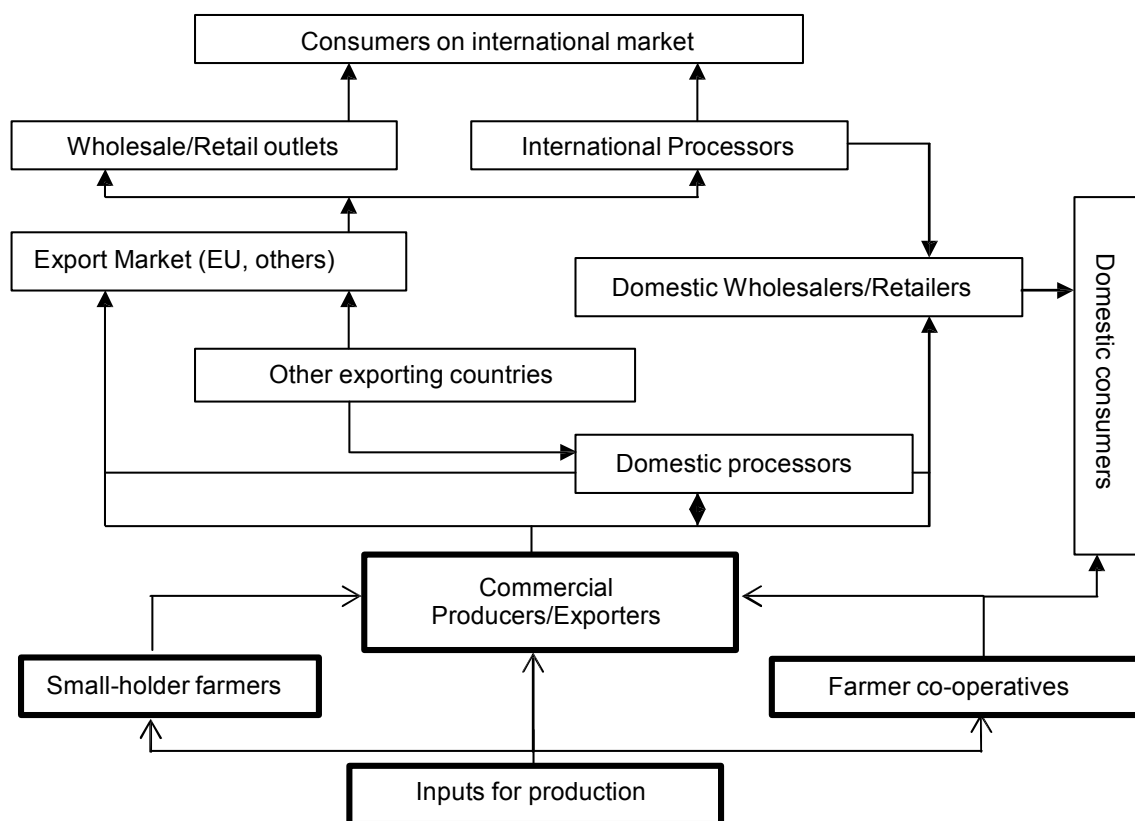
**Table 1. Destinations for pineapple exports from Ghana**

Share in pineapple exports	2007	2009	2010
Between 0% and 1%	United States of America, South Africa, Egypt, Libya, Spain, Netherlands, Vietnam	South Africa, United Arab Emirates, Libya, Egypt, Spain, Germany, Denmark, United Kingdom	Spain, Netherlands
Between 1% and 10%	Italy, Switzerland, Germany, United Kingdom, United Arab Emirates	Morocco, Italy	United Kingdom, Morocco
Between 10% and 25%		France	Italy, France
Between 25% and 100%	France, Belgium	Switzerland, Belgium	Switzerland, Belgium

*Source: Detailed world Agricultural Trade Flows (FAOSTAT) [31]*

Ghana has a relatively less complex pineapple supply and export chain (see Fig. 2) compared to chains for commodities like cocoa and coffee observed in Ghana and in countries like Ethiopia [see chains in 8,30]. Like many other commodities

(although usually ignored in various supply chains), the pineapple supply chain commences from the factor market side with sourcing of relevant inputs, especially high quality crowns, fertilizer and fumigants. Achieving higher yields requires the undertaking of important cultural practices like weeding, spraying, fertilization among others. Three groups of people have been identified so far to engage in pineapple production; the small-holder as an individual, co-operatives (organization owned and run jointly by a group of small-holders), and large scale producers (nucleus farmers/exporters). In as much as some of the small-holders sell directly to wholesalers on the domestic market by themselves, or through co-operatives (in case of contract), majority of the farmers sell their produce to the larger producers/exporters. Similarly co-operatives have the option of selling directly to wholesalers/retailers and to consumers, or selling their produce to exporters (due to limited capacity for most cooperatives to engage directly in export).



**Fig. 2. Pineapple supply and export chain for Ghana**

*Source: Authors construct*

After sorting and grading, exporters mostly export grades with medium to highest quality, and either sell the relatively lower grades to domestic processors or directly to wholesalers/retailers and to consumers. In times of shortage of the

produce on the market, both domestic processors and exporters source pineapples from other exporting countries to keep them in operations. As shown in Table 2, pineapples exported from the country are either in the fresh form or canned. Over the period 1997 to 2011 however, there have been very low value added in pineapple exports from the country, as most of the produce exported are in the fresh form. The European Union continues to be the major destination for exports of pineapples from Ghana and from other major exporting countries worldwide (see Appendix 2) with Belgium, Switzerland, France and Italy being the primary export destinations for Ghana. Return of any pineapple exported from the shores of Ghana unto the local market is mostly in a processed form (from foreign processing companies). Pineapples are transported unto foreign markets (destinations) either by sea (mostly for MD2 variety) or by air (mostly for Smooth Cayenne variety).

**Table 2. Composition of pineapple exports from Ghana**

Year	Fresh pineapple exports (\$1000)	Canned pineapple exports (\$1000)	Total pineapple exports (\$1000)	Value added (%)
1997	9,998	0	9,998	0
1998	11,676	0	11,676	0
1999	11,593	0	11,593	0
2000	11,514	5,926	17,440	33.98
2001	7,933	5,655	13,588	41.62
2002	15,520	5,500	21,020	26.17
2003	33,403	3	33,406	0.01
2004	68,343	253	68,596	0.37
2005	15,664	109	15,753	0.69
2006	51,367	29	51,396	0.06
2007	9,950	282	10,232	2.76
2008	6,260	94	6,354	1.48
2009	6,692	190	6,882	2.76
2010	3,531	18	3,549	0.51
2011	51,144	18	51,162	0.04

*Source: Authors computation with data from FAOSTAT (Agricultural Trade Database) [31]*

#### 4. METHODOLOGY

In estimating export supply functions, several approaches ranging from co-integration techniques (notably the Engle-Granger approach and Johansen Full Information Maximum Likelihood test) and bound test to OLS estimation of static models have been applied in literature. In as much as the co-integration techniques and bound test are generally useful, they only yield efficient estimates for extended series (at least 30 years), factoring in long- and short-run effects. Usually, it becomes impossible (due to problems with lag order selection) to apply the Johansen

technique (deemed the most efficient co-integration approach) for analyzing data series with less than 28 observations. Bearing in mind the scope (1984-2009, because pineapple exports from Ghana commenced in 1984 and data on domestic consumption was up to 2009, as of the time data was collected and analyzed) of our study, we employ the OLS estimation technique to assess the magnitude and effects of key determinants of exports based on the literature reviewed. To avoid discussing output of regressions hauling nonsense correlation between unrelated random walks however, residual series for the regressions specified in the subsequent sections are tested for stationarity and for appropriate standard Gaussian assumptions. The coefficients are as well tested for reliability through the CUSUM and CUSUM of squares tests, and the respective equations tested for misspecification through a RAMSEY Reset test. In this study, two primary equations are estimated; one with value of exports as the explained variable, and the other with volume of exports as the explained variable. Use of two different explained variables is to help identify how the effects of the respective explanatory variables on one explained variable (volume of exports) translate into the other (value of exports).

#### 4.1 Sources of Data

All the data (secondary) used in this study were gathered from the agricultural production, supply and trade database of FAO (FAOSTAT [31]) and the United Nations Conference on Trade and Development Statistics (UNCTADSTAT [32]). Data gathered from the UNCTADSTAT include real effective exchange rate, terms-of-trade index of exports (as against that for goods and services) and foreign direct investment (Net inflows). All other series except export price faced by Ghana for pineapples and comparative export performance index of exports (CEP) are gathered from FAOSTAT [31]. Based on differences in quality of products exported by countries, as well as spatial differences in policy environment (including barriers to trade—tariffs among others), countries face respective export prices that are usually different from the average world price for a given commodity. Along this line, we make use of the export price faced by Ghana for export of pineapples and not the price quoted on the world market as is usually seen in other studies. The export price is calculated based on value and volume of exports as follows:

$$\text{Export price} = [(\text{Value of export}) / (\text{Volume of export})] \times 1000 \quad (1)$$

The outcome is in \$/tonne. Multiplication of the fraction by 1000 is due to the fact that value of exports gathered from the FAOSTAT is in \$1000, while volume of exports is in tonnes.

#### 4.2 Model Specification

Based on the empirical literature reviewed and objective of this study, our model is specified econometrically as follows holding the following a priori expectations (for both value and volume of exports):

$$\begin{aligned} \text{Ln (EXPTVal)} = & C + \text{Ln (Prod)} + \text{Ln (Domcons)} + \text{Ln (EXPTprice)} + \\ & + \text{Ln (TOT)} + \text{Ln (REXR)} + \text{Ln (CEP)} + \text{FDI} + \text{Ln (EXPTVol (-1))} \end{aligned} \quad (2)$$

$$\begin{aligned} \text{Ln (EXPTVol)} = & C + \text{Ln (Prod)} + \text{Ln (Domcons)} + \text{Ln (EXPTprice)} + \\ & + \text{Ln (TOT)} + \text{Ln (REXR)} + \text{Ln (CEP)} + \text{FDI} + \text{Ln (EXPTVol (-1))} \end{aligned} \quad (3)$$

Where a priori,  $\{C, \text{Ln (EXPTVol (-1))}, \text{FDI}\} < 0$ ;  $\{\text{Ln (Prod)}, \text{Ln (EXPTprice)}, \text{Ln (TOT)}, \text{Ln (CEP)}\} > 0$ ;  $\{\text{Ln (REXR)}, \text{Ln (Domcons)}\} < 0$

Ln (EXPVal): Log of value of pineapple exports;

Ln (EXPVol): Log of volume of pineapple exports;

Ln (Prod): Log of domestic production of pineapple;

Ln (Domcons): Log of domestic consumption (demand) of pineapple;

Ln (EXPTprice): Log of export price of pineapple;

Ln (TOT): Log of Terms-of-Trade Index of exports (measure of trade openness);

Ln (REXR): Log of Real Effective Exchange Rate;

Ln (CEP): Log of Comparative Export Performance Index (to help capture;

Competitiveness: Improvement in quality and share of exports);

FDI: Net inflow of Foreign Direct Investment<sup>1</sup>;

<sup>1</sup> Use of FDI in level instead of logging it is to make the specification externally valid and pave room for future replication by other researchers. In as much as the values obtained for the period under study are positive, some values for years before the scope of the study (1984-2009) are negative. This could preclude logging for extended period. In addition, data for some countries from the developing world shows negative net inflows in a significant number of years, and using log of FDI may require modification of our specification in situations where researchers want to apply the exact equation in their study.

C: Intercept.

Employed in this study, the log of comparative export performance index is defined as follows:

$$\ln(CEP) = \ln \frac{\frac{X_{iB}}{X_B}}{\frac{X_{iA}}{X_A}} \quad (4)$$

Where

$X_{iB}$  - value of pineapple exports from Ghana;

$X_B$  - total value of agricultural exports from Ghana;

$X_{iA}$  - value of world exports of pineapple;

$X_A$  - total value of world agricultural exports.

Equations 2 and 3 are estimated with the OLS estimator and tested for appropriate standard Gaussian assumptions, appropriateness of specification (through a reset test) and stability of coefficients (through the CUSUM and CUSUM of Squares test). The Analysis involves use of data for the period 1984-2009.

## 5. RESULTS AND DISCUSSION

In testing for the appropriate standard Gaussian assumptions, the residuals from estimation of both equations 2 and 3 were found to be normally distributed, non-serially correlated and homoscedastic. This inference is based on observed Jarque-Bera values, Breusch-Godfrey Serial Correlation LM values (for the F-statistic) and Q-statistic, and F-statistic from the Breush-Pagan-Godfrey Heteroskedasticity Test. Appropriateness of the specification and stability of coefficients are affirmed by the F-statistic value from a Ramsey Reset Test and the CUSUM and CUSUM of squares test (see Fig. 3). As a check on spuriousness of our results, the residual series for each specification was tested for stationarity through the Augmented Dickey-Fuller unit root test, the outcome of which confirmed stationary (absence of unit root) nature of the residuals. In checking for issues with endogeneity as often claimed by some researchers when OLS is used in estimating a regression, a two-stage least squares estimation of the regression equations was performed (although results not presented here) and the output was consistent and perfectly in line with that of the OLS;

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hence we stick to the use of the OLS output for discussion (output for the control estimation technique is deemed primarily less informative).

In interpreting the results, value of pineapple exports is noted to have a positive association with production, export price, terms of trade (trade openness) and index of competitiveness (increased share and quality of exports). Value of pineapple exports however has an inverse association with domestic consumption (demand) and net inflow of foreign direct investment. No significant association is found with respect to real effective exchange rate and lagged volume of exports. The intercept (C) term was also found highly significant and negative, implying that should conditions in all the other variables remain constant, the value of pineapple exports from Ghana would decrease significantly with time. This reflects a highly competitive nature of the world pineapple export industry and a relatively low power of Ghana in terms of share on the world market. As shown in Appendix 1, value of Ghana's pineapple exports represents only 1.067% of world export shares (and 0.788% in terms of volume), compared to 40.625% (54.269%-volume) for Costa Rica, 14.123% (8.088%-volume) for Belgium, 11.429% (6.556%-volume) for Netherlands, 6.197% (3.232%-volume) for the United States of America and 3.543% (7.881%-volume) for the Philippines. A total of 98.77% of variations in export value are explained by the associations identified in this study. This statement is reflected by the adjusted R-squared value observed.

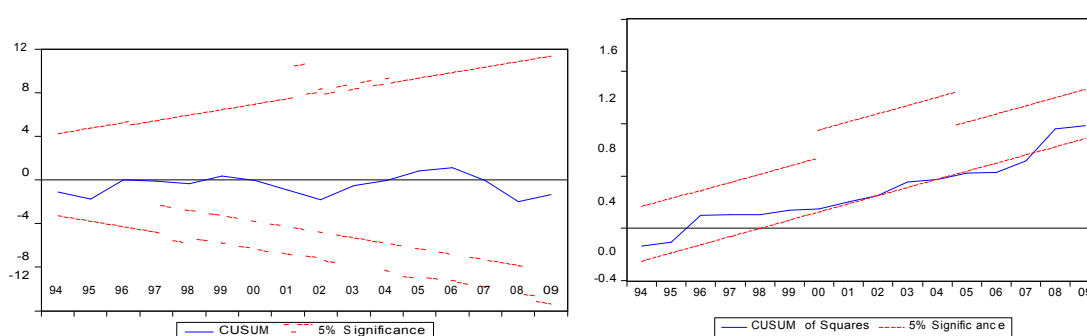
With the exception of the intercept term and export price which were found to have insignificant effects on volume of pineapple exports, similar associations were observed between volumes of export and all the other variables. Lagged volume of export is observed to have insignificant positive effect on both value and volume of exports. This once again affirms the lower share of Ghana's pineapple exports on the world market and potentially, a relatively positive image of previous exports from Ghana. In as much as exports of larger exporting nations could induce an adding-up effect, thereby causing a decrease in price of future exports and possible decrease in exports (both volume and value), the effect observed in case of Ghana is not statistically significant. A total of 97.52% of variations in volume of pineapple exports are explained by the associations observed in this study. By this, with the exception of the insignificant effect of real effective exchange rate and export price observed for output of equation 3, all associations observed are in conformity with our a priori

expectation. Associations observed in this study apply only to pineapple exports and may not necessarily reflect effects on agricultural exports in the broader sense.

**Table 3. Regression results**

Dependent variable →	Ln (EXPTVal)		Ln (EXPVol)	
Variables	Coefficient	Std. error	Coefficient	Std. error
C	-8.529286***	2.239984	-1.621530	2.239984
LnProd	0.980094***	0.227825	0.980094***	0.227825
LnDomcons	-0.310502***	0.065398	-0.310502***	0.065398
LnEXPTprice	0.846626***	0.123463	-0.153374	0.123463
LnToT	0.757655*	0.423276	0.757655*	0.423276
LnREXR	-0.206847	0.240172	-0.206847	0.240172
Ln CEP	0.185686*	0.088092	0.185686*	0.088092
FDI	-0.000132*	0.000070	-0.000132*	0.000070
LnEXPTVol(-1)	0.199383	0.121832	0.199383	0.121832
R-squared	0.991820		0.983449	
Adj. R-squared	0.987730		0.975173	
Log Likelihood	19.01030		19.01030	
F-statistic	242.5072		118.8358	
Prob (F-statistic)	0.000000		0.000000	
Durbin-Watson Stat	2.250357		2.250357	
Akaike info criterion	-0.800824		-0.800824	
Schwarz Criterion	-0.362029		-0.362029	
Hannan-Quinn criter	-0.679121		-0.679121	
Jarque-Bera	2.436059		2.436059	
Q-stat (1)	0.4582		0.4582	
Q-stat (2)	1.7452		1.7452	
BG-LM Test: F-stat 1	0.466483		0.466483	
BG-LM Test: F-stat 2	0.750313		0.750313	
B-P-G Het: F-stat	0.393497		0.393497	
Rest Test F-statistic	1.638920		0.944763	
ADF of Residual	-5.333056***		-5.333056***	

\*\*\*significant at the 1% level, \*significant at the 10% level



**Fig. 3. Stability test of coefficients**

A one percent increase in domestic production of pineapple leads to a 0.98% increase in both value and volume of exports, significant at the 1% level. Increasing production of pineapple ensures adequate volumes of the produce for both domestic consumption and for exports. Most of the processing and exporting firms in the



country are reported by [29] to be out of operation due to lack of pineapples for processing and export. With majority of the smallholders (who supplied about 50% of total volume of exports in the developmental stages of the industry) drifting from the subsector following recent development in the destination markets, as well as decreased productivity driven by changes in other key indicators and policy environment, the annual volumes of pineapple in the country available for export and for meeting domestic consumption needs has decreased significantly, and this in part could be a relevant cause of the recent decline in exports. Increasing production of pineapple in the country, through drafting of incenting measures could go a long way to revitalize the industry. The positive association observed between production and exports conform to propositions by [7,8,9].

In as much as domestic production has a boosting or pushing effect on exports, domestic consumption on the other hand, as suggested by [8] has a pulling effect on both export volume and value. In the present study, a 1% increase in domestic consumption leads to a 0.31% decrease in both volume and value of export, significant at the 1% level. This observation affirms a suggestion by [11] that at relatively higher levels of domestic demand, the quantity of resources devoted to export is lower. By this, at lower domestic demand, the surpluses obtained from production lead to increased volume (and probably value) of exports. Neutralization of this significant pulling effect could be ensured through increasing volumes of production at rates equal to or well above that for domestic consumption.

A 1% increase in export price faced by the country leads to a 0.85% increase in value of exports (significant at the 1% level), but no significant effect on volume of exports. Lagged volume of exports is noted to have no significant effect on both value and volume of exports. From this, we infer that value of Ghana's pineapple exports has been driven more by price faced by exporters than by actual volumes exported. This affirms competitiveness of Ghana in pineapple exports, thus a price-driven export rather than quantity driven exports. In addition, export demand is in theory believed to increase with a drop in price and vice versa, however, the inverse association observed in this study between price and volume of exports is not significant. This is an indication of competitive advantage of Ghana in export of the commodity. Improving on the quality of the country's exports, and attracting higher prices could therefore go a long way to increase value of pineapple exports from Ghana.

The index of openness to trade (captured by Terms-of-Trade index of exports) yields positive implications for both value and volume of exports. A one percent increase in this index leads to a 0.76% increase in both value and volume of export, significant at the 10% level. Being open to trade opens doors to greater opportunities for countries that are purposed on diversifying their exports. In addition, it promotes efficiency in production and export through exposing the countries involved to fierce competition on the global market. Such exposure ensures drafting and implementation of export-growth enhancing policy measures, which go a long way to firmly anchor beneficial export trade in such countries. The effect of the index of openness to trade on exports as observed in this study is in conformity with propositions by [20,14,18].

The index of competitiveness (captured by CEP-comparative export performance index) is observed to enhance both value and volume of exports, and the effect is significant at the 10% level. In as much as the association is positive and significant, the responsiveness is quite low, implying that increase in share and quality of pineapple exports from Ghana, although stimulates volumes and value of exports, such increments have been quite low. This is due to the fact that increases in volume of exports haven't been continuous and there equally have been quite some quality challenges in the sector. Slow adaptation of the country to shifts and developments in the global pineapple market, generally precludes the country from exploiting beneficial (or profitable) developments to the maximum. With the country's exports having no significant adding-up effect on world exports, increasing both the volumes and quality of pineapple exports from the shores of Ghana could help revitalize the sector and position it positively in wait for profitable developments in the near future.

Noted in empirical literature, the role of FDI in export promotion in developing countries has been quite controversial. In as much as some studies find a positive effect of FDI on export promotion [e.g. 27], others find insignificant or weak effect of FDI on exports [e.g. 26]. Other researchers including [25] found a negative association between FDI and export growth. Highlighted in such studies, the effect of FDI depends on the motive for such investment. Tariff-jumping types of investor investments that have a primary purpose of capturing domestic markets mostly do not contribute to export growth [26], while export-oriented investments generally contribute to export growth by taking advantage of a country's comparative and competitive advantages. Observed in Ghana, most of the investments noted so far in

the pineapple sub-sector have been towards capturing domestic markets (with majority being towards value addition to meet domestic demand and jumping tariff through establishment of both local and foreign centers of trade). Such investments tend to dampen trade. In the present study, a one percent increase in net inflow of foreign direct investment is associated with a 0.013%<sup>3</sup> decrease in both value and volume of pineapple exports, significant at the 10% level.

In summary, should there be no major improvements in current economic, policy and marketing environments, value of pineapple exports will decrease significantly with time, although the decrease in volume may not be significant. In as much as value of exports is driven by prices faced by exporters, the effect of export volumes on the value is relatively insignificant. Both value and volume of pineapple exports from Ghana are noted to increase with increasing production, openness to trade and improvements in export performance. They however decrease with increasing domestic consumption and net inflow of foreign direct investment, based on the domestic market capturing and tariff jumping nature of majority of such investment. Real effective exchange rate (as a surrogate measure of incentive) is found to have no significant effect on both value and volume of pineapple exports from Ghana.

## **6. CONCLUSION**

In identifying the key determinants of pineapple exports from Ghana, effort was made to estimate separate regressions with value of exports and volume of exports being the explained variables in the respective regressions. The study reveals that, should conditions for all the variables considered remain constant, value of pineapple exports from Ghana would with time decrease significantly. This reflects the highly competitive nature of the pineapple industry globally, and a need for Ghana to learn to adapt appropriately to market shifts in the shortest possible time. Both value and volume of exports were found to have a positive association with production, openness to trade and improvement in quality and share of exports (captured by the CEP index). Both however have negative association with domestic demand and foreign direct investment, with effect for the latter case being attributed to the tariff-jumping and domestic market capturing motive of majority of such investments in the country. A positive association was as well observed between export price faced by exporters and the value of pineapple exports. The corresponding association in terms of volume of exports however was not significant. The

effect of lagged volume of export on both current value and volume of exports was not significant. This implies that, Ghana's pineapples export is more price-driven than volume driven, an attribute reflecting competitive advantage of the country in pineapple export. To increase both value and volume of exports, measures should be put in place to increase production of pineapples for exports and domestic processing. In addition measures should be put in place to improve the quality of pineapples (both Smooth cayenne and MD2) exported from the country. Improving on the country's openness to trade could as well go a long way to enhance export growth. Although foreign direct investments are generally perceived to complement efforts by domestic industries to restructure production and export facilities and institutions, future efforts to attract foreign direct investments should place strong emphasis on identification of the motive behind such investments. In so doing, emphasis should not only be placed on achieving benefits from FDI inflows, but in attracting FDI with export growth motive; hence if attraction of such investment is to enhance export growth, domestic market capturing and tariff jumping types of investment should be minimized.

### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## APPENDIX

## Appendix 1. World exports of pineapple

Region/Country	2007/2008	2008/2009	2009/2010	2010/2011	4-year average	Share, %
<b>Volume of exports (tonnes)</b>						
World	2,884,571	2,849,733	2,908,082	3,146,214	2,947,150	
Africa	102,568	94,103	81,516	130,032	102,055	3.463
Americas	1,870,632	1,889,129	2,041,255	2,114,977	1,978,998	67.150
Asia	328,478	250,105	208,368	304,534	272,871	9.259
Europe	582,860	616,259	576,836	596,588	593,136	20.126
Oceania	33	137	107	83	90	0.003
Belgium	234,123	273,014	229,022	217,359	238,380	8.088
Brazil	32,566	19,818	1,886	2,238	14,127	0.479
Costa Rica	1,458,975	1,511,458	1,677,702	1,749,363	1,599,375	54.269
Cote d'Ivoire	69,201	54,443	54,956	64,116	60,679	2.059
Germany	30,648	31,263	37,545	41,604	35,265	1.197
Ghana	17,819	19,112	9,971	45,999	23,225	0.788
Italy	18,500	18,566	21,875	20,480	19,855	0.674
Netherlands	216,131	197,038	175,193	184,464	193,207	6.556
Philippines	219,825	209,532	164,650	263,019	232,257	7.881
United Kingdom	9,294	21,364	19,032	25,535	18,806	0.638
United States of A	90,512	88,108	99,076	103,300	95,249	3.232
European Union	582,492	615,831	576,419	596,317	592,765	20.113
<b>Value of exports (\$1000)</b>						
World	1,555,447	1,513,907	1,543,218	1,727,204	1,584,994	
Africa	43,172	35,882	32,462	91,174	50,673	3.197
Americas	814,171	839,997	919,315	962,169	883,913	55.769
Asia	80,557	70,583	63,916	89,479	76,134	4.804
Europe	617,493	567,270	527,379	584,230	574,093	36.222
Oceania	54	175	146	152	132	0.008
Belgium	239,429	240,854	206,754	208,312	223,837	14.123
Brazil	16,381	10,580	980	1,402	7,336	0.463
Costa Rica	574,921	604,517	677,392	718,725	643,889	40.625
Cote d'Ivoire	29,110	21,528	21,528	27,112	24,820	1.566
Germany	37,588	35,887	42,407	47,804	40,922	2.582
Ghana	6,260	6,692	3,531	51,144	16,907	1.067
Italy	18,032	16,117	18,270	17,234	17,413	1.099
Netherlands	224,055	179,581	150,628	170,327	181,147	11.429
Philippines	61,653	53,115	42,359	67,491	56,155	3.543
United Kingdom	9,960	17,485	15,808	22,145	16,350	1.032
United States of A	93,405	89,096	102,735	107,659	98,224	6.197
European Union	616,925	566,792	526,887	583,708	573,578	36.189



## Appendix 2. World imports of pineapple

Region/Country	2007/2008	2008/2009	2009/2010	2010/2011	4-year average	Share, %
<b>Volume of Imports (tonnes)</b>						
World	2,634,601	2,557,583	2,714,371	2,918,151	2,706,177	
Africa	5,997	5,709	6,919	10,695	7,330	0.271
Americas	857,595	845,671	955,589	1,047,269	926,531	34.238
Asia	303,681	279,832	310,136	378,552	318,050	11.753
Europe	1,459,246	1,420,659	1,434,977	1,477,502	1,448,096	53.511
Oceania	8,082	5,712	6,750	4,133	6,169	0.228
Belgium	309,156	290,252	258,827	232,054	272,572	10.072
China	19,310	23,027	34,216	59,737	34,073	1.259
Germany	173,060	202,557	183,325	191,956	187,725	6.937
Italy	149,255	140,453	142,105	151,300	145,778	5.387
Netherlands	228,079	198,087	213,781	232,850	218,199	8.063
Switzerland	19,170	21,420	22,716	21,980	21,322	0.788
United Arab Emir.	26,468	10,837	10,263	12,110	14,920	0.551
United Kingdom	125,932	144,518	155,257	167,513	148,305	5.480
United States of A.	713,584	712,945	815,872	817,131	764,883	28.264
European Union	1,384,862	1,349,788	1,350,407	1,392,416	1,369,368	50.602
<b>Value of Imports (\$1000)</b>						
World	2,328,083	2,113,159	2,208,242	2,373,622	2,255,777	
Africa	3,785	3,676	4,521	5,362	4,336	0.192
Americas	641,863	629,823	698,701	699,731	667,530	9.592
Asia	200,452	192,940	214,604	275,069	220,766	9.787
Europe	1,474,373	1,280,652	1,283,358	1,388,453	1,356,709	0.144
Oceania	7,610	6,068	7,058	5,007	6,436	0.285
Belgium	292,932	239,201	209,280	201,388	235,700	0.449
China	11,731	13,835	20,788	38,221	21,144	0.937
Germany	185,502	195,870	179,339	200,509	190,305	8.436
Italy	144,871	122,539	122,270	134,850	131,133	5.813
Netherlands	218,588	160,079	175,212	195,699	188,895	8.374
Switzerland	27,005	27,437	28,098	30,374	28,229	1.251
United Arab Emir.	19,483	4,358	4,964	4,660	8,366	0.371
United Kingdom	141,203	137,219	138,751	157,236	143,602	6.366
United States of A	531,854	527,180	585,167	550,420	548,655	4.322
European Union	1,398,160	1,207,915	1,193,479	1,287,694	1,271,812	56.380



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## ***Education or Experience: The Potentiality in Yielding the Best Productivity at the Working Environment***

### **ABSTRACT**

Till this day, knowledge surpasses strength in a way we handle different situation. Action may speak louder than words but by doing the wrong action it may bring us unpredictable misfortunes. The society of today is therefore in a dire need of essential knowledge through the use of the education system and experience accumulated from various encounter in life. This article is about a review between education and experience, the potentiality of either two or both in resulting to a better productivity. The combinations of the knowledge will result in better quality of work and productivity in the working environment.

**Keywords:** knowledge; education; experience; productivity; working environment.

### **1. INTRODUCTION**

In this era of new generations, parents focus more on education for children. They assume that by letting their children go through a stable education, they will have a better chance of workplace in the future. But, is it that easy to achieve a high academic level? It will be easy as most education focus more on the exam itself compared to the contents of teaching. Students intend to memorize and remember every topic taught by the teacher. In actual fact, they score pretty well in their examination and eventually forget about it. This is what definition of education is now in our time. Practically speaking, education isn't the problem. It is the person that delivers the information or how they try to create a successful teaching method whereas the students are able to pass using focused topics. In a sense, we will think that experience is more important than education. It is a fact that it is more important than education based on the first-hand experience of people. People who are exposed to situations are more likely to understand and correct their mistakes, which

will eventually improvise on the mistake. Working the way up the organization, it is very important to have a high education level in the society, because the implementation of mind-set is there and the success of their education level explains that they are willing and hardworking enough to strive for it. It may seem that the effort placed is futile but the results yield would increase and so does productivity. Wind energy instructor of Cloud Country Community College, Bruce Graham, warns that a person without a certificate or a degree will not advance as fast as a person that satisfies the requirement. Suzanne Tegen, Energy Analyst of U.S. Department of Energy, explains that job doesn't actually require a college degree but it requires training. Even though it is said that way, Tegen encourages students to further their education after high school. With a better educational background, working with anybody is easy with a set of skills [1].

## **2. THE SIGNIFICANCE OF EDUCATION**

According to Marafi [2], education is the main part of the sector in a country that links to the country's economy and the life of the people in the country itself. Investing on tertiary education sector would boost the economic factors of the country. According to Boyd [3], education is important to determine a person's job and income. It relates to the benefits of health care, paid holiday, and pension plans from the company itself. Education seems to be perceived as the main objective to social and economic development of the democratic society. Primarily, salaries and benefits of the working staff are mainly focused on the training and knowledge achieved, and with the aid of certification level of education. This shows that higher professional status of a person leads to higher paying salaries. Even in the working life, managers play an important role to educate employee about the importance of innovation in affecting the company and their goals [4].

## **3. EDUCATION BENEFITS FOR WORK**

According to Clark [5], as the requirements of human resource changes, the concept of educability changes as well. Education changes over time as how it is required in work force. According to LoCastro, cited by Hanlon [6], schools in this present period have started to provide the real-life experience to the students in order to help prepare them for real world. According to Eadie and Lymbery [7], the establishment of education have to emphasize on the importance of ideals that are to

be delivered and the quality of the profession which is required to create workers with the capabilities of functioning productively in an organisational work environment. Both the term technology education and vocational education are closely related to each other. Washington State define the term "vocational education" as planned learning experiences with specific objectives to prepare individuals for employment as semi-skilled or skilled professionals in occupations [8]. This type of education proves to be effective as it focuses mainly on the various set of skills that will be able to help during work in the future. According to Kuchinke [9], work is essential for human existence. Academic preparation is clearly essential but it is insufficient. The concept of vocational education is proposed to enhance the development of vocation in a person. To realize the full potential in vocational ability among humans is important to human for progression of the world in terms of social and economic development. In 2006, the term Career and Technical Education (CTE) is adopted to replace the previous accepted term. It is agreeable by the CTE teachers that they should focus more on technical skills that are required for success in the workplace, due to the needs of ever changing workplace. As the requirement in the work market evolves, CTE changes along to meet its requirement in terms of postsecondary education and career [10].

#### **4. THE DOWNFALL OF EDUCATION**

Today, presence of doubt occurs on the importance of receiving a quality education for the children to reach their maximum potentiality [11]. The social work education could differ from organizational requirements due to its lack of form in training that prepares students to comply with rules, standards, or law. According to Mendlowitz, cited by Hanlon [6], 50 years ago, schools offer strong foundation in accounting and control systems. School education programs today are irrelevant to students' requirement needed for work. Student's expectation for college is mainly onto employment first and a good study experience later [12]. Students mainly further studies to college only to receive the degree to suit their future work requirements. According to Nelson, as cited by Deppe, Smith and Stice [13], most graduates from a bachelor's degree are being lured by the employers stating that the time spent on actual practice would be better than continuing with the program to reach master's qualification. According to Hutchins, cited by Ainley [11], learning has to be adapted in a large versatile system to create a whole student experience. If this isn't the

answer to what learning should be, the question would be what are the students actually learning? Studies have shown that most teaching programs and textbooks do not help to improve the students' knowledge and understanding of a course. Teaching outcomes depends on the potential of teachers' inheritance of knowledge and teaching methods. During learning, there are restrictions and limitations that mainly focus on the group of students about the nature of team, whereas during the working environment, students are exposed to various types of perspective on rules and practice it to establish a critical view towards the classroom-based learning [7]. Having to learn and apply is two different methodologies to obtain knowledge. By learning a topic would be mainly limited to the theoretical part of understanding while by applying what had been learnt would be about experiencing a situation and changing accordingly to suit the issue. Gramming is one of the problems in education that is considered to be harmful, but it is widely practiced in school. It is true because they have to memorize information in a short period of time to be recalled later on [14].

## **5. CORE CONCEPT OF EXPERIENCE**

The concept of John Dewey's experience is just certain modes of interaction [15]. To gain experience is to start an interaction of certain aspect. Walter Benjamin observes that the poverty of the poor children in their daily life is ravaging through trash. Benjamin found and concludes that those children are able to develop through their daily activity and improvisation occurs without any restriction [15]. According to the research conducted by Motlagh, Bin Hj Hassan, Bin Bolong, and Osman [16], Journalist who had more than 10 years of working experience are more likely to make fair ethical decision. In results, people that have higher working experience are more likely to make decision to produce a better productivity. According to Nash [17], the improvement for efficiency of the school system will produce a generation without basic literacy skills. It is because the school system mainly focuses onto the education but do not monitor on the inputs and outputs. Teachers are the main source of knowledge for the students as they deliver valuable information known to be knowledge to the students. According to Horn, cited by Hanlon [6], experienced Professor would have a greater impact when teaching. It is an ineffective way to learn if work is based on books and theories due to lack of strong standing confidence. According to MA [18], college graduates realize that in the future, their place in the job market lies in the hands of their competency and expertise traits. It

will eventually lead to a selection of the best out of the rest due to supply of the students surpassing greater than the demand of the company. A person working will experience many different situations. This term refers to work experience. Once a person starts to work on different stations, they start to have control over their work, increasing the desire to be better. The person will pursue their goal by producing the best productivity; to be promoted to a higher level [19]. Social workers have to learn to survive according to organizational demands, so that they are able to sustain adequate careers [7]. The need of those workers to experience first-hand torture would be the efficient learning method to cope with the working environment. Thus, improvisation is required to improve work quality in order to yield better productivity.

## **6. TECHNOLOGY DRIVEN SOCIETY**

In the new modern era we live in today, technology changes the humans' lifestyle. Change is inevitable as technology is constantly improving [20]. Technological revolution has changed the workplace today. Employees have to learn how to adapt to the new technology as work can be carried out faster and more efficiently. According to Mageni and Slabbert, cited by Marafi [2], due to the advancement of technology as years goes by; employees can start to work from home. According to Jin [21], rapid globalization of technology in modern days appears to be the condition for economic success. The set of knowledge needed are important to be able to make full usage of technology. People who are familiar with computers are able to cope better during work to improve productivity. Technological revolution has made it crucial for students to be able to familiarize and adapt with technology in their undergraduate education [22]. It eases the burden of pen and paper and to be driven purely into the technology era. As technology improves, education improves along. Thus, E-learning comes to the approach. E-learning is identified as the process of education via computer over the Internet. Studies have shown that e-learning offers advantages to students in education. It is due to its flexibility and response to diversity. It is convenient to gain full access on educational experience. The benefit of E-learning in the working environment will be the increasing of computer literacy [23].

## **7. THE IMPORTANCE OF EDUCATION AND EXPERIENCE COMBINED**

Eadie and Lymbery (2002)'s, the aim of which their article is aimed to provide educational experience to stimulate students to handle the organisational require-

ments they will be working on [7]. It reflects firstly based on the foundation of the teaching in the beginning of the module, and secondly focuses on educational experience to clarify the basic themes in the module for the students. The first module starts by identifying the nature of problem through research. It examines the external factors that affect the recent changes of welfare organizations. Moving on to the internal environment factors by knowing the team's nature and teamwork, the second module starts from the outline of the structure and understands the learning theories in the design. The module links to broader issues and it explains the tendency to fulfil the multiple purposes. According to Smith [24], the article is about an experience he had, drawing ideas from high education's learning and teaching, and applied them in a Masters course. Smith had a traditional concept towards teacher as a conveyor of knowledge. Once he had completed a course for teachers, higher education introduced him the idea to learn and teach. Apparently, the knowledge existed was from experiences of those who worked in the field rather than theoretical studies.

## **8. WELL BALANCED WORK LIFE**

It was suggested that an employee is able to exert high productivity level if he/she is having a positive work life balance. Thus, it leads to higher salaries paid. Job contribution refers to the extent of how a person is showing interest and commitment to their job [25]. Therefore, job satisfaction is important as it plays the emotions and feelings of an employee's experience at their work place. When having a greater productivity in work, eventually it leads to job satisfaction. According to Locke, cited by Gill, Sharma, Mathur, and Bhutani [19], Job satisfaction is defined as the self-fulfilment state of which the results of one's job in achieving the objectives of the job value. It creates positive feelings among workers, reacting towards the desire for reaching high goals.

## **9. DISCUSSION**

Education is changing to adapt to the working lifestyle of today. As the requirement of work changes, so does the concept of education as well. The teachings of programs in school are irrelevant towards the working society, as the teachings only cover the syllabus of the topic and grant them the certificate of achievement of certain level of education. This does not necessarily imply that

education is meaningless in the eye of society. Nonetheless, the concept of vocational education exists to enhance the development of vocation in a person. Vocational education focuses more on the technical skills that meets the requirement to strive for success in a work area. Furthermore, the theory of experience is about interaction. It is an interaction towards certain aspect of life which in return gains experience on the other hand. Experience helps in making better decision in life. For an experienced Professor, the Professor will be able to share out more information based on the experience he had throughout his entire life. Books and theories are useless if we were not to practice it. It is because to understand is to experience it. In the age of technology, we are to adapt to certain changes and use it for our benefit of easing work. We have to have experience in computer literacy to provide better productivity in work. In short, the existence and advancement of technology makes our life easier and better throughout our daily life. In comparison of whether education or experience being better, why not consider both together? This will help create an ideal solution in achieving a better work quality.

## **10. CONCLUSION**

In summary, education differs from experience. Going through the path of education, one will only know what they have learnt whereas going through the path of experience, one is able to improvise and reflect upon their mistakes in due time. In other words, education and experience are both similar but different in their own ways. Ultimately, the need of knowledge of education and experience is important to diversify our actions against certain situations. Knowledge is infinite, a never ending learning process. Humans will continue to learn as long as they live.

## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## ***An Evaluation of Service Quality of Mobily and STC Telecommunication Companies in Saudi Arabia***

### **ABSTRACT**

The study aims at evaluating service quality of Mobily and STC; the main providers of telecommunication services in Saudi Arabia. The study uses the five quality dimensions introduced by [1]; assurance, empathy, reliability, responsiveness and tangibles. For this purpose, 300 questionnaires are collected and analyzed. The study reveals that the level of service quality in Mobily is of mid-high level in all dimensions. Mobily sequence of dimensions are as follows; empathy, tangibles, responsiveness, reliability and assurance comes last. On the other hand, STC level of quality services starts with tangibles and empathy in the mid-high level while responsiveness, reliability and assurance come in the average level of quality. The study reveals that Mobily performs better than STC in all the five quality dimensions and the differences between the two companies are of significant values. Finally, male and female respondents in the study agree on their opinions on both companies.

**Keywords:** service quality; dimensions; evaluation; telecommunication companies; mobily; STC; Saudi Arabia.

### **1. INTRODUCTION**

There are three telecommunication companies serving the public in Saudi Arabia. Mobily, an affiliated joint venture of Etisalat of the United Arab Emirates has operated in the country since 2006. This company provides mobile and internet services in the country. Secondly, Saudi Telecommunication Company (STC) has been in the field since 2003. STC provides mobile, fixed and internet services. Zain, a Kuwaiti affiliated joint venture, operates in the country since 2008 providing both mobile and internet services. Mobily has shown a growing success both financially and in terms of customer attraction in the country. STC profits and market share are

shrinking over time and losing a growing number of customers towards Mobily and Zain. On the other hand, Zain is suffering from great financial losses year after year since its establishment.

This study aims at evaluating the service quality of the three companies using the five quality dimensions introduced by [1]. Those dimensions are: assurance, empathy, reliability, responsiveness and tangibles. However, only 17 respondents Zain company. Such questionnaires have been removed from the study due to lack of generalization. Therefore, this study will evaluate service quality of Mobily and STC telecommunication companies. It is also needed to compare between the two companies regarding those five dimensions. Although [1] provides SERVQUAL scale in that paper, our study will use the dimensions of quality only and not pursue the model itself. The reason for that is to make the study as simple as possible and focus on the comparison itself between the two companies. SERVQUAL model requires the investigation of the "Gaps" between the expectation and the delivery of service quality by the users of the service of the company. Therefore, a more thorough answer has to be developed by each respondents stating his or her opinion twice for each question. Hence, we decide to use the five dimensions developed by [1] but collecting data using our interpreted question to each dimension.

The first objective of this current study is to evaluate the service quality of the two major telecommunication companies in Saudi Arabia using the five quality dimensions introduced by [1]. Those dimensions are: assurance, empathy, reliability, responsiveness and tangibles. Another objective is to compare between Mobily and STC in their performance of service quality of the five dimensions and find out if there are significant differences between those companies in their performance. The third objective is to find significant differences, if any, between the two genders included in the study in their opinions regarding their evaluation of the companies.

## **2. LITERATURE REVIEW**

### **2.1 General Overview**

[2] define service quality as being achieving or exceeding customers' expectation while [3] consider service quality as the difference between the provided and the expected level of service quality. The quality of service has become a key factor for the survival and success of businesses [4]. Believe that the most powerful competitive trend currently shaping marketing and business is service quality. It is

linked to increased profitability and it provides an important competitive advantage by generating repeat sales, positive word of mouth feedback, customer loyalty, and competitive product differentiation. In present times, the highest priority issue involves understanding the impact of service quality on profit and other financial outcomes of the organization [5]. [6] find in Egypt that service quality has significant effect on customer satisfaction. [7] find that sex, education, income and occupation have significant influence on patient satisfaction of service quality in hospitals in Saudi Arabia. The quality offered by services has become an important strategic tool for organizations across the world. Offering successful quality services results in major benefits including reduced costs and increased profit margins and performance, increased sales and market shares, satisfied customers and employees and their retention, attracting new customers and their long term relationship, and enhanced corporate relationship [8,9,10]. [11] find that service quality has significant direct effect on customer value perceptions, satisfaction judgments, and behavioral intentions in India.

## **2.2 Measurement of Service Quality**

Offering good services leads to enhanced customer satisfaction. However in implementing a strategy for measurement of service quality, there are many problems. One of them is the elusive nature of the service quality construct, making it extremely difficult to define and measure [12,13,3]. Practitioners and academicians have focused on accurately measuring service quality in order to better understand its essential incidents and consequences, and ultimately, establish methods for improving quality to achieve competitive advantage and build customer loyalty [14]. Many studies have been done on service quality, but still there are some unresolved issues that has to be addressed, and the most controversial one refers to the measurement instrument for service quality [15,16,17]. Quality of services is a difficult and elusive concept to measure [3]. The measurement of quality in the service sector is based on customer's perceptions of the service and is highly multidimensional [18]. The customers are usually involved in the delivery of service and their perceptions of quality depend on contentment, and satisfaction with both the result of the service and the service process itself. Metrics have been developed to measure this. The most commonly used scales for measuring quality of service are SERVQUAL and SERVPERF [19].

### 2.3 Servqual vs. Servperf

[1,3] proposed the SERVQUAL scale that measure service quality. At that time, this model was considered to be a revolutionary tool in measuring service quality. However, they criticize SERVQUAL in their literatures in later years. [1] has conceptualized service quality and SERVQUAL is based on this, it is the difference between consumer's perceived performance and expectation. SERVQUAL is the most commonly used scale for measuring service quality [20,21]. SERVQUAL is a technique used for assessing and managing service quality [17]. It measures service quality through customers' expectations and their perceptions [22]. Expectations is what firms should provide and perceptions is how a given service provider performs against these criteria. SERVQUAL consists of 22 items with five dimensions: reliability, responsiveness, assurance, tangible and empathy. Each item in the instrument is of two types. One to measure expectations about the firms in general within an industry and the other measures perceptions of the particular firm whose service is being studied. The application of SERVQUAL in measuring service quality is immense. It is used to measure quality in different fields. It has been used in retail chains including Wal-Mart, K-Mart and Target stores among others [23], health care applications [16,24,25] website application [26], banking [27], and public services [28].

On the other hand, [29] present SERVPERF model to measure service quality in four industries; banks, pest control, dry cleaning and fast food. They prefer this model over SERVQUAL considering it to be confusing with service satisfaction. They argue that SERVPERF is an enhanced means of measuring the service quality construct. They emphasize that SERVPERF is purely a performance based approach for measuring service quality. The scale of SERVPERF as a measuring instrument for service performance has a wide application. It is used in retail sector [30], libraries [31], higher education [32], fast food industry [33] and automotive repair industry [15].

### 2.4 The Dimensions of Quality

[3] consider ten quality dimensions in their study. Those dimensions are: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding and tangibles. However, [1] change service quality dimensions from ten elements mentioned above to five dimensions believing that there is a redundant and overlap. Therefore, [1] specify those elements as: assurance, empathy, reliability, responsiveness and tangibles. This current study will work on

those five dimensions of quality. [34] find in their study on Thailand hospitals that those five dimensions have significant influence on overall service quality. Responsiveness has the most influence followed by empathy, tangibles, assurance and reliability comes last. On the other hand, [11] find two dimensional construct consisting of service system (human and technology) and core service or service product in India. In a study of [35] in Kenya, they find that confidence and communication dimensions come first, then emotional satisfaction, reliability and responsiveness. Another study in India by [36], when using factor analysis, find that the dimensions to be service improvements and technical preparedness, apart from the applicability of dual aspects of perceived service quality technical and functional dimensions.

### **3. RESEARCH DESIGN**

The research instrument is a questionnaire which contains five questions that reflect the five dimensions of quality as defined by [1]. Those dimensions are; assurance, empathy, reliability, responsiveness and tangibles. We use a 5-points Likert scale starting from strongly agree, agree, neutral, disagree and strongly disagree. We distributed more than 400 questionnaires, collecting 344 and analyzing 300 questionnaires. Questionnaires are distributed to male and female students of the Executive MBA, Master of Accounting, Master of Health Administration and Master of Public Administration at King Abdulaziz University in three campuses; Jeddah, Gassim, Riyadh and Hail. Those students are employees working in both public and private sectors and some of which are self-employed in their companies. Moreover, questionnaire are distributed to senior male and female students at the Faculty of Economics at King Abdulaziz University. They come from all parts of Saudi Arabia and study during the weekends and we may imply high representation of the country. The questionnaire includes a question at the beginning asking respondents about their current service providers. They have to choose between three service providers; Mobily, STC or Zain. Therefore, we assume that each respondent is evaluating his or her current provider. It was found that there are 17 respondents who are clients of Zain Company and since that number is too small, those questionnaires have been dropped from this study. Therefore, the study includes Mobily and STC; the main provider of telecommunication services in the country.



The researcher assumes a reasonable validity of research instrument since the five quality dimensions used in the study, have been introduced by experienced scholars in the field of service quality [1]. However, the wording of the five questions included in the study have been pilot tested and modified. We assess the reliability of data collected using Cronbach's Alpha reliability test. The value of this test is (.767) which is a reasonable figure that constitutes a strong internal consistency. This suggests that respondent who tends to select high scores for one item also tends to select high scores for the others. Therefore, we can safely conclude that the data used in this study are reliable. The five categories of Likert scale are represented by value of means, this representation is displayed in Table 1.

**Table 1. Representation of the ranges of means**

Range of Mean	Representation
1 to 1.80	Strongly Disagree
1.80 to 2.60	Disagree
2.60 to 3.40	Neutral
3.40 to 4.20	Agree
4.20 to 5	Strongly Agree

#### 4. FINDINGS AND ANALYSIS

##### 4.1 Classification of Respondents

Questionnaires are distributed to male and female respondents and to great range of people so that we can generalize the results regarding their opinions on Mobily and STC service quality. Table 2 depicts the distribution of respondents by gender and service provider.

**Table 2. Classification of respondents by gender and service provider**

Respondents by gender		
Gender	Frequency	Percent
Male	202	67.3
Female	98	32.7
Total	300	100
Respondents by service provider		
Service Provider	Frequency	Percent
Mobily	117	39.0
STC	183	61.0
Total	300	100

Table 2 shows that male respondents to this study are 202 representing approximately two third of total sample while female's are 98 making the remaining one third of the sample. This distribution does not imply that males using telecommunication services are double the size of females. However, it is the convenience of approaching and accessing male respondents more than female. We would say that almost all males and females in the country are using the telecommunication services. We needed the representation of opinion of both genders in this current study so that we may generalize the findings. The second part of Table 2 shows the distribution of the sample between Mobily and STC customers. It shows that more than 60% of respondents are clients of STC while approximately 40% are those of Mobily. This distribution can be valid and representing the true distribution since STC started its business years before Mobily launching its business in the country. However, these two figures cannot be a decisive distribution of market share in the country. Nevertheless, it has been noticed that a growing number of STC customers are shifting their patronage to Mobily in recent years.

#### 4.2 Level of Service Quality of Mobily and STC

Respondents of the study are asked to determine the degree of their agreement on the five questions that represent the quality dimensions. A question is developed by the researcher to interpret each of the five quality dimension included in this current study.

**Table 3. Level of service quality (Mobily and STC Combined)**

Items	Quality Dimensions	Weighted Mean	Std. Deviation	Overall Response (in Mean)	Priority
Employees are polite, positive and provide respect to customers	Empathy	3.86	.87	Agree	1
Company offices are accessible have employees and well equipped	Tangibles	3.83	.99	Agree	2
Employees are ready and desired to provide service to customers	Responsiveness	3.37	1.12	Neutral	3
Services are provided in a consistent manner in terms of performance and reliability	Reliability	3.22	1.08	Neutral	4
Employees acquire skills and knowledge needed to serve customers	Assurance	3.18	1.05	Neutral	5

Because of the significance of this interpretation, we give it special attention by reviewing it during the Pilot testing of the questionnaire. Therefore, we reach a conclusion that the five questions represent the five dimensions with a high degree of confidence. The results are shown in Table 3 which reflect the opinions of both Mobily and STC customers.

Table 3 shows that both Mobily and STC together perform a level of mid-high (agree) in two quality dimensions; empathy and tangibles. However, they perform an average level (neutral) in the remaining three dimensions; responsiveness, reliability and assurance. It can be said from the results of this table that the two telecommunication companies do better in the empathy which reflect some kind of politeness and respect to customers which is an attribute in the cultural scene itself and this dimension is not related to the professional well-being of the companies. Offices and equipment (tangibles) dimension come second which is also not related to the professional performance of the companies. In contrast, such companies did not do well in the dimensions that constitute professional performance. We may conclude from this table that both Mobily and STC combined level of service quality in Saudi Arabia is not promising.

#### 4.3 Mobily vs. STC in Service Quality

After the overall evaluation of both Mobily and STC companies, we will now compare between the firms in the five quality dimensions. The results are depicted in Table 4.

**Table 4. Comparison between Mobily and STC**

Quality 5 Dimensions	Mobily		STC	
	Weighted Mean	Overall Response (in Mean)	Weighted Mean	Overall Response (in Mean)
Empathy	4.18	Agree	3.62	Agree
Tangibles	3.97	Agree	3.78	Agree
Responsiveness	3.64	Agree	3.12	Neutral
Reliability	3.44	Agree	3.02	Neutral
Assurance	3.40	Agree	3.02	Neutral

Table 4 shows that Mobily performed better than STC in all five quality dimensions; empathy, tangibles, responsiveness, reliability and assurance. The level of quality service of Mobily in all five dimensions is in the level of mid-high (agree)

ranging from Means of 4.18 to 3.40. On the other hand, the level of service quality of STC is average (neutral) in responsiveness, reliability and assurance. All those three dimensions are the real constructs of service quality. STC, however, performs in the level of mid-high (agree) in the empathy and tangibles dimensions, both are related to the politeness of employees and facilities. We perform Independent Samples t-test (Table 5) to determine if the difference between the two companies is significant or not. It appears clearly in the table that there are significant differences (P-value=.000) between Mobily and STC in the levels of all five quality dimensions of the study in the favor of Mobily.

**Table 5. Independent samples t-test (Differences between Mobily and STC)**

Company	N	Mean	Std. deviation	Std. Error Mean	T- value	P-value
Mobily	117	22.2393	3.76153	.34775	5.099	.000
STC	183	19.8033	4.43198	.32762		

#### 4.4 Comparison between Genders

The study includes both male and female respondents and we want to know if there is a significant difference between the two genders in their opinions regarding the services of Mobily and STC. The following table (Table 6) shows that the value of significance (P-value=.915) is greater than (0.05) which is not a significant value. Hence, we conclude that both male and female respondents of this current study share similar opinions on their evaluation of the two companies; Mobily and STC.

**Table 6. Independent samples t-test (Differences between genders)**

Group	N	Mean	Std. Deviation	T-value	P-value
Male	211	20.8578	4.24474	.106	.915
Female	106	20.8019	4.50274		

## 5. CONCLUSION AND DISCUSSION

Saudi Telecommunication Company (STC) that inherits its operations and organizational culture from those of the government has not shown a promising level of quality service. The organizational culture, ways of doing business and practice of the company are apparently not to the aspirations and expectations of its customers. In Contrast, Mobily, the newly UAE joint venture is doing a better standard of service quality based on the results of this current study. The know-how and expertise in

Mobily have been transformed from its parent company in the UAE. The billing procedures and calculation of internet and calls fares of STC are done in a vague and inconsistent ways. Customers who transformed their services from STC to Mobily in recent years have experienced lower bills in Mobily aside from a better dealing and courteous services. Saudi government still owns almost 70% of STC and choose the CEO's of the company because of the government voting power. Therefore, some of the selected CEO's of STC may be of public backgrounds which will lead to a more bureaucratic dealing and inefficient management of STC. In addition, STC offered what was known in 2008, "the Golden Check" to encourage its low productive employees to get early retirement. Nevertheless, what happened then was that a great number of STC productive and professional employees got the check and found other promising jobs somewhere else while the low productive employees stayed in the company. STC profits have shown a decline accompanied by a growth of Mobily profits in recent years which complicates the situation in STC. This decline lead STC to increase its prices in some services and reduce them in others which make customers wondering about the consistency and transparency of the company.

## **6. RECOMMENDATION AND POLICY IMPLICATIONS**

1. The first recommendation stems from the low level of service quality that STC has and the need to improve the company image in the country. Therefore the first recommendation to the company is that it has to exert its efforts to improve its organizational culture. Changing organizational culture is a very difficult process and we suggest the following policies to improve STC organizational culture:

a. Saudi government is encouraged to fully privatize STC. This move requires the selling of the government shares to the public. By doing so, the influence of the government will diminish and a change in its leadership executive formulation will eventually exist.

b. Employees who have been inherited from the government-run company mentality, may be laid off with proper compensation. The process should not be voluntary, instead, a thorough employee's appraisal should take place.

c. As STC has some affiliations with some world telecommunication companies, the company may benefit from their systems, procedures or even exchanging some employees with such companies. This move may result in bringing some

talented employees from abroad and send some Saudi employees to those companies.

d. Extensive training programs in customer care, human, as well as technical skills should be mandatory to STC employees across the country. However, the majority of those training programs should be held outside Saudi Arabia in the form of workshops and role playing type of development.

2. STC should have a more reliable appraisal and compensation system of its employees to ensure the proper negative and positive incentives to its employees. Hence, incentives cannot be given as a face value manner to all employees. Rewards and compensations should be tied to the accomplishment of employees.

3. Outcomes and effects of STC training programs should be evaluated periodically to ensure proper changes and revisions of such programs. Also, assessing the training packages and trainers shall be undertaken.

4. STC may consider the participation in King Abdullah Scholarship Program and benefit from the program. The company may send some high school or university graduates to some highly developed countries to benefit from their advance educational and vocational systems.

5. Finally, as Mobily and STC the main provider of telecommunication services in the country, they should observe a fair competition and provide better services with reasonable prices to their customers.

## **7. LIMITATION OF THE STUDY**

This study is limited to the evaluation of service quality dimensions of Mobily and STC [42]; the two leading telecommunications companies in Saudi Arabia. Therefore, it will not investigate the other important aspects such as prices of services, internet services, fixed line services and promotional programs of the two companies. Other researchers may want to study those aspects of such companies in the country.

## **8. SIGNIFICANCE OF THE OUTCOMES OF THIS STUDY**

The outcomes of this study may contribute to the empirical researches in service quality field in Saudi Arabia and in the Middle Eastern countries that share similar business and cultural attributes with those of Saudi Arabia. Results of this current study may help the telecommunication companies in the country; Mobily,

STC and Zain to understand the current situation in all of service quality attributes. They can benefit from the evaluation of their five quality dimensions: assurance, empathy, reliability, responsiveness and tangibles. Such companies may improve their negative aspects based on the results of this study. In addition, other service organizations such as hotels, hospitals, travel agencies and banks may benefit also from the outcomes of this current research. They may understand the directions and preferences of Saudi customers on service quality and hence improve and develop their strategies and programs. Researchers may build from the outcomes of this study and expand through other aspects of service quality on their future studies.

### **COMPETING INTERESTS**

Author has declared that no competing interests exist.

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## ***How People Respond to Different Types of Humorous Advertising***

### **ABSTRACT**

**Aims:** This study examined the different types of humorous advertising on attitude toward advertising and brand in order to analyze the effect on brand recognition and brand recall.

**Study Design:** This study focused on three types of humorous advertisings: cognitive, affective, and social orientation, and used an experimental method to understand the influence of humorous advertisements on advertising attitude and brand communication effects.

**Place and Duration of Study:** The study was conducted in companies in the city of Taipei, Taiwan, between May and June 2012.

**Methodology:** This study used a 4 (affective, cognitive, social and non-humorous advertising) x 2 (low and high degree of advertising involvement) between-subjects factorial experimental design and the group of non-humorous advertisings as control groups. A total of 268 subjects were randomly and equally assigned to one of the four ads. Removing 28 copies of unusable questionnaires because of incomplete answers, 240 copies of the questionnaires were usable, resulting in a response rate of nearly 90%.

**Results:** Findings indicate that humorous advertisings do promote brand message comprehension, and are superior to those of non-humorous advertising. In addition, the results indicate that different types of humorous advertising have different effects on brand recognition and brand recall.

**Conclusion:** The different types of humorous ads have statistically significant differences on various dimensions of brand communication. The humorous advertising of affective has greater brand recall than those of the humorous advertisings of social and cognitive. Furthermore, presenting an advertisement with humorous

elements can transfer the consumers' positive perceptions on the advertising to the brand itself, thus achieving effective brand communication.

**Keywords:** humorous advertising; brand recall; brand recognition; experimental design.

## 1. INTRODUCTION

The media environment has changed dramatically in recent years. Traditional advertising media such as TV, magazines and newspapers are losing their power on catching consumers. Instead, online advertising, such as web banner, social media marketing, mobile advertising are gaining power and growing rapidly. With the power of internet connections and ubiquitous mobile devices, advertisers are forced to rethink and create on-line approach practices to be going viral. Websites, on-line ads/videos, and blogs/bulletin boards are three on-line media often being used by marketers to communicate their brand message [1]. Humorous advertising is a good tool to use in internet and mobile environments for going viral. When advertisement makes audiences laugh, they are more likely to want to share it with others. Thus, humorous appeals are the means by which marketers attempt to inform, persuade and remind consumers - directly or indirectly - about the brands they market.

Examination of broadcast and print advertising suggests that humor is a widely adopted form of commercial appeal and general used in election debate [2,3]. Underlying this popularity is the belief that humor can increase the effectiveness of advertising. The use of humor in advertising has its origins in the early days of business. Studies have shown that audiences are more open to a humorous message, because humor lowers audience defenses, making them more receptive to the message [4]. Funny communication messages are more memorable and can also be shared more frequently than more serious messages [5].

Previous studies have indicated that adopting humor in advertising can enhance consumer concerns and interest them [6], increase the degree of favor toward advertisements or brands [7,8], and maintain longer lasting memories of advertisements [9]. In contrast, some studies speculate that humor in advertising may lower message comprehension and found humorous commercials to be no more effective than comparable serious messages [4,10]. Thus, serious questions can be raised about the generalizability of these results. Cantor and Venus [11] point out that previous studies failed to demonstrate the effective of humorous advertising,

because they didn't manipulate the type of humor and also not control the degree of how much humor is perceived by the respondent. Clearly, the literature needs distinguish among the conditions under which humor effects may vary. However, few studies have addressed the difference of various types of humorous advertisements, but they ignored the humorous message processing would influence audience's affect and cognition. Information processing theory assumes that consumer will follow the steps of acquisition, integration, and evaluation of information to make a decision [12]. In general, humorous advertising communications can serve as a stimulus-as-coded in the mind of the consumer, thereby achieving advertising effectiveness as relates to cognition. Helson's adaptation-level paradigm argues that stimuli will attract attention when perceived as different from previously established stimulus norms [13]. Thus, when messages are passed on to consumers by humorous ads, consumers will pay more attention to the information that triggers their interest. This study re-examines humor's influence by focusing on type of humor and the effectiveness of humor in accomplishing brand communications.

Previous studies considered the impact of humor only on low-involvement products, but not on high-involvement products [14,15]. This study proposed that humorous advertising influences both high- and low-involvement products on audience, but only influential paths vary. The humorous ads for low-involvement products easily produce emotional transfer, whereas those for high-involvement products trigger consumer cognitive models to generate emotional transfer [16], because humorous advertising communications can serve as a stimulus-as-coded in the mind of the consumer. When humorous messages are passed on to consumers by ads, consumers pay attention to the brand. The main purpose of humorous ads is to communicate effectively, meaning that the information can be remembered, thereby changing consumer attitudes. Voss [17] even suggests that presenting negative consequences in a humorous way can be effective.

High-risk, high-function, and high-involvement products are often involved in consumer complex buying behavior [18]. Consumers pass through a learning process characterized by first developing beliefs about the product, then attitudes, and then making a thoughtful purchase choice. Thus, marketers of high-involvement products should employ humorous advertising to relieve the individual emotional tension of consumers engaged in complex buying behavior, because humor lowers audience defenses, making them more receptive to the message.

This study proposes that the relationship between attitude toward an advertising ( $A_{ad}$ ) and attitude toward a brand ( $A_b$ ) play crucial roles for high-involvement product on brand communication, and an effectively humorous ad can enhance the  $A_{ad}$ , as well as strengthen brand cognition. Humorous advertisements can attract more consumers and increase  $A_{ad}$ , which is a crucial antecedent of brand attitudes. This study focused on three types of humorous message content: cognitive, affective, and social orientation [7], and used an experimental method to understand the influence of humorous advertisements on advertising attitude and brand communication effects.

This research has relevant implications for both academics and advertising practitioners. From a theoretical perspective, this study expands the domain of humorous ads affecting brand communication. From a managerial perspective, this research explored the rationale of why humorous appeal has an effect superior to that of conventional creative strategies, and why adopting an optimally humorous ad creates brand awareness and brand association.

## **2. LITERATURE REVIEW AND HYPOTHESES**

### **2.1 Effects of Humorous Ad Types on Advertising Attitude**

Weinberger and Spotts [19] found that humorous advertising is more attractive than non-humorous advertising and increases the brand memory of consumers, making consumers feel good by being persuasive. In addition, Speck [7] believed that different types of humorous ads lead to different psychological reactions and produce various advertising effects. This study used a method proposed by Li [20] to classify humorous ads into: affectively humorous ads, cognitively humorous ads, and socially humorous ads. The affectively-oriented humorous ad can effectively induces audience's strong emotional reactions; the cognitively-oriented humorous ad can activate audience's mental process leading to the perception of a situation to be funny; the socially-oriented humorous ad shapes the audience has the dominant position in the way of attack, satire, ridicule, contempt, and mockery to increase the difference between social status of different groups. MacKenzie and Lutz [21] also found that attitude toward an ad affects consumer brand attitudes and purchase intentions. Spotts et al. [18], Catanescu and Tom [22] have also considered the type of humorous advertising to be one of the main factors that influence advertising effectiveness, and  $A_{ad}$  is one of the indicators used to measure the level of feelings

in advertising effectiveness. That is, Speck [7] believed that humor can draw the audience's attention and increase their favor. Humor helps audiences strengthen positive attitudes and promote the ad purchase intention [20,23]. Therefore, humorous advertisings are more effective than non-humorous advertisings regarding advertising attitude.

Affective message appeals are a popular method of drawing attention to any type of advertising [24], whereas cognitive message appeals are typically more useful for improving brand recognition [25]. This study suggested that cognitively humorous advertising generates humor by contending with and resolving contradictory or inconsistent messages. Therefore, the process for solving inconsistent messages requires further cognitive effort to engage in deliberative information processing activity, generating a persuasive effect [26]. By contrast, affectively humorous advertising generates humor by virtue of the evoked emotion, which causes the viewer's emotions to run high and become soothed while watching ads. Furthermore, the viewer may focus more on the ads themselves and ignore information the advertising product conveys. Therefore, the affectively oriented humorous ad generates persuasive effects based on affective associations or simple inference ties to peripheral cues occurring in ads. However, the purpose of the socially humorous ad is to create a verbal attack, satire, laughter, spite, or deception, which might lead to higher levels of irritation that carelessly produce the discontent in some viewers and listeners; hence, this type of advertising attitude is the least favorable. Therefore, this study proposes that various types of humorous advertising have different effects on advertising attitude. The hypotheses are as follows:

H1: The cognitively oriented humorous advertising invokes a more favorable advertising attitude than the socially oriented humorous advertising does.

H2: The affectively oriented humorous advertising generates a more favorable advertising attitude than the socially oriented humorous advertising does.

## **2.2 Effects of Humorous Ad Types on Brand Communication**

Lutz et al. [16] studied Aad mediation effects and confirmed the relationship among  $A_{ad}$ ,  $A_b$ , and intention to purchase the brand ( $I_b$ ). This model suggests that  $C_{ad}$  (ad cognition) directly affects  $A_{ad}$ , and  $A_{ad}$  influencing  $C_b$  (brand cognition) and  $A_b$ . Therefore, two obvious sources affect  $A_b$ . The first is the direct effect of  $A_{ad}$ , and the second is the indirect impact of  $C_b$  [27].



MacKenzie and Lutz [21] revealed that advertising attitude influences  $A_b$  and  $I_b$ . Humor is frequently used in advertising because the audience harbors a positive attitude toward humorous ads. Humor presented in an ad enables consumers to own a positive attitude toward advertising [23,28], thereby facilitating the transfer of a consumer's positive attitude toward  $A_{ad}$  into a positive attitude toward  $A_b$  [29].

This study proposes that the distinct types of humorous ads have substantially varied influences on various dimensions of the brand communication effects of both brand recall and brand recognition. Brand recall is the ability of consumers to remember the brand's name, facilitating the classification of a group of products [30]. Brand recognition is the ability of consumers to verify a certain brand when a line of the brand claim is provided [26]. Humorous advertising may be a valid strategy for attracting attention, similar to provocation advertising that can enhance brand awareness [31]. However, Vezina and Olivia [31] found that provocation appeal seems to lead to negative reaction to a brand. Based on relevant research, whether or not humorous advertising affects  $A_b$  negatively is uncertain.

Speck [7] used the elaboration likelihood model (ELM) to explain the consumer information processing route toward a brand while watching a humorous advertisement. A consumer focusing on the main message of a product or brand involves the central path of the information processing route. By contrast, if the main message is associated with the background of an ad, it involves the peripheral route. Therefore, the cognitive humorous ad has characteristics of cognitive thinking, causing the audience to pay more attention in-depth. The link between humorous ads and brand communication is represented by  $A_{ad} \rightarrow C_b \rightarrow A_b$ . It is also relatively easy for customers to associate ads with brands and products. Furthermore, after deliberate thinking, the link between humorous ads and brands increases understanding of the brand message. Therefore, the audiences' ability to recognize a brand is greater when given brand-related messages or clues. Therefore, cognitive humorous advertising can attract viewers to spend more time attending to the message of a product- and brand-related advertising, thereby obtaining more brand recognition.

The purpose of the affectively humorous ad is to generate the audiences' curiosity, thus placing the focus on information related to advertising. The affective reactions to advertising regarding brand attitude are attained by  $A_{ad} \rightarrow A_b$ . Thus, we know that the association with the product-related message is low. Therefore, when

given more than one ad message, the audiences frame perception, enhance experience, and organize memory [32,33], thus giving them a greater ability to recall the brand. Finally, the socially humorous ad generates humor mainly via attack, satire, laughter, spite, or deception; therefore, the socially humorous ad might carelessly produce discontent in some audiences. Consequently, we can infer that audiences have a lower ability of brand recall and recognition. Therefore, this study infers the following hypothesis:

H3: The humorous advertisement of affective orientation creates greater brand recall than other humorous advertisements do.

H4: The humorous advertisement of cognitive orientation produces greater brand recognition than other humorous advertisements do.

### **3. METHODOLOGY**

This study suggested that humorous ads can affect the  $A_b$  of the public for high-involvement product. Therefore, we chose cars as research products. In addition, advertising involvement is one of the vital factors that influence consumers' judgment of advertising information and measure of advertisement effectiveness [34]. Lacznia, Muehling and Grossbart [35] proposed that the advertisement message is the incentive that triggers the follow-up involvement process. This study used a 4 (four types of advertisement) x 2 (both low and high degree of advertising involvement) between-subjects factorial experimental design on the humorous advertisement of affective, cognitive, and social orientations, using non-humorous advertisements as control groups.

As for brand selection, this study chose the medium-level-popularity brand, Hyundai Motors, as a measurement subject because consumers have a high level of brand awareness and positive advertising attitude toward high-level-popularity brands, resulting in a less obvious effect than those for medium-level-popularity brands after watching humorous ads [36].

#### **3.1 Design of Advertisements**

Humorous ads are selected according to the definition of three types of humorous ads that previous studies [18,20] have proposed to determine if the ad matches the classification of advertisement. In this regard, researcher has attempted to control degree of humor, using panels of Judges (researchers or advertising

professionals) to select the three types of humorous commercials employed in this investigation. Manipulation checks are made to ensure that three humorous treatments are rated as funnier than the versions of the control group, and the three types of humorous commercials classification are based on Chen's [37] five questions. To reduce the study error, the subjects in our study were asked whether they had seen the chosen advertisements; most of the subjects had never seen them before.

### **3.1.1 Affectively oriented humorous Ad**

The protagonists of this advertisement are a married couple, who trap each other in the house by whatever means necessary to drive the car parked outside the house. The advertisement shows the secretive and hilarious expressions of the husband and wife who just woke up in the morning, as well as a series of funny pranks during their preparation for work, and the husband and wife do not forget to pop their heads to see the car they love outside below. The purpose of this advertisement is to evoke consumers' driving desire. Considerable human nature and emotion are projected in advertisement, which causes people to feel empathy toward the content of the advertisement after laughing with the funny couple and the exaggerated plot.

### **3.1.2 Cognitively oriented humorous Ad**

In this advertisement, the hero is a knight riding a motorcycle. When the traffic light turns red, he stops between two cars. Two beautiful women in a car to his left car seem to make eyes at him, which pleases the knight. When he turns to the car to his right, he realizes that the women are actually interested in the man in this car. At the same time, the man and women in the cars all look at the knight and laugh. The motorcyclist continues cycling with a lonely look in his eyes. He then realizes that many beauties pass-by all adore those men who are driving cars of the same brand on the street. Suddenly, the motorcyclist spots a large advertisement billboard of the same car standing erect alongside the road. He takes out a knife and later, the audience sees the motorcyclist driving a car, which he parks next to a car whose driver is beautiful. She ogles at him. When the camera angle turns, the audience finds out that the motorcyclist is still riding his motorcycle, but with a large advertisement billboard of that car's brand in his left hand. Ending with humor, the

advertisement makes the audience understand that the original appeal is "standing upon one's dignity for men".

### 3.1.3 Socially oriented humorous Ad

The actress in this ad is a beautiful woman, who is walking elegantly among a crowd. All passersby are following her with their eyes; all of the drivers in the cars on the road nearby are looking at her with adoring eyes. One of the drivers bumps into a car ahead and a tree on the side of the road. However, she is unmoved and continues walking forward elegantly.

At this moment, a car is driven to the beautiful woman's direction, and at this time she keeps staring at the car, hitting a lamppost on the roadside. The image of the woman falling causes the people in the crowd to smile knowingly.

### 3.1.4 Non-humorous Ad

The advertisement of the control group is based on a non-humorous advertisement, which emphasizes the functions of the Hyundai Motor Company.

The measurement of "degree of humor" in the ads adopts the six-point scale measurement of Zhang [38], including five items- not humorous I humorous, not interesting I interesting, not funny I funny, not laughable I laughable, boring I not boring; 1 point means strongly agreed; 6 points refers to strongly disagreed. As the chosen products, cars are expensive and high-involvement products; the selection of nominees was based mainly on people who possess a job and purchasing power. The mean of each advertisement is  $M_{affective}=5.01$ ,  $M_{cognitive}=5.02$ ,  $M_{social}=4.96$ ,  $M_{control}=2.59$ . The degrees of humor of three types of humorous ads are greater than those of the non-humorous advertisement of the control group. Therefore, all of the advertisements are humorous, except for the advertisement of the control group.

The method of humorous advertisement classified by Chen [37] adopts six semantic points of advertisement association levels and five questions to measure the subjects' level of association and thought toward the advertisements they are viewing. If the level of association and the thought required additional effort, the ad close to the cognitively oriented humorous advertisement; otherwise, it close to the affectively oriented humorous advertisement. 1 point means strong disagreement; 6 points represents strong agreement. The average scores of thought and association level for each advertisement are  $S_{affective}=14.81$ ,  $S_{cognitive}=20.94$ ,  $S_{social}=18.78$ ,

$S_{\text{control}}=13.61$ . The average score of the cognitive group is significantly greater than the average score of the other three groups. Based on the score of affective advertisement, which is less than those of the cognitive and social groups, this ad can be judged to be an affective orientation. The total score of social advertisement is between those of affective orientation and cognitive orientation.

### **3.2 The Selection and Arrangements of the Filled Ads**

The subjects may have been aware of the purpose of this study while watching the humorous advertisements, causing an error in the results; hence, the other filled ads were selected and display to subjects. In this way, the effect of different types of humorous ads can be examined. Therefore, the subjects in each group were given a different humorous advertisement to watch. The ads were arranged as follows: one filled advertisement, one humorous advertisement, and two filled advertisements.

### **3.3 The Level of Advertising Involvement**

The various humor types and processes described by Speck's taxonomy are linked to consumer involvement and motivation [39]. Therefore, this study adopted the level of advertising involvement as an independent variable for analysis. The primary scale of advertising involvement is PII [40]. The advertising involvement was divided into two groups with cluster analysis. When the number of cluster from the second to the first group, the agglomeration coefficient increased to 0.966; hence dividing the involvement degree into two groups was more appropriate. There was a significant difference between the high and low degree of advertising involvement ( $M_{\text{high}}=4.02$   $sM_{\text{low}}=2.68$ ,  $P<0.05$ ); therefore, this result was consistent with the needs of experimental design of this study.

### **3.4 Measuring the Dependent Variable**

#### **3.4.1 Advertising attitude**

Brackett and Carr [41] presumed that the entertainment, information, irritation, and certainty of an advertisement influence a consumer's evaluation of advertising attitude; therefore, the forms of measurement were revised according to the measurement of the advertising attitude that Atkin and Block [42] performed. The forms of measurement can be seen below.

### 3.4.2 Brand recall

Following the approach of Malaviya, Kisielius, and Sternthal [43], this study examined whether subjects were able to recall the brand name of the car in the humorous ads after watching all of the ads, by listing all of the associations that they could remember in the targeted ads. A score of one was given for any subject who could correctly write "the brand name of the targeted car and correctly choose the association of the targeted advertisement". Furthermore, half point were awarded for subjects who have only one correct answer from the two items.

### 3.4.3 Brand recognition

These forms of measurement are based on the method proposed by Malaviya et al. [43], which asks the subjects, after watching all of the ads, whether they are able to distinguish the brand attributes of the targeted humorous ad (three items) from the total ads (12 items). The rate of correct answers is the measurement of scores that determines whether the subjects are able to select the brand attributes of the targeted car in humorous ad. As for the list of brand attributes, advertisement practitioners were requested to view the targeted and filled advertisements, and then separately list the brand attributes that the targeted humorous ads mention (brand attributes), the attributes that the filled advertisements note (filled attributes), and the attributes that are not noticed in all of the advertisements (virtual attributes).

### 3.5 The Design of the Questionnaire

The questionnaire of this study was divided into seven parts: brand recall, brand recognition, the degree of humor in an advertisement, the level of association in the advertisement, the degree of advertising involvement, attitude toward the ad, and basic demographic information. In addition, the questionnaire had four versions of questionnaires according to the four types of ads. In each questionnaire, only *brand attributes of the ad*, in the brand recognition part varied; but the other parts were the same.

### 3.6 Participants and Experimental Procedures

This research was conducted from May 1 to May 25, 2012. Ads were arranged just like TV commercial and played on a computer. First, the subjects were asked to watch preparatory ad films; they were then asked to complete the questionnaires.

The survey time in each group lasted from 25 to 30 minutes. The survey was administered mainly at the following locations in Taipei City: Chunghwa Telecom, Yuanta Bank, Kuang Chuan Dairy Co., Yes 123 Job Bank, and Insight Brand Consulting. All subjects had jobs with purchasing power. A total of 268 subjects were randomly and equally assigned to one of the four ads. Removing 28 copies of invalid questionnaires because of incomplete answers, 240 copies of the questionnaires were usable, resulting in a response rate of nearly 90%.

#### 4. RESULTS

In this study, the effective sample size was 240, of which women accounted for 57.5% of subjects, while men make up to 42.5%; distribution of age 40 to 31 accounted for 58.3% as the majority; as for the marital status, the married accounts for 61.1%; have accounting for 80.8% by the persons who own driver's licenses; speaking of the educational degree, the university (junior college) level accounts for 80.4% as the majority; in the industry leaves, financial and insurance industry take mostly up to 51.3%, followed by services sector accounted for 25.4%; the general staff take the most part of the positions accounted for 67.9%; for the part of the monthly income, the payment from \$ 50,000 to \$ 30,001 accounted for 46.7% as the majority, followed by \$ 50,001 - \$ 80,000 accounted for 34.2%.

The study used a number of important socio-demographic characteristics to conduct mean tests for the humorous degree of Ads' campaign. The results showed the difference between the mean of married and the mean of single is significantly ( $M_{\text{married}}=4.81$ ,  $M_{\text{single}}=3.98$ ,  $p=0.001$ ). It also can see that bachelor's degree report higher mean than other groups ( $M_{\text{high-school}}=3.61$ ,  $M_{\text{bachelor}}=4.54$ ,  $M_{\text{master}}=4.50$ ,  $p=0.054$ ). However, no significant differences in the humorous degree of Ads' campaign were found between male and female. There were significant differences among the mean from the four monthly income brackets ( $M_{<\text{NT\$}30000}=3.37$ ,  $M_{\text{NT\$}30000-50000}=4.46$ ,  $M_{\text{NT\$}50000-80000}=4.79$ ,  $M_{>\text{NT\$}100000}=5.20$ ,  $p=0.001$ ). The results have shown that demographic factors played substantial effects in the ads' campaign.

The scale of this study demonstrates a high level of internal consistency, with the Cronbach's  $\alpha$  values being greater than 0.84 and the variance extracted being higher than 0.65 on its respective dimensions. The item-total correlations range from 0.5 to 0.93 and the factor loadings range from 0.62 to 0.96.



#### 4.1 Manipulation Test

The experimental ad is divided into four kinds: three different types of humorous advertisements, and a non-humorous advertisement; joined with the level of advertisement involvement, which totally reaches up to eight groups. The test indicates that the three different types of humorous advertisements have no significant difference ( $F=1.945$ ,  $P>0.05$ ) on degree of humor; to compare with the control groups, the means of the degree of advertising humor of the three different types of humorous advertisements are significantly higher than the ones of the control groups ( $M_{\text{affective}}=5.07$ ,  $M_{\text{cognitive}}=5.24$ ,  $M_{\text{social}}=5.05$ ,  $M_{\text{control}}=2.62$ ). Accordingly, on the extent of the degree of advertising humor in this study is successfully manipulated.

The study aims is to see whether the level of thought and association have differences by judging the type of its types of humorous advertisements. The test results show that the level of thought and association of each advertisement has a significant difference ( $F=4.595$ ,  $P<0.05$ ). Furthermore, this study find out that the level of thought and association of cognitive orientation is greater than the affective orientation and the non-humorous advertisements of the control group ( $M_{\text{affective}}=2.76$ ,  $M_{\text{cognitive}}=3.26$ ,  $M_{\text{social}}=3.00$ ,  $M_{\text{control}}=2.70$ ). Consequently, on the extent of the types of humorous advertisements in this study is successfully manipulated.

#### 4.2 The Analysis of Variance on Advertising Attitude

In Table 1, the study uses the advertising attitude as the dependent variable, along with the usage of the types of advertisements and advertising involvement as independent variables to do 2-way ANOVA. There is no 2-way interaction effect in this model.

**Table 1. Analysis of variance of advertising attitude**

Source	Sum of square	df	Mean square	F test	Significance
Types of ads.(A)	15.27	3	5.09	11.20	0.000***
Advertising involvement (B)	19.08	1	19.08	41.97	0.000***
(A) * (B)	1.89	3	0.63	1.39	0.25

\*\*\*  $P < 0.001$

Table 1 lists the types of advertisements that have a significantly main effect ( $F=11.20$ ,  $P<0.05$ ) on advertising attitude, which also shows that different types of humorous advertisements are statistically significant at the .05 level on advertising

attitude. According to the post hoc paired comparison, the significance of the cognitively oriented humorous ad is higher than those of socially oriented ( $M_{\text{cognitive}}=4.21 > M_{\text{social}}=3.82$ ,  $P < 0.05$ ), which shows that the cognitively oriented humorous ad has a more favorable advertising attitude than that of the socially oriented humorous ad. Therefore, the hypothesis H1 is supported. Socially humorous ad and affectively humorous ad are below the significant differences in advertising attitude ( $M_{\text{social}}=3.82$ ,  $M_{\text{affective}}=4.01$ ,  $P > 0.05$ ). Therefore, the hypothesis H2 is not supported. Furthermore, three different types of humorous advertisements are significantly higher than the non-humorous advertisements in advertising attitude ( $M_{\text{control}}=3.52$ ,  $P < 0.05$ ).

#### 4.3 The Analysis of Variance on Brand Recall

In Table 2, the study lists the brand recall as the dependent variable, along with the usage of the types of ads and advertising involvement as independent variables to conduct a 2-way ANOVA. Table 2 lists the types of ads that have a significantly main effect on brand recall ( $F=3.63$ ,  $P < 0.05$ ), showing that different types of ads have a significant effect on brand recall. Additional information from the paired comparison indicates that the significance of the affectively oriented humorous ad is greater than that of the cognitively oriented humorous ad ( $M_{\text{affective}}=0.73 > M_{\text{cognitive}}=0.60$ ,  $P < 0.05$ ), meaning that the affectively humorous ad has greater brand recall than the cognitively humorous ad. Furthermore, the significance of the affectively humorous ad is greater than the socially humorous ad in brand recall ( $M_{\text{affective}}=0.73 > M_{\text{social}}=0.60$ ,  $P < 0.05$ ), showing that the affectively humorous ad has greater brand recall than the socially humorous ad. Therefore, hypothesis H3 in this study is supported.

**Table 2. Analysis of variance of brand recall**

Source	Sum of square	df	Mean square	F test	Significance
Types of ads. (A)	0.68	3	0.23	3.63	0.014*
Advertising involvement (B)	0.32	1	0.32	5.18	0.024*
(A) * (B)	0.29	3	0.10	1.56	0.201

\* $P < 0.05$

Using an additional paired comparison, this study found that the brand recognition of the cognitively humorous ad is statistically significant greater than that of the affectively humorous ad ( $M_{\text{cognitive}}=0.86 > M_{\text{affective}}=0.75$ ,  $P < 0.05$ ).

#### 4.4 The Analysis of Variance of Brand Recognition

Table 3 lists the types of ads that have a significantly main effect on brand recognition ( $F=13.76$ ,  $P<0.05$ ). We concluded that the different types of advertisements have a significant impact on brand recognition.

**Table 3. The analysis of variance on brand recognition**

Source	Sum of square	df	Mean square	F test	Significance
Types of ads. (A)	2.31	3	0.77	13.76	0.00***
Advertising involvement (B)	0.07	1	0.07	1.23	0.268
(A) * (B)	0.23	3	0.08	0.35	0.26

\*\*  $P < 0.01$ ; \*\*\*  $p < 0.001$

Furthermore, the brand recognition of the humorous ad of cognitive orientation is statistically significant greater than that of the humorous ad of social orientation ( $M_{\text{cognitive}}=0.86 > M_{\text{social}}=0.70$ ,  $P<0.05$ ), showing that the cognitively humorous ad has higher brand recognition than that of the socially humorous ad. Therefore, hypothesis H4 is supported.

Moreover, the three different types of humorous ads are significantly higher than those of the non-humorous advertisements in brand recognition ( $M_{\text{cognitive}}=0.86$ ,  $M_{\text{affective}}=0.75$ ,  $M_{\text{social}}=0.70$ ,  $M_{\text{control}}=0.58$ ,  $P<0.05$ ); that is, the humorous ads have higher brand recognition than those of the non-humorous ads.

#### 5. CONCLUSION AND IMPLICATIONS

The three different types of humorous ads are significantly higher than the non-humorous ad in advertising attitude. Thus, the humorous ads have a high advertising attitude. Attitude towards the ad is a crucial antecedent to brand attitudes [21]. Hence, humorous advertising is more attractive than non-humorous advertising and increases the brand memory of consumers, thus making consumers feel good more easily persuaded. In another respect, the results also suggest that humorous advertising can translate into a valuable segmentation strategy, because younger people, among others, show more positive reaction towards humorous appeal. Therefore, humorous appeal has a superior effect to those produced by conventional creative strategies.

### **5.1 The Effect of Different Humorous Ads on Brand Communication**

Different types of humorous ads for brand communication effects have a significant impact, which agrees with Speck [7], and Weinberger and Gulas [2]. The humorous ad of cognitive orientation has more favorable brand recognition effects than those of the humorous ad of affective orientation and humorous ad of social orientation. Specifically, the ELM suggests that the likelihood of message elaboration occurs as a function of separable elements of a consumer's motivation and ability to process information. When a message receiver is both motivated to process message content and has the ability to process the content, the central route to persuasion is hypothesized to occur. These conditions of motivation and ability can foster message-relevant thinking, activate cognitive responses, create changes in cognitive structure, and eventually lead to an enduring impact on a consumer's attitudes toward the communicated topic. The humorous ad of cognitive orientation draws more attention to thinking and the message component; hence, it achieves a greater level of brand recognition effect.

Based on the results of this study, the different types of humorous ads have statistically significant differences on various dimensions of brand communication effects. The humorous advertisement of affective orientation has greater brand recall than those of the humorous advertisement of social orientation and cognitive orientation. Furthermore, presenting an advertisement with humorous elements can transfer the consumers' positive perceptions on the advertisement to the brand itself [29], thus achieving effective brand communication.

### **5.2 Managerial Implications**

A favorable advertising effect helps people remember the brand as well as the ad. The key lies in the associations the advertisement arouses regarding the product or brand, so that the consumers feel impressive. Thus, humor is one of the elements that allow the advertisements to attract people's attention; with proper strategy, humor can increase advertising effectiveness. Joshi and Hanssens [44] found that advertising spending has a positive, long-term impact on a firm's market capitalization and may have a negative impact on the valuation of a competitor of comparable size. This study also proposed that humorous ads influence high involvement products, but influential paths vary on low involvement products. The humorous ads of low-involvement products easily produce emotional transfer, but those of high-

involvement products must trigger the consumers' cognitive models to generate emotional transfer. The main purpose of humorous ads is to achieve a state of effective brand communication, meaning that the brand could be recalled and recognized, thus changing the attitude of consumers.

According to the results, different categories of products associated with different humorous ads create various types of advertising communication. Aad and Ab of the humorous ad of cognitive orientation elicit responses from consumers and achieve the most favorable advertising results; the humorous ad of affective orientation causes the audience to recall the brand easily, creating a desire to purchase that product; the humorous ad of social orientation has a poor communication effect because it may cause discontent in some audiences. Therefore, we recommended that business owners should use advertising humor effectively, to generate resonance and positive association with the product and brand image. Persuasion mechanisms induce the consumer to incorporate both cognitive and non-cognitive elements in his or her attitude toward a brand when using humorous elements.

While designing a marketing strategy, the business owners could segment the targeted markets, as well as develop an appropriate strategy for the targeted customers and purpose of the advertisement. To raise brand awareness and brand associations, business owners could focus on the symbolic part of the brand and adopt the humorous ad of cognitive orientation; to awaken the positive recognition of a brand, the business owner could effectively use the humorous ad of affective orientation.

### **5.3 Study limitations**

Because the brand and product in this research already existed on the market, the subjects may have established preconceptions of them. This study did not account for the previous brand attitude, and the subjects were likely affected by their experience with the brand. Future studies may benefit from conducting research on different product categories.

Based on literature review, three critical factors influence advertising effectiveness: advertising-related, consumer-related, and situation-related factors. This study considers only advertising-related and consumer-related factors regarding types of ads and advertising involvement. Situational factors are the most difficult to

identify because of the vast variety with which they exert influence on human information processing. Future study can examine the effect of brand communication on target brands when a particular ad with a good or poor brand image displayed before the ad of target brands. Future studies could attempt to combine various types of products with distinct media and make a comprehensive comparison of distinct types of brand communication.

### **COMPETING INTERESTS**

Author has declared that no competing interests exist.

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### ***Impacts of Pesticides and Fertilizers on Soil, Tail Water and Groundwater in Three Vegetable Producing Areas in the Cordillera Region, Northern Philippines***

#### **ABSTRACT**

The study focused on the impacts of pesticides and fertilizers on soil and water in three vegetable producing areas in the Cordillera region in the northern central part of the Philippines. Three major vegetable producing communities were selected as study sites with seventy five (75) key informants interviewed. Soil and water samples were obtained to determine the extent of soil and water contamination with pesticides and fertilizers. There was a high level of awareness on the negative impacts of commercial pesticides and fertilizers on soil, water and human health but awareness did not influence the way farmers utilize pesticides and dispose of empty bottles/containers of pesticides after use. Soil samples from Balili, Mankayan, Benguet and Sadsadan, Mt. Province contain variable amounts of pesticide residues in the top 15 centimeter soil surface. The residues detected were: chlorpyrifos, profenofos, cyhalothrin, cypermethrin and fenvalerate. Chlorpyrifos was found in one soil sample in Sadsadan above the Limit of Determination. Similarly, chlorpyrifos, cypermethrin and fenvalerate were found in two soil samples in Balili higher than the limit of determination. No pesticide residue was found in all soil samples obtained from the inner 200 centimeter soil depth. Soils in the garden sites of Tinoc, Ifugao were still pesticide free. Water samples in all the sites contain no pesticide residues but found to contain high levels of coliform bacteria. Pesticide contamination of soil and water was not as severe as anticipated but rather it is the presence of coliform bacteria severely contaminating water bodies in the area. Natural springs unspoiled by human population are still clean and potable. Nitrate levels in soil and water is low but showed some signs of building up due to the continuous application of fertilizers. Hospital records showed no reported cases of pesticide poisoning due to improper handling. However, there were cases of intentional ingestion of pesticides for purposes of committing suicides. Respiratory diseases top the list of the ten leading

causes of morbidity in all three study sites. The study site in Tinoc was affected by frequent cases of diarrhea especially during the rainy months.

**Keywords:** soil contamination; tail water; groundwater contamination; agricultural chemicals; chicken manure; total coliform bacteria.

## 1. INTRODUCTION

The Cordillera region is home to the largest vegetable industry in the Philippines. It is composed of 6 provinces namely: Benguet, Mt. Province, Ifugao, Abra, Kalinga and Apayao. The region supply 70% of temperate vegetables in the Philippine market chiefly potato, cabbage, beans and carrots [1]. The study covered 3 major farming communities that are found in Benguet, Mt. Province and Ifugao. The farming communities included in the study are: Balili, Mankayan, Benguet, Sadsadan, Bauko, Mt. Province and Tinoc Poblacion, Tinoc, Ifugao. The three study sites differ in terms of the evolution of the gardening industry in each of the sites. In Balili, the vegetable industry started way back in 1957 followed by Sadsadan in 1960 and Tinoc in 1998. Over the years the vegetable industry is known to rely heavily on commercial fertilizers and pesticides. Farmers use fertilizers and pesticides to enhanced yield and control pest and diseases. Aside from chemical inputs, the gardening industry has a long history of using fresh chicken manure to remedy nutrient deficiencies in the soil. The use of chemical inputs is sometimes concomitant with the presence and persistence of fertilizer and pesticide residues in soil and water. The lingering negative connotation associated with pesticide use led some people to believe that soil and water inside garden areas are heavily polluted with chemical residues detrimental to human health. Still others refuse to eat vegetables believing that they contain high levels of pesticide residues. The study was made primarily to provide evidences to repudiate or affirm some of the prevailing assumptions regarding the impacts of pesticides and fertilizer on soil and water. The main objectives of this study are: 1) to assess the farmers level of awareness on the negative impacts of agrichemicals on health and environment 2) to obtain information on the types of agricultural chemicals used by vegetable farmers 3) to determine the effects of agricultural chemical on soil and water 4) to identify major sources of pollutants in the area aside from agricultural chemicals and 5) to recommend solutions for mitigating the negative effects of soil and water contamination that affects people's health and their communities. The direct beneficiaries of the study

are the vegetable farmers who are handling agricultural chemicals pursuant to their vegetable production. Fertilizers and pesticides are inseparable components of the vegetable industry and growers should know the negative impacts of these farming inputs to soil and water. Farmers themselves and their families including their animals are the ones working with the soil and having access to water resources within the vicinity of their garden areas and it will always result to poor health and even death in the long-term.

Understanding the impact of agricultural chemicals on soil and water quality will have a direct bearing on how farmers should use their agricultural chemicals in such a way that it will not continue to contaminate soil and water resources. It would hopefully raise people's awareness on these important environmental issues and develop mitigation measures to address these issues for the benefit of both present and future generations.

## **2. MATERIAL AND METHOD**

Three vegetable growing barangays in 3 provinces in the Cordillera region were selected as the site of this study. The sites are Balili, Mankayan, Benguet, Sadsadan, Bauko, Mt. Province and Tinoc Poblacion, Tinoc, Ifugao. Twenty five farmers in each of the community were interviewed as key informants. Level of awareness was measured using a 4 point rank order scale such as: not aware (NA), less aware (LA), adequately aware (AA) and very much aware (VMA). Focus Group Discussion (FGD) was used to validate the data that was gathered.

Soil samples were gathered at the upper, middle and lower portion of the garden landscape. A line sampling method was employed for each subunit and 10 subsamples were gathered per subunit. Thus, one composite sample is made up of 10 subsamples. Soil samples were collected from the upper 15 cm soil surface and inner 200 cm soil depth. Grab water samples were collected at the point source of natural springs and at the tail-end of creeks that are found inside the garden areas. Soil samples were brought to the regional analytical laboratory of the Department of Science and Technology in La Trinidad, Benguet, Philippines for analysis. On the other hand, water samples were brought to the National Pesticide Analytical Laboratory in Quezon City, Philippines for the corresponding analysis.

### 3. RESULTS AND DISCUSSION

#### 3.1 Level of Awareness on the Impacts of Pesticides on Health

Better awareness on the harmful effects of fertilizers and pesticides is the key to the proper handling and disposition of such hazardous materials. To obtain farmers level of awareness on the impacts of pesticides on human, a four point awareness question was floated. On a scale of 1.00-4.49, the farmers' level of awareness on the key issues on the impacts of pesticide were ranked accordingly. Farmer's level of awareness is high ranging from adequate to very much aware indicative of a high level of understanding on the negative association between pesticide utilization and human health. The farmers' level of awareness on the impact of pesticides on human health is shown in Table 1.

**Table 1. Farmers level of awareness on the impacts of pesticides on human health study sites**

Items of awareness	Tinoc	Balili	Sadsadan	Mean	Description
Pesticides generally affect people's health	3.60	3.41	3.59	3.53	Very Much Aware
Pesticides can cause skin and eye irritation	3.64	3.38	3.52	3.51	Very Much Aware
Pesticides can cause stomach irritation and vomiting	3.60	3.43	3.30	3.44	Adequately Aware
Pesticides can cause dizziness	3.48	3.38	3.56	3.47	Adequately Aware

#### 3.2 Level of Awareness on the Impacts of Pesticides on Soil and Water

Pesticides may influence the quality of soil and water found inside garden areas but may also affect the health of people using these pesticides. With no other recourse, gardeners have to deal with pesticides and herbicides everyday to control pest and diseases and weeds, respectively. The concern for environment and human health relative to the use of hazardous farming inputs are the two important aspects of agriculture. Awareness on the negative impacts of pesticides on environment and human health is the key to the proper handling and utilization of pesticides. To determine the farmer's level of awareness on the impacts of pesticides on soil and water, a seven point awareness question was floated. Using the same scale of 1.00-4.49, the farmer's level of awareness was ranked accordingly. Result indicates that farmer's are adequately aware of the negative impacts of pesticides on soil and water. It is however, evident that farmer's level of awareness on the impacts of pesticides on soil and water appears to be lower compared to their awareness on its

impact on human health. It may imply that farmers are more concern in protecting their health when handling pesticides than protecting the environment.

Farmers' level of awareness on the impacts of pesticides on human health and soil and water is high which ranges from adequate to very much aware. However, it appears that awareness did not influence the way farmers handle pesticides in their respective farms. During field work it was observed that farmers do the easy way by putting pesticide bottles along farm corners and boundaries. It was also noted during the field work that farmers do not use adequate protective gears while spraying pesticides. The failure of farmers to use the appropriate protective gears during spraying may have exposed themselves to the risk of pesticide poisoning. However, there were no reported cases of direct poisoning due to pesticide spraying. The only reported cases are intentional ingestion of pesticides particularly gramoxone, sumicidin and some unnamed pesticides for purposes of committing suicide. In Tinoc for instance, there were five cases of suicide attempts from CY 2010-2011. Of the five intentional cases, 4 died and one survived.

**Table 2. Farmers level of awareness on the impacts of pesticides and fertilizer on soil and water study sites**

Items of Awareness	Tinoc	Balili	Sadsada	Mean	Description
Pesticides can kill beneficial organisms in the soil	3.16	3.41	2.29	2.95	Adequately Aware
Pesticide can pollute the air we breath	3.28	3.41	3.15	3.28	Adequately Aware
Pesticide can kill fishes and shells in rivers and other water bodies	3.28	3.18	3.52	3.33	Adequately Aware
Pesticide residues can remain for many years in the soil	3.00	3.27	2.59	2.95	Adequately Aware
Pesticide residues can be retained in the vegetables produced	3.24	3.23	3.07	3.18	Adequately Aware
Commercial inorganic fertilizer Makes soil hard and difficult to cultivate	3.24	2.95	2.22	2.80	Adequately Aware
Commercial inorganic fertilizer is carried by rain and pollute rivers/creeks and springs	3.32	3.05	2.33	2.90	Adequately Aware

Scale: 1.00-1.49 Not Aware. 3.50-4.49 Very Much Aware. 1.50-2.49 Less Aware. 2.50-3.49 Adequately Aware

In Sadsadan, only one case of suicide was reported which occurred in 2008. In Balili, there were 6 reported cases of intentional ingestion from 2008-2010. Fortunately, five (5) of them survive and only one died of complication from high



blood pressure. Farmer's level of awareness on the negative impacts of pesticides on environment is indicated in Table 2.

### 3.3 Pesticides, Herbicides and Fertilizers Used by Farmers in the Three Study Sites

At the time of interview, the three study sites were using ten (10) brands of pesticides, five (5) brands of herbicides and an undetermined number of commercial fertilizers in its solid or liquid form. Of the 10 common brands of pesticides, five of which belong to the pyrethroid class of pesticides, four organophosphate and two under the carbamate class of pesticides. Nobody is using any organochlorine compound but farmers claimed they have been using DDT and Endrin prior to their restriction in the 1980's. On-site utilization of pesticides and other farming inputs is driven by sales agent, farmers' cooperatives and private agricultural traders.

**Table 3. Pesticides, herbicides and commercial fertilizers used in the 3 study sites**

Name of Insecticide	Active ingredients	Length of Usage	Pesticide Class	Name of Herbicides	Name of Commercial Fertilizers
Sumicidin	Fenvalerate	15	Pyrethroid	Power	Urea
Bida	Cyhalothrin	10	Pyrethroid	Gramoxone	Complete Fertilizer (14-14-14,16-20-0)
Karate	Cyhalothrin	10	Pyrethroid	Clear out	Foliar Fertilizers
Nurell	Cypermethrin	2	Pyrethroid	Afalon	Fresh Chicken manure
Selecron	Profenofos	5	Pyrethroid	Bio 480	
Tamaron	Methamidophos	10	Organo-phosphate	Redeem	
Silicron	Dimethoate	5	Organo-phosphate		
Lorsban	Chlorpyrifos	3	Organo-phosphate		
Cartap	Dymethylamin	10	Carbamate		

With this arrangement farmers have continuous access to the latest information and pesticide being sold in the market. Table 3 shows the pesticides, herbicides and commercial fertilizers used by farmers in the 3 study sites.

### 3.4 Disposal of Pesticide Waste

The most common type of spraying pesticides in the three study sites is the use of knapsack sprayers. It was observed that some farmers are also using power

sprayers. In terms of the management of pesticide bottles, farmers do not follow any definite procedure for disposing these bottles and washing sprayers after use. During the field work, the research team came across empty pesticides bottles piled along farm corners and boundaries. Some of the bottles are partly buried with soil indicating that it had been there for many years. Bottles with leaking rusted caps can be filled with rain water and slowly release poisonous liquid that can leach to underground springs and surface water bodies. In the same manner, farmers washed sprayers in rivers and creeks or to any water they can access such as springs, rice field or irrigation canals. The improper disposal of empty pesticide bottles and indiscriminate washing of sprayers posed a direct hazard to soil and water. Safe disposal should become a part of the solid waste management program of the barangay through the Local Government Units (LGU's) pursuant to RA 9003 or otherwise known as the Ecological Solid Waste Management Act of the Philippines. It may also be the responsibility of private salesmen and pesticide dealers to educate gardeners on the proper disposal of toxic chemical waste.

**Table 4. Methods of disposal of empty bottles of pesticides employed by farmers in the 3 study sites**

Method of Disposal	Study sites			
	Ifugao	Mt. Province	Benguet	Total
Leave empty bottles in the farm	15	21	12	48
Keep the bottles at home	3	2	9	14
Leave bottles in waste bins	7	2	4	13
<b>Total</b>	25	25	25	75

The construction of centralized leak proof concrete waste vaults for storing pesticide bottles is one way of containing the indiscriminate disposal of bottles. The different ways by which gardeners dispose of empty bottles of pesticides and clean their sprayers is shown in Table 4-5.

Statistical analysis using the Analysis of Variance (ANOVA) showed no significant relationship between farmers' level of awareness and disposal of pesticide waste. The insignificant relationship confirmed the observation that farmers' level of awareness did not influence the way farmers dispose of pesticide waste. Farmers do

the easy way by leaving empty bottles of pesticides in the farm and wash sprayers anywhere where they can find water.

**Table 5. Methods of cleaning sprayers employed by farmers in the 3 study sites**

Method of Cleaning Sprayers	Study Sites			Total
	Ifugao	Mt. Province	Benguet	
Washing of sprayers in rivers/creeks	13	10	12	35
Washing in spring	2	9	7	18
Washing in irrigation canals	1	5	2	8
Washing in rice fields	9	1	0	10
<b>Total</b>	25	25	21	71

### 3.5 Soil Quality Status of the Three Study Sites

Soil samples were obtained from October to November of CY 2011. Crops grown during field sampling include cabbage, carrots, Chinese cabbage and potatoes. The crops were fertilized with urea and complete fertilizers at least twice prior to soil sampling. The fertility and pH status of soils in the three study sites is shown in Table 6.

Soil pH ranges from moderate to strong acidity. The low pH can be attributed to the excessive use of fertilizers. To raise the pH level it may be necessary for farmers to consider applying lime. The nitrogen (N) content of the soil is low below the typical range of 1.0 percent indicative of nitrogen deficiency. Nitrogen deficiency can be attributed to the high uptake of nitrogen by actively growing vegetables. Farmers ameliorate nutrient deficiency in two ways: the application of commercial fertilizers such as urea and complete fertilizers (NPK), and the application of fresh or semi-decomposed chicken manure. Chicken manure is applied one time per cropping cycle at a rate of 100-120 cavans (35-40 kilos per cavan) per hectare. The vegetable industry is a net importer of fresh chicken manure from the lowlands.

Phosphorous (P) is another nutrient needed by plants in large quantities. The Phosphorous content of soil in the 3 study sites is above the standard limit (Olsen) of 2-60 ppm. The high P content can be attributed to the low pH level of the soil. Under acidic soils, P is fixed by iron and aluminum. Busman et al. [11] pointed out that the low availability of P is very pronounced in acidic soil (pH<5.5) and alkaline soil (pH>7.3). The low pH range of surface soils in the 3 study sites ranging from 4.9-5.7 possibly accounted for the fixation of P in the soil. Recent application of P fertilizer in

the area may have contributed to the observed high levels of P concentration in the surface soil. Further lowering of soil pH would mean the greater fixation of P. To enhance the availability of P to plants, farmers may have to raise the soil pH by applying lime.

The typical range of K in soils is from 50-700 ppm with greater than 900 considered excessive (<http://www.soiltestlab.com/forms/soil-handout.pdf>). The importance of potassium (K) in ensuring normal growth and production of quality vegetables is well recognized in literatures (Bidari and Hebsur 2011, Kanwar 1976). In all the study sites, the soils contain small amounts of K nutrients below the minimum level. The inadequate concentration of K in the garden soil is indicative of the rapid uptake of K during and in between the active growth stages of vegetables. K deficiencies can be ameliorated through the application of K fertilizers in its pure or mixed with other nutrients.

Magnesium (Mg) is a secondary nutrient needed by plants in large quantities that are typically readily available in the soil. The typical range of magnesium in soil is from 2-30 me/100 g soil. The relatively newer garden soil in Tinoc contain higher amounts of Mg than the older garden soils in Balili and Sadsadan but still below the required minimum Mg level to sustain the normal growth and development of garden crops. The low concentration of Mg in all the study sites can be attributed to the natural properties of Mg nutrients which are quite soluble in water. Their soluble properties may have caused them to deteriorate quickly either by hydrolysis, microbial action or leach into the inner soil layers during watering or rainfall. The soils across all study sites do not contain the required minimum levels of Mg for efficient growth of vegetables. The garden soil is in need of Mg supplementation through fertilization.

Calcium is another secondary nutrient essential for many plant functions. Calcium is found in many of the primary or secondary minerals in soils. Calcium (Ca) is not considered a leachable nutrient. The typical amount of Ca in garden soil is from 5-50 me/100 g soil. In natural soils, the availability of Ca is conditioned by soil pH where soils with higher pH (alkaline soils) have more Ca content than soils with lower pH (acidic soils). Under intensive gardening, calcium is lost in the soil by the rapid uptake of growing vegetables without replenishment. In other words, the deposition of calcium from decaying plants parts is slow while the rate of depletion is very fast. The newer garden sites in Tinoc have more adequate calcium content than the soils

in Balili and Sadsadan. The calcium deficient soils in Balili and Sadsadan can be attributed to many years of repeated cropping and too much extraction of calcium by rapidly growing crops. To replenish the calcium deficient soil, it may require supplementation through fertilization. However, before fertilization, it may be necessary to raise the soil pH toward the neutral range so as to increase the availability of calcium in the soil.

**Table 6. Fertility and pH status of the upper 15 cm. and 200 cm. soil depth in the three study sites**

Study Sites	Sampling Depth	pH	N (%)	p (ppm, Olsen)	K me/100 g Soil	Ca me/100 g Soil	Mg me/100 g Soil
Poblacion, Tinoc, Ifugao	Upper 15 cm.	5.7	0.28	73	0.98	9.22	1.71
	200 cm	5.3	0.16	4.3	0.55	6.02	1.84
Sadsadan, Bauko, Mt. Province	Upper 15 cm.	4.9	0.44	176	0.70	3.84	0.39
	200 cm	4.6	0.40	25	0.43	1.66	0.39
Balili, Mankayan, Benguet	Upper 15 cm.	5.4	0.16	80	0.36	4.10	0.79
	200 cm.	4.7	0.39	1.5	0.44	1.79	0.39

### 3.6 Pesticide Residues in Soils of the Three Study Sites

Pesticide residues were detected in all composite samples obtained in the surface soils of Balili and Sadsadan. The pesticide residues detected were: chlorpyrifos, profenofos, cyhalothrin, cypermethrin and fenvalerate. The residue chlorpyrifos, cypermethrin and fenvalerate were detected in the soils of Sadsadan and Balili exceeding the Limit of Determination (LoD). The observed higher levels of pesticide residue concentration in soil above the Limit of Determination (>LoD) can be attributed to the current application of these chemicals a few days prior to sampling. The residue chlorpyrifos could have come from Lorsban insecticide, cypermethrin from Nurell, profenofos from Selecron and fenvalerate from Sumicidin. There was no detection of organochlorine compounds in spite of the fact that farmers reported having used them in the 1980's. Garden soils in Tinoc are still pesticide free. No residue was detected in the 200 cm depth implying that pesticides did not leached into the inner soil layers. Most of the pesticides currently in use by farmers are known to have a short half life and given the relatively short half lives of these pesticides, it is likely that residues detected came from current season application and that there was a high probability that it may have degraded prior to leaching into

the inner soil layers. The short half-life and degradable nature of pesticides therefore explained the absence of residues in the inner 200 cm soil layer. The pesticide residue content of the garden soils of the three study sites are shown in Table 7 below.

**Table 7. Pesticide Residues Found in the Garden Soils of Tinoc, Ifugao, Sadsadan, Mt. Province and Balili, Mankayan, Benguet Pesticide Residues**

Study Sites	Organo-Chlorine	Organo-phosphate	Pyrethroid	Residue Level	Remarks
Tinoc					
a. Upper 15 cm	nd	nd	nd	nd	nd
b. 200 cm	nd	nd	nd	nd	nd
Sadsadan					
a. Upper 15 cm	nd	Chlorpyrifos Profenofos	Cypermethrin Cyhalothrin	0.05,0.009 0.01, 0.01	>LoD,<LoD <LoD,<LoD
b. 200 cm	nd		nd	nd	nd
Balili					
a. Upper 15 cm	nd Profenofos	Chlorpyrifos, Cyhalothrin Fenvalerate	Cypermethrin 0.01,0.01 0.03	0.05,0.01 <LoD, <LoD >LoD	>LoD, <LoD
b. 200 cm	nd	nd	nd	nd	nd

*\*Limit of Determination (LoD) using Gas-Liquid Chromatography: Organochlorine = 0.005 mg/kg or ppm, Organophosphate= 0.02 mg/kg or ppm. Pyrethroid= 0.02 mg/kg or ppm, nd= no detection.*

### 3.7 Water Quality Status of the Three Study Sites

Grab water samples were collected from point source of natural springs (level 1 spring as defined by DOH AO No. 2007-0012) [2] and tail-end of creeks. Water samples were transported to the BPI-Pesticide Analytical Laboratory in Baguio City for pesticide residue analysis and at the DOST Regional Standards and Testing Laboratory in La Trinidad, Benguet for the other water quality parameters.

The presence of pesticide residue in water make it toxic unsuitable for use by both humans and animals. Laboratory analysis done on water samples did not reveal any traces of pesticides in all the three study sites. It is quite uncommon that after many years of pesticide application, surface water and underground natural springs are still pesticide free. Again, the absence of any pesticide residue in water samples highlighted the short half-life and degradable nature of newly manufactured pesticides being used by farmers. The pervasive assumption that inland waters within garden areas are heavily polluted with pesticides is not true and not supported by the findings of this study. The water quality status of the three project sites is summarized in Table 8.

**Table 8. Water quality status of the three study sites**  
**(Tinoc, Sadsadan and Balili)**

Study Sites	Pesticide (ppm)	Nitrate (mg/L) (Lmgo/LD=m50ax)	Total Coliform Count(<1.1 (MPPNSN/D10W0) ml	Total Suspended Solids
Tinoc (Creek water)				
Mulmog creek	nd	0.57	>8 MPN/100 ml	41.6
Pipingew creek	nd	0.42	>8 MPN/100 ml	0
Jerry creek	nd	0.41	>8 MPN/100 ml	1.80
Tinoc (Natural spring water)				
Gadingan spring	nd	1.24	>8 MPN/100 ml	0
Dangla Spring	nd	<LoD (LoD= 0.18 mg/L)	<1.1 MPN/100 ml	0
Sadsadan (Creek water)				
Cawanagan creek	nd	1.00	>8 MPN/100 ml	0.60
Baobao Creek	nd	<LoD (LoD= 0.18 mg/L)	< 1.1 MPN/100 ml	1.70
Sadsadan (Natural spring water)				
Kinawanagan proper Drinking water	nd	0.90	< 1.1 MPN/100 ml	0
Mabilig spring	nd	0.24	< 1.1 MPN/100 ml	0.40
Baobao spring	nd	1.00	< 1.1 MPN/100 ml	0
Saad spring	nd	1.29	> 8 MPN/100 ml	3.90
Cawanagan- Sadsadan Spring	nd	0.66	> 8 MPN/100 ml	14.6
Balili (Creek water)				
Dagadag creek	nd	2.77	> 8 MPN/100 ml	0
Sil-ak creek	nd	4.39	> 8 MPN/100 ml	2.80
Balili (Natural spring water)				
Dagadag spring	nd	4.91	> 8 MPN/100 ml	0
Munoz Spring	nd	<LoD=0.18 mg/L	> 8 MPN/100 ml	0
Upper Cada spring	nd	0	< 1.1 MPN/100 ml	0

Nitrate is one of the many determinants of water quality. Clean and healthy water must be free from nitrates or does not exceed the required maximum level of 50 mg/L. Nitrates in drinking water interfere with the ability of red blood cells to carry oxygen. Children and infants are more vulnerable to nitrate poisoning. Babies can turn blue when there is not enough oxygen transported by their blood. Water samples collected from springs and creeks in the study sites contain small amount of nitrates below the Philippine Department of Health (DOH) prescribed maximum allowable nitrate level. Nitrates may occur naturally in soil and water, but there is no doubt that the traces of nitrates found in the water samples may have come from the recent application of commercial fertilizers and chicken manure. The older garden sites of Sadsadan and Balili contain higher amounts of nitrates than the relatively new garden sites in Tinoc. The nitrate levels had not reach toxic levels yet, but there are



indications that it will continue to rise as the use of commercial fertilizer and animal manure expands in the future. In another gardening community in Atok, Benguet, Tirado [3] found higher concentrations of nitrate in surface water and ground-wells above WHO recommended minimum standards of 50 mg/1 NO<sub>3</sub> due to the intensive use of nitrogen fertilizers.

Springs/wells are the natural sources of drinking water for the gardening communities. The presence of coliform in natural springs/wells indicates that the wells are prone to fecal contamination. The Philippine National Standard for Drinking Water [2] set the acceptable limit for total coliform count at <1.1 MPN/100 ml of water. Of the total number of creeks and springs sampled, only one spring in Tinoc (Dangla spring) and two springs in Sadsadan (Kinawanagan proper drinking water and Mabilig spring) met the national standard for drinking water of <1.1 MPN/100 ml. On the other hand, only one spring in Balili (upper Cada spring) met the national standards for drinking water. All the other springs sampled contain high levels of coliform bacteria. There were no other sources of pollutants noted in the area such as piggery and poultry projects. In the absence of such point sources of pollutants, it is likely that the source of coliform contamination came from decaying vegetable left in the soil surface or thrown into bodies of water, human waste diverted to these bodies of water and fresh chicken manure applied to the gardens. It is clear that the location of natural springs/wells relative to garden areas and population centers influenced the presence or absence of coliform contaminants. Clean springs and wells in the three study sites remain unspoiled by garden areas and population centers. Their strategic location within the landscape prevents point and non-point pollution from reaching the water sources. Definitely, the intrusion of people and garden areas within these well/spring sites endanger these clean water sources from coliform bacteria. Thus, the communities using these wells should develop policies and mechanisms to safeguard these wells from human intrusion to maintain its clean and potable water status.

Total Suspended Solid (TSS) are water pollutants made up of suspended materials such as soil, silt, decaying plants and animals, industrial waste and sewage. Total Suspended Solids (TSS) carried by water is indicative of the effect of surface run-off influence by management, vegetation and slope. Water with high TSS has less clarity and may often mean higher concentrations of bacteria, nutrients, pesticides and metals in the water [4]. TSS is often related to turbidity and it can be

remedied by flocculation, sedimentation and filtration. The Philippine National Standards for Drinking Water [2] did not specify any standard for TSS but specifically set a standard for turbidity at no higher than 5 NTU. Cole-Palmer International [5] set the maximum standards for TSS at 100 mg/L or 100 ppm using the gravimetric method with soils dried at 103-105°C.

Some of the creeks and natural springs sampled have zero loads for TSS while others have small amounts of TSS carried with it. Across all three study sites, the TSS load is below the limit set forth by Cole- Palmer [5] at 100 mg/L of water. Farmers mitigate runoff by establishing plot along the contours and planting vegetables densely in each of the plots.

#### **4. CONCLUSION**

Farmers apply fertilizers and pesticides to enhance yield and control pest and diseases. It constitutes the major bulk of farming inputs used by the farmers. Although these farming have meritorious impact on crops it may have deleterious effect on both humans and environment. Based on the findings of the study, the following conclusions are drawn:

Farmers high level of awareness on the negative impacts of pesticides did not influence the way they utilize pesticides and treat pesticide waste.

Garden soil in the three study site is obviously sick with declining pH range. This can be attributed to the excessive use of fertilizers.

Pesticide use for many years did not show any severe negative impact on soil and water. The findings of this study did not confirm the widespread assumption that soils and inland waters found in garden areas are severely contaminated with pesticides.

Coliform bacteria are severely contaminating natural springs and other water bodies. The primary sources of coliform are chiefly fresh chicken manure, decaying plant organics thrown into water bodies and human fecal waste.

Nitrate levels in water are still below the required limit of 50 mg/l but have the potential to rise due to continued use of nitrogen fertilizers.

#### **RECOMMENDATIONS**

1. The continued use of fresh chicken manure and the disposal of vegetable organics in soil and water coupled with human waste should be discouraged. A solid

waste management program addressing these issues should be developed through the intervention of the Local Government Unit and the Department of Health. For chicken manure, it may be necessary to process these fresh manures into safer forms of organic fertilizers before they are use in the gardens.

2. Best Management practices should be observed in the utilization of commercial fertilizers and manures to mitigate the contamination of wells and springs with coliform bacteria and deposition of nitrates. The one time application of fertilizers and chicken manure should be discouraged to be replaced by split applications. This will enable crops to absorb all the nitrogen content of applied fertilizers before another split application is done.

3. Water quality surveillance should be in place in all vegetable producing areas to continually evaluate the microbial quality of water. Water quality surveillance will ensure that springs/wells or centralized water system used by gardening communities are free from diseases causing organisms as a pro-active response to possible outbreaks that may result from water borne pathogens.

4. Gardeners to consider using organic fertilizers that satisfied organic safety requirement as a substitute to fresh chicken manure. This would help reduce coliform contamination of water bodies and at the same time improve soil tilth.

5. Farmers need to consider mitigating acidity by the application of lime prior to cropping.

6. There is a need to inform individual households to treat their drinking water by boiling to eliminate existing pathogens. For the clusters of households using centralized water distribution systems, treatment with chlorine may be necessary to remove water borne pathogens.

7. It is also necessary for communities with clean natural springs to develop policies at the barangay (community) level to protect and safeguard these wells by enacting local resolutions to declare them off-sites to gardening and human settlement to protect its potable water status.

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### **COMPETING INTERESTS**

Author has declared that no competing interests exist.

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## ***Scaling up of Stocking Density of Tiger Shrimp (*Penaeus Monodon*) under Improved Farming System in Khulna Region of Bangladesh***

### **ABSTRACT**

**Aims:** Scaling up of stocking density of black tiger shrimp (*Penaeus monodon*) under improved shrimp farming system in the Khulna region of Bangladesh.

**Study Design:** Completely randomized design (CRD) with three treatments each with three replicates.

**Place and Duration of Study:** In the farm station of Gazi fish culture ltd. at Koilashgong, Khulna, Bangladesh between March to June 2011.

**Methodology:** Nine ponds were selected and all ponds were prepared according to the general pond preparation system. Polymerase chain reaction (PCR) tested post larvae (PL<sub>15</sub>) were stocked at three different stocking densities i.e. 8 pcs/m<sup>2</sup> (T1), 15 pcs/m<sup>2</sup> (T2) and 22 pcs/m<sup>2</sup> (T3). Commercial shrimp feed were supplied to all the treatments. Feed were adjusted according to the body weight gain of shrimp. Probiotics were applied in all the treatments to prevent diseases and maintain water quality parameters. Monthly water samples were collected for analysis and growth parameters were measured.

**Results:** Results showed that all the water quality parameters were within the optimum range. Highest survival was found in T2 (82±4) and lowest was recorded in T3 (68±2) (P<0.05). Harvesting size of shrimp varied from 29.0±1.53 g to 38.5±0.5 g.

Harvesting size was smaller in T3 than in T1 and T2 ( $P < 0.05$ ). Stocking density of 15 and 22 pcs/m<sup>2</sup> exhibited the highest production of 4635.1±128 kg/ha/crop and 4328.7±138.2 kg/ha/crop respectively whereas, T1 showed lowest (2431.3±35.2 kg/ha/crop). It was observed that two crops can be found from each pond/year. Net profit calculation showed that highest net profit was found in T2 compared to other treatments ( $P > 0.05$ ).

**Conclusion:** The research showed that stocking density of tiger shrimp 15 pcs/m<sup>2</sup> is the optimum density for improved shrimp farming system in Khulna region of Bangladesh.

**Keywords:** stocking density; culture system; tiger shrimp; *Penaeus monodon*; Bangladesh.

## 1. INTRODUCTION

Shrimp farming is a century-old practice in many Asian countries. It is one of the most exportable frozen products of Bangladesh [1]. The culture of shrimp received maximum importance due to its high value in the world market as well as its unique taste; high nutritive value making it's a quick profit item in the country. Until a decade ago, this commodity was generally considered a secondary crop in traditional fish farming practices. Shrimp fry trapped in salt beds, coastal paddy fields or brackish water fishponds were allowed to grow to marketable size and harvested as secondary crop. However, in recent years when higher income are derived from the harvest of shrimp than the principal crop, many farmers have converted their rice fields, salt beds and fishponds into shrimp farms [2].

In Bangladesh the shrimp farming mostly concentrated in the southern region and about 80% of the areas are in Khulna region that covers more than 145 thousand hectares of land. Most of the culture techniques are done through extensive method where production never goes above 120 kg/ha/year [3]. In the traditional farming system, the ponds are stocked with fry either collected from the wild or concentrated through tidal water entering the ponds [4]. Subsequently yield is very low because of inefficient control of predators and competitors, full dependence on natural food, inadequate pond depth and water quality management. Some improvements of the traditional farming systems have been made in the past years. Stocking density of shrimp can be increased through better management practices. As a result, pond yield has correspondingly increased. However, expansion of the shrimp

farming industry is still restricted due to the lack of suitable culture technology and disease problems in Bangladesh.

The success in the mass production of shrimp can be achieved to 4-5 tons/ha through improved pond culture techniques, water quality management and artificial feeding. Shrimp farming has now developed into an important export-oriented food industry especially in South Asian countries. The perception of an unlimited market demand, high export price, generation of employment and increase in foreign exchange earnings may have encouraged many countries in the region rich in aquatic resources to place high emphasis on the development of the shrimp culture industry. However till now optimization of stocking density in shrimp farming in Bangladesh is the triggering factor for maximizing the survival rate and boost up production. Stocking density also related to the culture system and environmental condition of the agro-ecological conditions. Most of the research findings are concentrated on the extensive farming system and pond dynamics of shrimp farms in Bangladesh [5-7]. Some of the research works on stocking density and total production by Shofiquzzoha and Ahmed [8], Apud et al. [9], Islam et al. [10], Islam and Alam [11], Nuruzzaman et al. [12], were showed that in all cases the stocking density were within the 5 pcs/m<sup>2</sup> and the production were not more than 760 kg/ha, that is much lower compare to the neighboring countries [3]. Information on improved farming system compare to the present conventional system with higher stocking density is still lacking. However, there is little research on the improved farming system in the farm scale. That is why the present experiment was carried out for scaling up of stocking density of black tiger shrimp (*P. monodon*) under improved shrimp farming system in Khulna region of Bangladesh.

## 2. MATERIALS AND METHODS

The experiment was carried out in the farm station of Gazi fish culture ltd. at Koilashgong, Dakop upazilla of Khulan, Bangladesh from March to July 2011. Nine ponds were selected for three treatments with three replications. All ponds were prepared according to the general pond preparation system. Black soil of the pond was eliminated and pond bottom was allowed to sun dry. The average pH was calculated and required amount of lime was applied to maintain the optimum pH. The ponds were fenced by net to prevent entering other species. PCR tested post larvae at 15 days old (PL<sub>15</sub>) average weight 0.05 g were stocked in each pond maintaining



three different stocking densities i.e. 8 pcs/m<sup>2</sup> in Treatment 1 (T1), 15 pcs/m<sup>2</sup> in Treatment 2 (T2) and 22 pcs/m<sup>2</sup> in Treatment 3 (T3). The experiment was set up according to the completely randomized design (CRD) protocol.

Ponds were filled with water by filtration with small mesh size filter net. The initial water levels in the ponds were maintained at 60 cm level. After filling the pond, crab net was fixed along the pond perimeter. Ponds were bleached with bleach containing 30% chlorine at the rate of 60 ppm [13]. Inorganic fertilizers were applied weekly for producing natural food in the culture ponds at a rate of 28 kg N/ha/week and 7 kg P/ha/week [14]. Different types of chemicals and minerals such as dolomite, sodamix, nutrilake and A-soil were applied to the pond in the three days interval during the pond preparation. After three weeks the ponds were ready for stocking and the seeds were acclimatized to the pond environment. After acclimatization seeds were released slowly to the ponds water.

Commercial shrimp feed were applied in all the treatments (Table 1). Blind feeding was done for first 30 days. Later the feeding was adjusted based on the check tray observation and body weight sampling. Four check trays were installed in each pond for monitoring the shrimp health conditions and feed intake. The feed ration was divided into 4 times a day as 25%, 20%, 30% and 25% in the morning at 6.00 a.m., 11.00 a.m., 6.00 p.m. and 10.00 p.m. respectively. The ingredients of the feed include Fish meal, Cod liver oil, Shrimp/prawn meal, Squid meal, Wheat flour, Binder, Soybean meal, Broken rice, Phospholipid, Cholesterol, Vitamins and Minerals, Di calcium phosphate etc.

**Table 1. Composition of commercial feed applied during the culture period**

Composition	Percentage
Moisture	11 (maximum)
Crude Protein	38 (minimum)
Fat	5 (minimum)
Fiber	4 (maximum)

Additional water exchange was not done for the first 60 days. After that 12 cm of water was added regularly in every 15 days interval till harvesting and water level was maintained around one meter in all the ponds. Commercial probiotics were collected from local market. Based on the water quality parameters and health conditions of shrimp, probiotics were applied in all the treatments during the culture period (Table 2). Sampling was done in the pond every week during early hours of

the day with cast net for checking the healthiness and growth rates. The water quality parameters of the culture pond were regularly monitored. Monthly water sample were collected for analysis. The water level was measured by using a handmade wooden scale with cm marking. The water salinity of the pond was measured by using a hand refractometer (Erma-Japan). The pH, alkalinity, total ammonia nitrogen (TAN) of the pond water was recorded by using pH test kit, alkalinity kit and ammonia test kit respectively (Advance Pharma, Thailand). Water temperature was measured by using a standard centigrade thermometer. The dissolved oxygen (DO) was estimated by DO test kit (Advance Pharma, Thailand). Transparency was observed in terms of light penetration by using Secchi disc.

Economic analysis was done considering all variable costs to the expenditure and respective shrimp sales of the treatment to the gross return. One way ANOVA was done to observe the differences in growth, survival rate, production, FCR values and economic return among different treatments.

**Table 2. Name of probiotics used during the experimental period**

Name of probiotics	Bacterial Composition	Concentration	Doses
Super P S	Rhodobacter sp, Rhodococcus sp	$\pm 10^9$ CFU/ml	20 Lt/ha
Super Biotic	Bacillus sp		5 Kg/ ha
Mutagen	Enzyme compound		10 g/kg Feed
Zymetin	Enzyme compound		5 g/kg Feed
Pro-w	Bacillus subtilis, Bacillus licheniformis	$5 \times 10^{10}$ CFU/g	250 g/ha
Pro-2	Bacillus subtilis, Bacillus licheniformis, Bacillus pumilus	$2 \times 10^{10}$ CFU/g	10 g/kg Feed

### 3. RESULTS AND DISCUSSION

Salinity was found between 10-18 ppt during the culture period. The average pH was fluctuated within the range of 7.7 to 9.4 in different treatments (Table 3). DO remained within the suitable limit and DO was recorded maximum 8.5 mg/l and minimum 3.5 mg/l. The temperature of the water was ranged between 27 to 34°C during entire culture period. Transparency ranges from 25 to 55 cm during the culture period. Total ammonia nitrogen (TAN) was 0.1 to 0.5 mg/l in culture period. The highest was observed in the T3. Most of the time the unionized ammonia level in three treatments were between 0.002 to 0.004. However with increasing the pH and temperature sometimes it was increased. The water quality parameter in different treatments did not show any significant difference among the treatments.

**Table 3. Water quality parameters in different treatments during the experiment**

Parameters	Treatment 1 (T1)	Treatment 2 (T2)	Treatment 3 (T3)
Salinity (ppt)	10-17	12-18	11-17
pH	7.8-9.2	7.7-9.1	7.9-9.4
Temperature ( $^{\circ}\text{C}$ )	27-34	27-34	27-34
Transparency (cm)	26-50	27-54	20-35
Dissolved Oxygen (mg/l)	3.5-8.5	4.0-8.0	3.5-8.5
Total ammonia Nitrogen (TAN) (mg/l)	0.1-0.25	0.1-0.2	0.1-0.5
Un-ionized ammonia (mg/l)	0.004-0.151	0.0024-0.098	0.0039-0.302
Total alkalinity (mg/l)	120-135	125-130	110-130

The growth rates and production data of *P. monodon* are shown in Table 4 and 5. Shrimps were cultured for 144 days. The harvesting size of shrimp varied from  $29.0 \pm 1.5$  g to  $38.5 \pm 0.5$  g. The lowest was observed in T3 that was significantly lower than T1 and T2 ( $P < 0.05$ ). Daily weight gain of shrimp was significantly different among treatments. Treatment 3 showed lowest value than other treatments and the value was  $0.20 \pm 0.00$  g/day ( $P < 0.05$ ). The highest survival was found in T2 ( $82 \pm 4$ ). The survival rate was found lowest in T3 ( $68 \pm 2$ ) that was significantly lower than T1 and T2 ( $P < 0.05$ ) (Table 4). The average production in different treatments showed significant difference ( $P < 0.05$ ). Stocking density 15 pcs/m<sup>2</sup> and 22 pcs/m<sup>2</sup> exhibited the highest production of  $4635.1 \pm 128$  kg/ha/crop and  $4328.7 \pm 138.2$  kg/ha/crop respectively, and lowest was observed in lowest stocking density of 8 pcs/m<sup>2</sup> ( $2431.3 \pm 35.2$  kg/ha/crop) in T1 (Fig. 1).

Total amount of feed used in different treatments were significantly different among the treatments as the number of PL was different in three treatments ( $P < 0.05$ ). The highest amount of feed was used in T3 ( $3963.7 \pm 77.3$  kg). FCR in T3 was significantly different than T1 and T2 ( $P < 0.05$ ). Highest FCR value was observed in T3 and the value was  $1.83 \pm 0.03$ . However, there was no significant difference among the FCR value between T1 and T2 (Table 4).

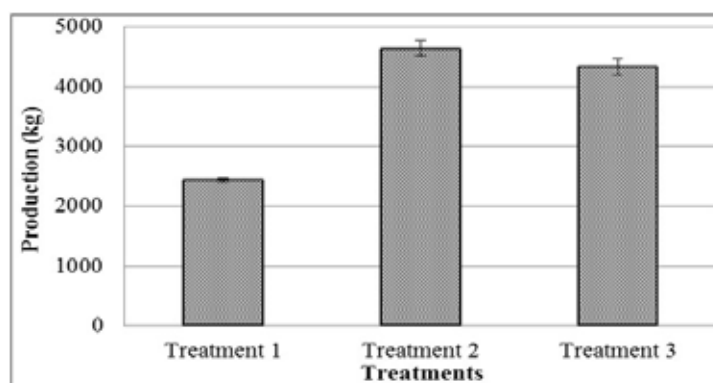
**Table 4. Production performance of *Penaeus monodon* under different stocking densities**

Parameters	Treatment 1 (T1)	Treatment 2 (T2)	Treatment 3 (T3)
Stocking size (g)	$0.05 \pm 0.0$	$0.05 \pm 0.00$	$0.05 \pm 0.00$
Initial biomass (kg)	2	3.75	5.5
Harvesting size (g)	$38.5 \pm 0.5^a$	$37.6 \pm 0.74^a$	$29.0 \pm 1.53^b$
Daily weight gain (g/day)	$0.26 \pm 0.00^a$	$0.26 \pm 0.00^a$	$0.20 \pm 0.00^b$
Production (kg/ha/crop)	$2431.3 \pm 35.2^a$	$4635.1 \pm 128.4^b$	$4328.7 \pm 138.2^b$
Survival	$79 \pm 2^a$	$82 \pm 4^a$	$68 \pm 2^b$
FCR	$1.433 \pm 0.03^a$	$1.513 \pm 0.02^a$	$1.833 \pm 0.03^b$

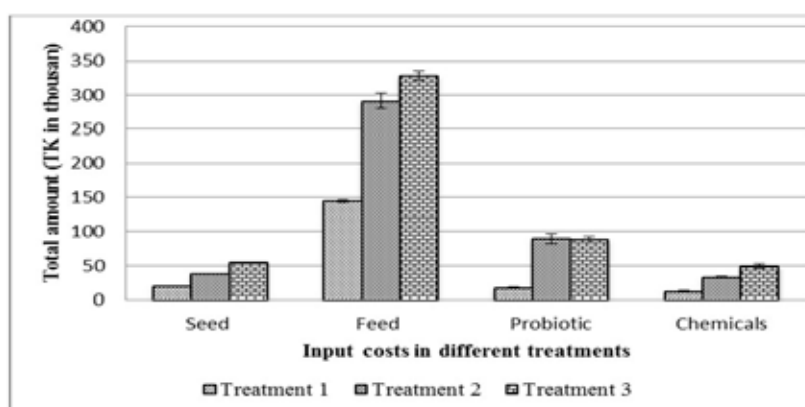
**Table 5. Economic analysis of *Penaeus monodon* farming under different stocking densities**

Parameters	Treatment 1 (T1)	Treatment 2 (T2)	Treatment 3 (T3)
Feed used (kg)	1741.0±21.7 <sup>a</sup>	3508.7±131.3 <sup>b</sup>	3963.7±77.3 <sup>c</sup>
Feed cost (tk)	144503.0±1801.3 <sup>a</sup>	291219.3±10901.6 <sup>b</sup>	328984.3±6412.4 <sup>c</sup>
Probiotics cost (tk)	17333.3±1453.0 <sup>a</sup>	89333.3±6984.1 <sup>b</sup>	88333.3±4409.6 <sup>b</sup>
Chemical cost (tk)	12333.3±1453.0 <sup>a</sup>	32666.7±1453.0 <sup>b</sup>	49333.3±3480.1 <sup>c</sup>
Total Cost (tk)	304169.7±4030.2 <sup>a</sup>	560719.3333±15817.9 <sup>b</sup>	631651.0±7662.5 <sup>c</sup>
Net profit (tk)	650535.0±16679.7 <sup>a</sup>	1242844.6±16576.4 <sup>b</sup>	707766.0±54557.7 <sup>a</sup>
Profit percent	213.7±7.7 <sup>a</sup>	221.8±3.5 <sup>ab</sup>	111.3±7.5 <sup>c</sup>

The cost of feed was also significantly different among the treatments. The highest feed cost was observed in T3 (328984.3±6412.4 tk) and lowest was in (144503.0±1801.3 tk) (Table 5). For the prevention and control of diseases probiotics and chemicals were used in all the treatments. The cost of the probiotics in T1 was significantly different than T2 and T3 ( $P < 0.05$ ). The cost of probiotics was lowest in T1 than other treatments. On the other hand the costs of chemicals were significantly different between each treatment. The highest cost was observed in T3 (49333.3 ±3480.1 tk) and lowest was observed in T1 (12333.3±1453.0 tk) (Fig. 2).



**Fig. 1. Production of *P. monodon* in different treatments during the experiment**



**Fig. 2. Major expenses during the experimental period in different treatments**

The farming of the black tiger shrimp has been increasing in Bangladesh due to high demand and price in the international market. But there are lot of obstacles in shrimp farming to makes it as a sustainable aquaculture business. To make shrimp farming sustainable, stocking density of post larvae in a pond is determined in accordance with the production capacity of the pond and the culture system, which included the soil and water quality, food availability and seasonal variations, target production. Moreover, farmers experience is also essential. In the present study the production of *P. monodon* was found better in the stocked density of 15 and 22 pcs/m<sup>2</sup>, that is similar to the statements of Ramanathan et al. [15]. They also found that stocking density between 10-20 pcs/m<sup>2</sup> was ideal for successful shrimp farms and for the nursery of shrimp Khan et al. [16] suggested the stocking density of 100 pcs/m<sup>2</sup>.

All the common water quality parameters were within the range for shrimp. Salinity, pH, Temperature, Dissolve oxygen were within the limit according to Boyd [17-18]. Sometimes with increasing the pH and temperature the unionized ammonia was increased specially in the T3, It might be due to the large amount of feed used. In such situation proper aeration and probiotics were used to control it. Probiotics might also helpful in controlling the toxic ammonia. Feed is one of the essential inputs in shrimp production and increase profits. Feed management is very important, as feed consumption cannot be directly observed. Excess nutrients which may affect pond water quality and increase cost of farming [19]. In the present experiment the total amount of feed given to the different treatments was 1741.0±21.7 kg, 3508.7±131.3 kg, 3963.7±77.3 kg in T1, T2 and T3 respectively. The FCR value was higher in T3 (1.8) compare to other treatments. Lowest FCR value was found in T1 (1.4). Paul [20] reported that the average food conversion ratios of shrimp were varying 1.5 to 1.75. Cheekait [21] observed the food conversion ranges were varying from 1.50 to 1.55 when microencapsulated diets were used. Saha et al. [22] observed that the food conversion ratios of 1.31 to 1.58 in low saline ponds and 1.35 and 1.68 in high saline ponds. In the experiment the FCR value of T1 and T2 were within the recommended limit.

The survival rate was 79±2, 82±4, 68±2, in the T1, T2 and T3 respectively. The lowest survival rate was found in highest stocking density and this might be due to the cannibalism, higher level of ammonia and other water quality parameters as in this treatment highest amount of feed were applied. Due to the lack of facility it was not possible to analyze the Nitrate-nitrogen and Nitrite-nitrogen. Krantz and Norris [23]

stated that survival rates of 60 to 80% are to be expected for *P. monodon* under suitable rearing conditions. Reddy [24] got 76% survival during the culture of shrimp. The author suggested that 70-80% survival is possible if the idle conditions are maintained for *P. monodon*. In the present study the average body weight of the shrimps were calculated as  $38.5 \pm 0.5$  g,  $37.6 \pm 0.74$  g and  $29.0 \pm 1.53$  g in T1, T2 and T3 respectively. The average body weight of tiger prawn 35.2 g was found by Reddy [24] that is similar to the present experiment.

In normal practice of shrimp culture in south western region of Bangladesh farmers are using extensive culture system without any supplemental feed. In this experiment we used higher stocking density than the normal practice with commercial feed, probiotics and proper management system. It was found that the production of shrimp was  $4635.1 \pm 12.8$  kg/ha/crop with stocking density 15 pcs/m<sup>2</sup>. The production of shrimp in the stocking density of 22 pcs/m<sup>2</sup> was  $4328.7 \pm 138.2$  kg/ha/crop where as in the lowest stocking density (8 pcs/m<sup>2</sup>) it was  $2431.3 \pm 35.2$  kg/ha/crop. But there was no significant difference among the production shrimp in T2 and T3. In T1 the harvesting size was highest and lowest was in T3. However due to the lowest stocking density in T1 the production was lowest in the treatment. Treatment two showed best production performance and this might be due to the optimum stocking density for this improved aquaculture practice. However due to the lower survival in T3, the final production was lower the treatment. In all the treatments probiotics and chemicals were used for the prevention of diseases and maintain water quality parameters. Islam and Alam [11] reported that production of shrimp culture for 120 days with stocking density 5 pcs/m<sup>2</sup>, 7 pcs/m<sup>2</sup>, 9 pcs/m<sup>2</sup> was 759.14 kg/ha, 670.77 kg/ha and 701.24 kg/ha respectively. In another experiment by Apud et al. [9] showed that production of shrimp was 340 kg/ha with stocking density 4 to 5 pcs/m<sup>2</sup> for 125 days with supplemental feed and improved water exchange system. However, in these experiments the stocking densities were lower than the present experiment. None of these experiments used probiotics for prevention and control of diseases. The average production of shrimp found in the present study in all the treatments were much more higher than those reported in the above mentioned authors for the shrimp culture in the south-western region of Bangladesh. This might be due to the use of PCR testes post larvae (PL), proper management techniques, use of probiotics, control of water quality parameters and prevention of diseases in appropriate time.

Though there was no significant difference between the total production of shrimp in T2 and T3, but total cost was higher in T3 than T2. That is why the net profit was significantly higher in T2 compare to other treatments. This might be due to the higher cost of seed, feed, chemicals for the highest stocking density and lower harvesting size of shrimp in T3. This indicated that stocking density of 15 pcs/m<sup>2</sup> is best suitable for improved shrimp farming system that will give better profit to the shrimp farmers as well as will increase the shrimp production in the country.

#### **4. CONCLUSION**

With the improvement of culture technology, management system and higher market price of shrimp, it is needed to increase production from the limited resources. Considering the improvement of shrimp culture in neighboring countries and infra-structural facilities and environmental condition in the agro-ecological conditions of the south-western region of Bangladesh, it could be concluded the stocking density of 15 pcs/m<sup>2</sup> is the best stocking density for improved shrimp farming system to boost up the production of shrimp many folds than the present farming culture system. However, further research could be done on environmental stress within the prescribed stocking density.

#### **ETHICAL APPROVAL**

All authors hereby declare that "Principles of laboratory animal care" (NIH publication No. 85-23, revised 1985) were followed, as well as specific national laws where applicable. All experiments have been examined and approved by the appropriate ethics committee.

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#### **COMPETING INTERESTS**

Authors declare that no competing interests exist.



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***Special economic zones as a direction of market transformations and an instrument of the international economic cooperation expansion in the entered sanctions conditions***

**Abstract:** In the article is considered the role of special economic zones in the conditions of the entered sanctions. The number of residents (including foreign residents) and their capital investments are analyzed. Special economic zones of tourist type are investigated as an important tool to increase investment appeal of the country and regions.

**Keywords:** special economic zone (SEZ), efficiency, investor, region, development, tourist special economic zones.

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***Особые экономические зоны как направление рыночных преобразований и инструмент расширения международного экономического сотрудничества в условиях введенных санкций***

**Аннотация:** В статье рассмотрена роль особых экономических зон в условиях введенных санкций. Проанализировано количество резидентов, в том числе иностранных, а так же объем их капиталовложений. Исследованы особые экономические зоны туристического типа в качестве инструмента повышения привлекательности страны и регионов, в частности.

**Ключевые слова:** особая экономическая зона (ОЭЗ), эффективность, инвестор, регион, развитие, туристические ОЭЗ.

Special economic zone is a term assuming solution of many state problems both in external, and in domestic economic policy of the country. The main characteristics of special economic zones is a special tax mode, granting privileges, strengthening of foreign economic relations, infrastructure development in the region and increase population's employment rate.

2014 is marked by negative events in foreign policy. In this case, it is a question of the sanctions entered in relation to the Russian Federation. To number of the countries which have declared introduction of changes in the international economic relations with Russia, as sanctions, were – Australia, Albania, Bulgaria, Great Britain, Germany, Denmark, Iceland, Canada, Latvia, Liechtenstein, Moldova, the Netherlands, New Zealand, Norway, Poland, the USA, Ukraine, France, Montenegro, the Czech Republic, Switzerland, Sweden, Estonia, Japan.

Reaction of the Russian Federation Government was laconic and unambiguous. The Russian industry headed for import substitution. However we should not forget what is special economic zones. Special economic zones assume involvement of investors. From 2006 to 2014 in special economic zones of the Russian Federation more than 320 resident investors came from 25 countries among which there are such transnational giants, as Yokohama, Itochu, Sojitz, Air Liquide, Bekaert, Rockwool, Novartis, Plastic Logic, NSN, Arkray and etc.

The companies being residents in special economic zones of the Russian Federation are registered in Belgium, Denmark, Finland, France, Switzerland, Japan and td. Some regularity is traced, after all the above-mentioned countries at the same time are initiators of sanctions against Russia.

Anyway, the discord in actions of foreign colleagues is obvious. But despite it, the authorities of the Russian Federation take steps for country development as a whole and regions in particular. It is considered that creation and SEZ functioning in Russia will be one of the main directions and a condition of market transformations, the most important instrument of expansion the international economic cooperation and trade for the next 10–15 years. World experience of creation special economic zones (SEZ) testifies that it is one of the most effective ways of investment attraction, the catalyst of foreign economic relations development of the national and the region economy in which SEZ takes place. It is important that for the beginning of 2015 the volume of the investments declared by residents makes more than 400 billion rubles.

For example, special economic zones of tourist type provide growth of tourists number, wishing to visit Russia. Natural resources do these economic zones even more popular. Besides development in them hotel business, the special attention is given to ecological, historical and cultural, extreme and medical tourism. All above-mentioned services provided or planned for granting within special economic zones are called to increase investment appeal of the country and regions.

Special economic zones of tourist type in the Russian Federation were officially registered on February 3, 2007.

Today financing of these special economic zones makes – 71 billion rubles. Money of residents - 23,36 billion rub (32 %), and 47,64 billion rub (68 %) – the state investments.

The resident in the territory of a special economic zone as the businessman pursues one main aim, namely, money attraction and gradual increase in profit. However feature of formation of SEZ in the territory of Russia is – a huge territory. Considering foreign experience, arrangement of 1 sq.km. Costs more than 50 million dollars. The total area of special economic zones of tourist type in Russia is 101,43 sq.km. The authorities of the Russian regions have no above-mentioned sum of money which would be possible to be directed on its development. Also, nowadays, in the world economic crisis conditions the state reduces costs of construction financing in special zones. Is it profitable to investors? Can available privileges pay expenses partially?

So the following conditions are offered residents of special economic zones of Russia:

1. The property tax of the organizations – release of the resident from tax payment within five years from the moment of statement on the accounting of property (point 17 of article 381 of the Tax code of the Russian Federation);

2. A land tax – concerning the land plots located in the territory of a special economic zone, for a period of five years from the moment of emergence of the property right to each land plot (point 9 of article 395 of the Tax code of the Russian Federation);

3. Application of lowering factor concerning fixed assets of the resident of OEZ to the main norm of depreciation but not higher than 2 (point 3 of article 259.3 of the Tax code of the Russian Federation);

4. A rent for the land plots on which the resident of SEZ – no more than 2 % from cadastral cost in a year (point 3 of the Resolution of the government of the Russian Federation No. 67 from 03.02.2007 is located.);

5. The profit tax of the SEZ resident organizations in 13,5 % is established;

6. The tax rate is established at a rate of 0 percent from tax base concerning taxpayers and (or) the property recognized by object of the taxation of residents of SEZ, operates to 31.12.2017;

7. A guarantee from adverse change of the legislation on the taxes and fees worsening position of taxpayers during period of validity of the agreement on implementation of tourist and recreational activity (article 38 of the Federal law «About special economic zones in the Russian Federation» No. 116 from 22.07.2005).

Anyway, the system of privileges provided to special economic zones has to be the instrument of realization available comparative advantages of the territory, instead of the compensation mechanism of available shortcomings or absent development factors.

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## ***Methodical approach to evaluating the development of innovative environment monotown***

**Abstract:** The article reviews the system of efficiency indicators for innovative environment is presented. The author suggests a method of assessing development level of innovative environment in the monotown using correlating indicators of innovative actions receptiveness and innovative activity efficiency in order to define the strategy of development for monotowns.

**Keywords:** innovative environment, efficiency indicators, methods of assessment, monotown.

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## ***Методический подход к оценке развития инновационной среды моногорода***

**Аннотация:** В статье представлена система показателей эффективности инновационной среды. Предложен метод оценки уровня развития инновационной среды моногорода на основе взаимосвязи показателей инновационной активности восприимчивости и эффективности инновационной деятельности в целях определения стратегии развития моногородов.

**Ключевые слова:** инновационная среда, показатели эффективности, метод оценки, моногород.

Устойчивое развитие моногородов, снижение рисков их функционирования, повышение уровня жизни населения возможно только на основе создания диверсифицированной экономики инновационного типа. Единая региональная инновационная политика, реализуемая органами государственной власти субъекта РФ, должна быть направлена на увеличение численности субъектов малого и среднего предпринимательства, а также объемов их деятельности посредством осуществления ими инновационной деятельности, эффективность которой во многом обуславливает благоприятная инновационная среда.

Для разработки перспективных направлений развития моногородов и управления данными процессами необходимо с определенной периодичностью проводить анализ состояния инновационной среды моногородов региона, оценивая уровень ее развития. Результаты анализа позволяют:

- оценить современное состояние инновационной среды моногорода;
- определить динамику ее развития;
- повысить эффективность использования инновационного потенциала территории;
- выявить проблемы, сдерживающие развитие инновационной деятельности;
- снизить риски развития моногородов региона;
- определить перспективы развития моногорода;
- принять эффективное управленческое решение о выборе инновационной стратегии и тактики развития моногорода.

Таким образом, актуальной задачей органов местного самоуправления во взаимодействии с органами государственной власти субъектов РФ является мониторинг состояния инновационной среды и повышение уровня ее благоприятности в целях снижения рисков развития моногородов региона и улучшения уровня жизни населения на основе роста восприимчивости и активности субъектов инновационной деятельности.

В этой связи возникает объективная необходимость разработки метода оценки инновационной среды моногорода. Необходимо отметить, что на

сегодняшний момент такой метод отсутствует. В экономической литературе имеются отдельные подходы к оценке инновационной среды региона, но они имеют определенные недостатки, а данная проблематика нуждается в дальнейшем изучении и углубленной научной проработке. На наш взгляд, необходимо использовать такой подход к оценке уровня развития инновационной среды моногородов региона, который позволит не только определить уровень развития отдельных ее элементов, но и позволит учесть их взаимосвязанность.

Непременным условием осуществления инновационной деятельности является восприимчивость и активность субъектов инновационной деятельности. Инновационная восприимчивость заключается в готовности экономических субъектов осуществлять инновационную деятельность, в то время, как активность субъектов инновационной деятельности представляет собой качественную характеристику и отображает степень ее интенсивности.

Научный и практический интерес представляет выбор конкретных показателей, выступающих в качестве критериев оценки качества инновационной среды моногорода.

Необходимость включения в анализ расчета показателей инновационной активности обусловлена тем, что уровень развития инновационной среды региона и эффективность протекающих на его территории инновационных процессов пропорциональны активности инновационной деятельности, осуществляемой хозяйствующими субъектами этого региона. То есть, при низких значениях показателей инновационной активности отдельного региона невозможно говорить о его высоком уровне инновационного развития и о наличии на его территории благоприятной инновационной среды соответственно. Таким образом, показатели инновационной активности являются определяющими факторами инновационности развития.

На наш взгляд, интегрированный показатель инновационной восприимчивости следует рассматривать как уровень инновационного потенциала моногорода, а интегрированный показатель инновационной активности – как уровень развития его инновационной среды.

Для оценки уровня развития инновационной среды и определения результативности инновационной деятельности необходимо рассчитать интег-

рированный показатель, учитывающий состояние и взаимосвязь элементов инновационной среды моногорода.

Система показателей, определяющих уровень развития инновационной среды моногорода:

1. Производство инновационной продукции, работ, услуг:

1.1 объем инновационных товаров, работ, услуг в ВРП, руб./руб.;

1.2 объем инновационных товаров, работ, услуг, на 1 руб. внутренних затрат на НИОКР, руб./руб.;

1.3 объем инновационных товаров, работ, услуг на 1 занятого в экономике, тыс. руб.;

1.4 объем инновационных товаров, работ, услуг на 1 предприятие, млн. руб.;

1.5 инновационная фондоотдача основных фондов, руб./руб.

2. Выдача охранных документов:

2.1 число выданных патентов на 1 исследователя, ед.;

2.2 число выданных патентов к внутренним затратам на НИОКР, ед./млн. руб.;

2.3 число выданных патентов на 1 исследовательскую организацию, ед.

3. Технологическая эффективность:

3.1 сумма затрат на технологические инновации на 1 созданную передовую производственную технологию, млн. руб.;

3.2 число созданных передовых производственных технологий на 1 предприятие, ед.;

3.3 число используемых передовых производственных технологий на 1 предприятие, ед.

4. Обеспеченность объектами инновационной инфраструктуры:

4.1 число предприятий, использующих информационные и коммуникационные технологии, в общем числе предприятий, ед.;

4.2 обеспеченность институтами развития в расчете на 100 предприятий, ед.;

4.3 востребованность объектов инновационной инфраструктуры, клиентов/день.

5. Научно-исследовательский сектор:

5.1 доля персонала, занятого исследованиями и разработками на 1 тыс. человек, занятых в экономике;

5.2 доля организаций, выполняющих научные исследования и разработки в общем числе организаций;

5.3 затраты на исследования и разработки в расчете на одного исследователя, руб./чел.;

5.4 обеспеченность образовательными учреждениями в расчете на 1000 чел.

6. Производственный сектор:

6.1 инновационная активность предприятий;

6.2 фондоотдача основных фондов, руб./руб.;

6.3 производительность труда, руб./чел.;

6.4 уровень дифференцированности кадрового состава населения;

6.5 уровень экономической активности населения.

7. Финансовый сектор:

7.1 обеспеченность объектами финансовой инфраструктуры;

7.2 государственное финансирование в расчете на 1 предприятие, руб.;

7.3 финансирование инвестиционных проектов в расчете на 1 предприятие, руб.

8. Уровень жизни населения моногорода:

8.1 среднедушевые инвестиционные ресурсы населения, руб. в месяц;

8.2 уровень материального благосостояния экономически активного населения;

8.3 численность населения с доходами выше прожиточного минимума;

8.4 обеспеченность жильем;

8.5 обеспеченность объектами социальной инфраструктуры в расчете на 1000 тыс. чел.

9. Устойчивое развитие моногорода:

9.1 уровень финансовой зависимости от градообразующего предприятия;

9.2 уровень однородности кадрового состава населения;

9.3 доля ГРОП в общем выпуске продукции моногорода;

9.4 баланс бюджета;

9.5 уровень дифференцированности экономики моногорода.

Все показатели, определяющие качество инновационной среды, являются относительными и отражают эффективность осуществляемой инновационной деятельности как с позиции готовности моногорода к инновационным процессам (инновационная восприимчивость), так и учитывают их результат (инновационная активность).

По каждой группе показателей необходимо рассчитать обобщенный показатель, для чего следует нормировать все рассматриваемые индикаторы, что представляется возможным осуществить по формуле линейного масштабирования. Далее рассчитываются обобщенные показатели по каждой группе по формуле средней арифметической.

Комплексный показатель уровня инновационной среды моногорода рассчитывается с учетом коэффициентов весомости каждого обобщенного показателя. Оценить вес  $j$ -го обобщенного показателя в формировании комплексной характеристики уровня инновационной среды моногорода представляется возможным посредством оценки их средних значений. Действительно, чем больше среднее значение  $j$ -го обобщенного показателя, исчисленного по совокупности моногородов региона, тем у большего количества моногородов величина этого фактора существенна и оказывает весомое значение на комплексную характеристику уровня его инновационной среды.

Такой подход к оценке уровня инновационной среды моногорода позволяет оценить не только уровень развития отдельных ее компонентов, но и учесть их взаимосвязанность.

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## ***Research and forecasting potential growth of housing construction in the Russian regions***

**Abstract:** The economic and statistical models describing probabilistic regression relationship between the annual growth rate of input of the total area of residential buildings in Russia and studied the key influencing factors on the basis of the study, found their suitability for forecasting purposes.

Proposed and tested scenario-target methodical approach to forecasting the annual volumes of housing construction in the region. Designed multifactor economic model is rigidly deterministic view for the purposes of analysis, evaluation, research, monitoring and forecasting the housing market in the region.

**Keywords:** Russia, region, potential housing, economic and statistical modeling, deterministic economic models.

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## **Исследование и прогнозирование потенциала роста жилищного строительства в регионах России<sup>1</sup>**

**Аннотация:** Разработаны экономико-статистические модели, описывающие вероятностные регрессионные зависимости между годовыми темпами роста вводимой общей площади жилых домов в регионе России и исследуемыми ключевыми воздействующими факторами на основе проведенного исследования, выявлена их пригодность для целей прогнозирования.

Предложен и апробирован сценарно-целевой методический подход к прогнозированию годовых объемов жилищного строительства в регионе. Разработаны многофакторные экономические модели жестко детерминированного вида для целей анализа, оценки, исследования, мониторинга и прогнозирования рынка жилищного строительства в регионе.

**Ключевые слова:** Россия, регион, потенциал жилищного строительства, экономико-статистическое моделирование, детерминированные экономические модели.

В 2013 г. ввод в действие общей площади жилых домов по России за счет всех источников финансирования составил наибольшую за весь период реформирования российской экономики (1991-2013 гг.) величину – 70,5 млн.кв.м [1]. Это позволило обеспечить ввод 0,494 кв.м. общей площади на одного жителя России, что составило только 49,1% к уровню целевого индикатора согласно Концепции долгосрочного социально-экономического развития Российской Федерации на период до 2020 г. [2]. В этой связи наращивание потенциала ежегодного ввода в действие общей площади жилых домов в целом по России и ее регионам за счет всех источников финансирования, является приоритетной государственной и региональной политикой в жилищной сфере в среднесрочной и долгосрочной перспективе [3]. Необходимость должного исполнения государственных обязательств в решении жилищной проблемы обуславливает поиск ее решения путем совершенствования организационно-экономического механизма развития жилищного строительства в регионах и

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реализации научного потенциала в части исследования и выявления ключевых факторов, ограничивающих рост объемов и темпов жилищного строительства в регионах, совершенствования методов прогнозирования вводимого жилья, моделирования и оптимизации процесса управления жилищным строительством [4]. Таково содержание постановки научной проблемы и актуальных направлений ее решения в прикладном аспекте.

### **Цель и задачи статьи**

Цель статьи – ознакомление широкой научной общественности с рекомендуемыми методами и моделями, востребованными в решении проблемы жилищного строительства в регионах России в современных условиях развития рыночной среды. Данная цель предопределила постановку и решение ряда задач в области:

- обоснования сценарно-целевого методического подхода к прогнозированию годовых объемов вводимого жилья по Сибирскому Федеральному округу России (СФО) на период 2013-2020 гг.;
- проведения экономико-статистического исследования и выявления вероятностной взаимосвязи изменения темпов роста по вводу общей площади жилых домов анализируемого округа, обусловленного воздействием исследуемых факторов;
- разработки экономических моделей жестко детерминированного вида, повышающих качество исследования, анализа, оценки, прогнозирования и мониторинга роста жилищного строительства, обусловленного воздействием исследуемых факторов.

### **Анализ исследования проблемы**

Анализ исследования проблемы выявил актуальность развития методов экономического прогнозирования роста жилищного строительства на основе экономико-статистического моделирования, методов тренда и анализа причинно-следственных связей, обоснования диапазона осуществимости прогноза и развития детерминированного подхода к исследованию, прогнозированию и построению экономико-статистических моделей.

Изложение основного материала и обоснование полученных результатов исследования.

В целях обеспечения адекватного качественного и количественного обоснования прогноза по вводу общей площади жилых домов в исследуемом

регионе, нами предложена концепция сценарно-целевого методического подхода к прогнозированию роста годовых объемов жилищного строительства по СФО на 2013-2020 гг. отражающая следующие методические предпосылки и параметры:

1. При обосновании оптимистического сценария:

- за исходную базу прогнозирования принят достигнутый объем по вводу общей площади жилых домов в 2012 г. – 7430,2 тыс. кв. м;

- исходным темпом прогнозируемого роста по вводу жилья на 2013 г. принят среднегодовой темп роста за 2005-2012 гг. – 108,4 %, на 2014 г. – 109,4 %, 2015 г. – 110,6 %, 2016 г. – 111,9 %, 2017 г. – 113,4 %, 2018 г. – 115,0 %, 2019 г. – 116,6 %, 2020 г. – 118,1 %, что отражает опережение темпов роста на 2016-2020 гг. относительно 2013-2015 гг.;

- обеспечена ориентация на ввод на конец 2020 г. не менее 1 кв. м общей площади жилья на одного жителя федерального округа исходя из необходимости ориентации на среднегодовой прогнозируемый темп роста по вводу жилья на 2013-2020 гг. не менее 112,9 % и предполагаемую численность населения на конец 2020 г. – 19585,3 тыс. чел.

2. При обосновании среднего варианта прогнозируемого сценария были учтены следующие предпосылки и параметры:

- исходной базой прогнозирования принят средний уровень введенного жилья за 2011-2012 гг. – 7322 тыс. кв. м в силу снижения темпа ввода в 2012 г.;

- прогнозируемый темп роста по вводу жилых домов на 2013 г. принят 106,05 %, как среднегодовой темп роста за 2011-2012 гг., на 2014 г. – 106,5 %, 2015 г. – 107,2 %, 2016 г. – 108,2 %, 2017 г. – 109,5 %, 2018 г. – 111,0 %, 2019 г. – 112,0 %, 2020 г. – 113,0 %, что позволяет обеспечить не менее 75,0 % вводимого жилья на конец 2020 г. относительно оптимистического сценария на этот период;

- ускорение темпов роста по вводу жилых домов на 2016-2020 гг. относительно 2013-2015 гг.

3. При обосновании пессимистического сценария были реализованы следующие предпосылки и параметры:

- исходной базой для прогнозирования объемов по вводу жилья явился среднегодовой объем за 2010-2012 гг. – 7083,6 тыс. кв. м;

- за прогнозируемые темпы по вводу жилья на 2013-2015 гг. приняты средний темп роста за 2010-2012 гг. – 105,94 %, на 2016 г. – 107,0 %, 2017 г. – 108,0 %, 2018 г. – 109,0 %, 2019 г. – 110,0 %, 2020 г. – 110,0 %;
- прогнозируемое опережение темпов роста вводимого жилья на 2016-2020 гг. относительно 2013-2015 гг.;
- ориентация на предполагаемую численность населения на 2013-2020 гг. по СФО.

**Таблица 1. Прогнозируемые параметры по вводу общей площади жилых домов за счет всех источников финансирования по СФО на 2013-2020 гг. согласно разработанного сценарно-целевого методического подхода**

Альтернативные сценарии прогноза	Прогнозируемые параметры		
	Ввод жилья, тыс. кв. м общей площади	Предполагаемая численность населения, тыс. чел.	Ввод кв. м на 1000 чел. населения
1	2	3	4
<b>Оптимистический сценарий</b> - среднегодовой прогнозируемый темп роста по вводу жилья на 2013-2020 гг. 112,88 %, на 2013-2016 гг. – 110,1 %, 2017-2020 гг. – 115,8 % - уровень роста по вводу общей площади жилья: 2016 г./2012 г. – 1,47 раза, 2020 г./2016 г. – 1,8 раза, 2020 г./2012 г. – 2,64 раза	2013 г. - 8054	19626,4	410
	2014 г. – 8811	19632,1	449
	2015 г. - 9746	19635,2	496
	2016 г. - 10905	19633,6	555
	2017 г. - 12366	(19622)	630
	2018 г. - 14221	(19609)	725
	2019 г. - 16582	(19597)	846
	2020 г. - 19587	19585,3	1000
<b>Средний вариант сценария</b> - среднегодовой прогнозируемый темп роста по вводу жилья на 2013-2020 гг. 109,2 %, на 2013-2016 гг. – 107,0 %, 2017-2020 гг. – 111,4 % - уровень роста по вводу общей площади жилья: 2016 г./2012 г. – 1,29 раза, 2020 г./2016 г. – 1,54 раза, 2020 г./2012 г. – 1,99 раза	2013 г. – 7765	19626,4	396
	2014 г. – 8770	19632,1	447
	2015 г. - 8865	19635,2	452
	2016 г. - 9592	19633,6	489
	2017 г. - 10503	(19622)	535
	2018 г. - 11659	(19609)	595
	2019 г. - 13058	(19597)	615
	2020 г. - 14756	19585,3	753
<b>Пессимистический сценарий</b> - среднегодовой прогнозируемый темп роста по вводу жилья на 2013-2020 гг. 107,7 %, на 2013-2016 гг. – 106,2 %, 2017-2020 гг. – 109,2 % - уровень роста по вводу общей площади жилья: 2016 г./2012 г. – 1,21 раза, 2020 г./2016 г. – 1,42 раза, 2020 г./2012 г. – 1,73 раза	2013 г. – 7504	19626,4	382
	2014 г. – 7950	19632,1	405
	2015 г. - 8422	19635,2	429
	2016 г. - 9012	19633,6	459
	2017 г. - 9733	(19622)	496
	2018 г. - 10609	(19609)	541
	2019 г. - 11670	(19597)	596
	2020 г. - 12837	19585,3	655

Данные предпосылки и параметры позволили применить сценарно-целевой методический подход к прогнозированию объемов жилищного строительства по СФО на 2013-2020 гг. (табл. 1).

Прогнозируемые параметры по годовому вводу общей площади жилых домов рекомендованы для корректировки целевой программы жилищного строительства региона на период до 2020 г.

Разработка методов достоверного прогнозирования экономических явлений является одной из коренных проблем экономической науки [5]. В этой связи в целях обеспечения продуктивного исследования потенциала роста жилищного строительства в исследуемом регионе, проведено научное исследование, направленное на выяснение регрессионной зависимости между темпами роста вводимого жилья в регионе и воздействующими факторами по данным статистических наблюдений. В ходе проведенного экономико-статистического исследования получены следующие результаты (табл. 2).

**Таблица 2. Результаты экономико-статистического исследования воздействия анализируемых факторных признаков на результативный по субъектам СФО за 2005-2011 гг.**

Исследуемые признаки	Среднее значение признака	Среднеквадратическое отклонение	Бета-коэффициент	Коэффициент регрессии	Коэффициент корреляции
Y	1,100	0,1503		0,286	
X1	1,111	0,2353	0,404	0,258	0,466
X2	1,120	0,1876	0,491	0,394	0,587
X3	1,139	0,2401	0,121	0,076	0,311
Число наблюдений = 69 С.К.О прогноза = 0,1047658 где Y – темп роста ввода общей площади жилых домов; X1 – темп роста производительности труда работников строительных организаций, исчисленной в натуральном выражении (кв.м/чел.); X2 – темп роста средней цены за кв.м на первичном рынке жилья; X3 – темп роста инвестиций в основной капитал в постоянных ценах по субъектам региона					
Коэффициент детерминации = 0,514 $Y = 0,286 + 0,258X1 + 0,394X2 + 0,076X3$					

Расчетные значения t-критерия Стьюдента по каждому факторному признаку составили:

$$t_{a_1} = 2,6 > 1,669; t_{a_2} = 3,55 > 1,669; t_{a_3} = 0,77 < 1,669.$$

На этом основании фактор X3 был удален на стадии дальнейшего моделирования, результаты которого представлены в табл. 3.

**Таблица 3. Результаты экономико-статистического исследования  
воздействия факторных признаков на результативный  
по субъектам СФО за 2005-2011 гг.**

Анализируе- мые признаки	Среднее значение признака	Среднеква- дратическое отклонение	Бета- коэффици- циент	Кoeffи- циент регрессии	Кoeffи- циент корреля- ции
Y	1,100	0,1503		0,334	
X1	1,111	0,2353	0,3996	0,255	0,466
X2	1,120	0,1876	0,5375	0,431	0,587
Число наблюдений = 69 С.К.О прогноза = 0,1061 где Y – темп роста ввода общей площади жилых домов; X1 – темп роста производительности труда работников строительных организаций, исчисленной в натуральном выражении (кв.м/чел.); X2 – темп роста средней цены за кв.м на первичном рынке жилья					
Коэффициент детерминации = 0,502 $Y = 0,334 + 0,255X1 + 0,431X2$ ,					

Для данной двухфакторной модели  $t_{a_1} = 0,255 * \sqrt{\frac{69-3}{0,1503} * 0,2353} = 2,59 > 1,669$  (табличного значения) и  $t_{a_2} = 0,431 * \sqrt{\frac{69-3}{0,1503} * 0,1876} = 3,91 > 1,669$ . Этот результат явился основанием для выявления уровня качества и надежности данной двухфакторной модели. Расчетная величина коэффициента детерминации ( $R_{yx}^2$ ) характеризует долю вариации Y и принимает значения от 0 до 1 [6]. В нашем случае  $R_{yx}^2 = 0,502$ , следовательно, 50,2 % вариации темпа роста ввода общей площади жилых домов по субъектам СФО за 2005-2011 гг. объясняется полученным уравнением регрессии  $Y(x) = 0,334 + 0,255X1 + 0,431X2$ .

Поэтому есть основание рассматривать данное уравнение достаточно качественным, но возможно ненадежным. Для проверки гипотезы о его надежности используется статистика, исчисляемая по формуле [7]:

$$F = \frac{R_{yx}^2}{1-R_{yx}^2} * \frac{n-h}{h-1}, \quad (1)$$

где n – число наблюдений; h – число оцениваемых параметров; F – расчетное значение статистики критерия.

В нашем случае  $F = \frac{0,502}{1-0,502} * \frac{69-2}{2-1} = 67,54$  и значительно превышает табличное значение (3,99) 5 %-ной точки распределения Фишера [8]. Следовательно, уравнение регрессии ( $Y = 0,334 + 0,255X_1 + 0,431X_2$ ) является качественным и надежным, но для уверенных выводов отличие наблюдаемого и критического F-критерия Фишера-Снедекора должно быть в 4 раза больше [9]. В нашем случае отличие составило 16,9 раза ( $\frac{67,54}{3,99}$ ), что достаточно надежно для прогнозирования темпа роста по вводу общей площади жилых домов по СФО на 2012 г. с учетом параметров полученного уравнения регрессии.

### Выводы и перспективы дальнейшего исследования

Результаты прогноза по вводу жилья согласно разработанного сценарно-целевого методического подхода могут рассматриваться базовой основой для формирования стратегии развития жилищного строительства и организаций строительного комплекса СФО на период до 2020 г.

В целях обеспечения необходимой достоверности к полученным результатам прогнозирования согласно применения сценарно-методического подхода и развития детерминированного подхода к прогнозированию годовых объемов регионального жилищного строительства, была предложена разработанная в ходе исследования аналитическая многофакторная модель жестко детерминированного вида (2) [10], повышающая качество анализа, прогнозирования и мониторинга вводимого жилья в расчете на одного жителя России.

$$\begin{aligned}
 \frac{O_{\text{годовой ввод жилья}}}{\text{Числен.населения России}} &= \frac{E_{\text{годовая емкость рынка жилищного стр., тыс.м.кв.}}}{O_{\text{годовой ввод жилья, тыс.м кв.}}} * \frac{O_{\text{годовой ввод жилья, тыс.м кв.}}}{O_{\text{годовые инвестиции в развитие стр., млн.руб.}}} * \frac{O_{\text{годовые инвестиции в развитие стр., млн.руб.}}}{O_{\text{годовые инвестиции в жилье, млн.руб.}}} * \\
 &\frac{O_{\text{годовые инвестиции в жилье, млн.руб.}}}{E_{\text{годовая емкость рынка жилищного стр., тыс.м.кв.}}} * \frac{C_{\text{годовые ср-ва фед.бюдж. на реал.гос.прогр., млн.руб.}}}{\text{Числен.населения России}} * \frac{O_{\text{годовой ввод жилья, тыс.кв.м}}}{C_{\text{годовые ср-ва фед.бюдж. на реал.прогр., млн.руб.}}}, \quad (2)
 \end{aligned}$$



где  $\frac{O_{\text{годовой ввод жилья}}}{\text{Числен.населения России}}$  – фактический (прогнозируемый) ввод жилья на 1 жителя;

$\frac{E_{\text{годовая емкость рынка жилищного стр., тыс.м.кв.}}}{O_{\text{годовой ввода жилья, тыс.м кв.}}}$  – фактическая (прогнозируемая) средняя рыночная цена 1 кв.м

общей площади вводимого жилья;  $\frac{O_{\text{годовой ввод жилья, тыс.м кв.}}}{O_{\text{годовые инвестиции в развитие стр., млн.руб.}}}$  – фактическая (прогнозируемая)

отдача инвестиций на развитие строительства;  $\frac{O_{\text{годовые инвестиции в развитие стр., млн.руб.}}}{O_{\text{годовые инвестиции в жилье, млн.руб.}}}$  – фактическое

(прогнозируемое) соотношение годовых объемов инвестиций в развитие строительства к годовому объему инвестиций в жилье (структурный фактор);

$\frac{O_{\text{годовые инвестиции в жилье, млн.руб.}}}{E_{\text{годовая емкость рынка жилищного стр., тыс.м.кв.}}}$  – фактическое (прогнозируемое) соотношение годовых объемов

инвестиций, направляемых в жилье к емкости рынка жилищного строительства

(доля);  $\frac{C_{\text{годовые ср-ва фед.бюдж. на реал.гос.прогр., млн.руб.}}}{\text{Числен.населения России}}$  – фактическая (прогнозируемая) доля средств, направляе-

мых из федерального бюджета на реализацию государственных программ на

одного жителя страны;  $\frac{O_{\text{годовой ввод жилья, тыс.кв.м}}}{C_{\text{годовые ср-ва фед.бюдж. на реал.прогр., млн.руб.}}}$  – фактическая (прогнозируемая) отдача

средств федерального бюджета, направляемых на реализацию программ жилищного строительства.

Разработанная многофакторная экономическая модель жестко детерминированного вида позволяет не только выявить значимость каждого из воздействующих факторов, включенных в эту модель, но и является востребованной для проведения экономико-статистического моделирования в целях повышения достоверности прогнозирования годовых объемов жилищного строительства в среднесрочной перспективе.

В целях развития детерминированного подхода к решению исследуемой проблемы и повышения качества исследования, анализа, оценки, мониторинга и прогнозирования изменения потенциала роста годовых объемов ввода в действие общей площади жилых домов на 1000 человек населения анализи-

руемого региона, разработана новая многофакторная экономическая модель жестко детерминированного вида (3):

$$\frac{O_v}{\chi_n} = \frac{O_v}{I_{\text{общ.}}} * \frac{O_{\text{общ.}}}{I_{\text{р.ф.с.}}} * \frac{I_{\text{р.ф.с.}}}{I_{\text{и.ф.с.}}} * \frac{I_{\text{и.ф.с.}}}{I_{\text{с.р.и.}}} * \frac{I_{\text{с.р.и.}}}{C_{\text{и.м.}}} * \frac{C_{\text{и.м.}}}{C_{\text{и.п.}}} * \frac{C_{\text{и.п.}}}{C_{\text{смп}}} * \frac{C_{\text{смп}}}{\chi_p} * \frac{\chi_p}{\chi_n}, \quad (3)$$

где:  $\frac{O_v}{\chi_n}$  – фактическая (прогнозируемая) величина годового ввода в действие общей площади жилых домов в регионе за счет всех источников финансирования на 1000 человек населения региона (кв.м общей площади на 1000 чел. населения);

$I_{\text{общ.}}$  – фактические (прогнозируемые) общие инвестиции в основной капитал, направляемые на новое жилищное строительство в регионе за счет всех источников финансирования (млн.руб.);

$I_{\text{р.ф.с.}}$  – фактическая (прогнозируемая) часть общих региональных инвестиций, принадлежащих российской форме собственности (млн.руб.);

$I_{\text{и.ф.с.}}$  – Фактическая (прогнозируемая) часть общих региональных инвестиций, принадлежащих иностранной форме собственности (млн. руб.);

$I_{\text{с.р.и.}}$  – фактическая (прогнозируемая) часть общих региональных инвестиций, принадлежащих совместной российской и иностранной формам собственности (млн.руб.);

$C_{\text{и.м.}}$  – фактическая (прогнозируемая) общая стоимость импорта строительных машин и оборудования для строительной деятельности в жилищной сфере региона (млн.руб.);

$C_{\text{и.п.}}$  – фактическая (прогнозируемая) общая стоимость импорта товаров и продукции для строительной деятельности в жилищной сфере региона (млн.руб.);

$C_{\text{смп}}$  – фактический (прогнозируемый) годовой объем строительномонтажных работ в жилищном строительстве в постоянных ценах (млн.руб.);

$\chi_p$  – фактическая (прогнозируемая) среднегодовая численность работников, занятых в жилищном строительстве в регионе;

$\chi_n$  – фактическая (прогнозируемая) годовая численность населения региона;

$\frac{O_{\text{ф}}}{I_{\text{общ.}}}$  – фактическая (прогнозируемая) отдача общих инвестиций в основной капитал, направляемых на новое жилищное строительство в регионе (кв.м/руб.);

$\frac{O_{\text{общ.}}}{I_{\text{р.ф.с.}}}$  – фактический (прогнозируемый) уровень структурного фактора (степень превышения годовых общих инвестиций над инвестициями российской формы собственности);

$\frac{I_{\text{р.ф.с.}}}{I_{\text{и.ф.с.}}}, \frac{I_{\text{и.ф.с.}}}{I_{\text{с.р.и.}}}, \frac{I_{\text{с.р.и.}}}{C_{\text{и.м.}}}, \frac{C_{\text{и.м.}}}{C_{\text{и.п.}}}, \frac{C_{\text{и.п.}}}{C_{\text{смп}}}$  – фактические (прогнозируемые) расчетные значения разновидностей структурных факторов, воздействующих на результативный признак;

$\frac{C_{\text{смп}}}{\chi_{\text{р}}}$  – фактическое (прогнозируемое) стоимостное выражение годовой производительности труда работников, занятых в жилищном строительстве (млн. руб./чел.);

$\frac{\chi_{\text{р}}}{\chi_{\text{н}}}$  – фактический (прогнозируемый) трудовой потенциал в сфере жилищного строительства в регионе.

Разработанная многофакторная экономическая модель (3) повышает потенциал новых аналитических и прогнозируемых возможностей для целей продуктивного анализа, оценки, мониторинга и прогнозирования изменения результирующего признака за счет воздействия ключевых инвестиционных и структурных факторов на уровне исследуемого региона. Предложенная модель направлена на развитие прикладных аспектов применения теории экономического анализа для целей исследования и прогнозирования сложных экономических явлений в сфере регионального жилищного строительства.

Результаты проведенного исследования подтверждают перспективность дальнейших разработок, направленных на совершенствование методов прогнозирования и разработку экономических, экономико-статистических и экономико-математических моделей в решении проблемы роста и развития жилищного строительства в России и ее регионах в среднесрочной и долгосрочной перспективе.

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## ***Marketing audit of the advertising company***

**Abstract:** The publication is devoted to Marketing audit of the advertising company. This article focuses on the stages of audit and the use of different audit methods of advertising.

**Keywords:** marketing audit, advertising company, audit advertising, advertising effectiveness.

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## ***Маркетинговий аудит рекламної діяльності підприємства***

**Анотація:** Публікація присвячена маркетинговому аудиту рекламної діяльності підприємства. В даній статті розглянуто етапи проведення аудиту рекламної діяльності та низку методів проведення аудиту.

**Ключові слова:** маркетинговий аудит, рекламна кампанія, аудит рекламної діяльності, ефективність реклами.

Запорукою успіху сучасного підприємства на ринку є його ефективне управління. В результаті світових досліджень [1,2,3] в пошуках напрямів підвищення ефективності та якості системи управління підприємницької діяльності було отримано низку теоретичних, методологічних та організаційних аспектів аудиту як інструменту контролю діяльності підприємства.

У сучасних ринкових умовах значної актуальності набуває розроблення теоретичних та прикладних аспектів маркетингового аудиту, який доцільно проводити на всіх підприємствах незалежно від специфіки їх діяльності, аудит дає можливість здійснити контроль витрат на маркетингові заходи, ефективність товарної політики, цінових стратегій і тактики, функціонування каналів дистрибуції, комплексу маркетингових комунікацій тощо.

Одним з напрямів маркетингу підприємства є рекламна діяльність. Дослідження вітчизняних та закордонних наукових джерел з проблематики ефективності рекламної діяльності [4,5] показало про відсутність систематичної теоретико-методологічної бази поняття «аудиту рекламної діяльності» (АРД).

На нашу думку, основними вимогами до АРД є діагностичний характер, багатовимірність аналізування результативності і ефективності реклами, застосування методів кількісного і якісного характеру під час тестування реклами, поєднання комунікаційних та економічних показників ефективності, використання комплексної системи маркетингової інформації.

Виходячи з цього, надамо власне визначення поняттю «аудит рекламної діяльності» - це процес періодичного оцінювання результативності рекламної діяльності підприємства: її стратегій (креативної та медіа) з метою контролю отриманих результатів та перевірки їх відповідності встановленим раніше цілям за допомогою показників оцінювання ефективності реклами. Використання АРД дозволяє визначити проблеми застосування реклами та вжити заходів щодо вдосконалення рекламної діяльності підприємства.

АРД є послідовний у часі процес, який можна поділити на певні етапи. Етапи АРД за своїм завданням та предметом аудиту абсолютно відповідають послідовності планування та реалізації рекламної кампанії підприємства. Так, АРД це: по-перше, попереднє оцінювання ефективності рекламного повідомлення та медіа стратегії, по-друге, оцінювання ефективності рекламного повідомлення та медіа аудит після розміщення реклами на носіях, по-третє, оцінювання загальних результатів рекламної діяльності (комунікаційна та

економічна ефективність). Необхідно зазначити, що через специфіку рекламної діяльності, зокрема, через неособистий характер комунікації, залучення в процес інших суб'єктів ринку та складний причинно-наслідковий зв'язок між впливом на цільову аудиторію та її реакцією на цей вплив, на кожному з етапів АРД враховуються різні параметри оцінювання ефективності. АРД може проводитися як власним персоналом підприємства, так і передаватися на аутсорсинг незалежним аудиторським підприємствам.

Оскільки, реклама – інструмент просування, ефектом від якої є зміна раціональної та емоційної поведінки цільової аудиторії, то на першому етапі аудиту рекламної діяльності - етапі попереднього оцінювання ефективності рекламного повідомлення та медіа стратегії необхідно визначити «точку відліку» для подальшого порівняння параметрів до впливу комунікації на споживача та після впливу. Західні науковці наголошують, що критеріями комунікаційних ефектів від реклами є сприйняття, увага, емоції, пам'ять, мотивація тощо. Так, головною задачею оцінювання комунікаційної ефективності є вивчення реакції цільової аудиторії на рекламу. В моделі Россітера-Персі [6] використовується п'ять комунікаційних ефектів від реклами: потреба продукції, знання марки, ставлення до марки, намір придбати марку, підтримка купівлі марки. Не завжди в межах конкретної рекламної кампанії є мета в досягненні всіх цих ефектів. Але, як влучно зазначають Кутлалієв А., Попов А. [5], знання марки та ставлення до неї є універсальними ефектами, які притаманні всім рекламним кампаніям.

Так, на першому етапі АРД проводиться пре-тестування реклами. Оцінювання ефективності рекламного повідомлення передбачає оцінювання ефективності розробленої концепції РП (концепт-тести) та пре-тестування самого РП до його розміщення на носії. Одним з напрямків концепт-тестів є дослідження позиціонування продукту в свідомості споживачів, виявлення вигод, які споживач пов'язує з даним продуктом, виявлення найбільш сильних вигод даного продукту і його відповідне позиціонування. Пре-тести повинні бути націлені на підготовку всієї рекламної кампанії, а не окремих рекламних повідомлень. Серед методів проведення такого тестування є фокус-групи, карти сприйняття, аналіз відповідностей, багатовимірне шкалювання, вільні дискусії, щоденники, інше.



Другим етапом АРД є оцінювання ефективності рекламного повідомлення та медіа аудит вже після розміщення реклами на носіях. Експерти з питань реклами [5,6,7] називають цей етап пілотним тестуванням. Принциповою різницею цього етапу від попереднього є те, що вперше завершене або майже завершене рекламне повідомлення передається споживачам в реальних умовах ринку, але на географічно обмеженій ділянці. Основу для побудови та організації пілотних тестів було запозичено з методології тест маркетингу. До переваг пілотного тестування реклами відноситься можливість отримання уявлення про те, на скільки ефективна буде повномасштабна кампанія. При цьому вимірювати повний комплекс параметрів - знання, згадування, відношення, намір купити, зміни обсягу продажів або кількості звернень. Також важливим є забезпечення реєстрації прямого відгуку. Чим більше різних параметрів фіксується на стадії пробного запуску, тим легше виявити ті чи інші закономірності, що зв'язують їх з ефективністю реклами. З дуже великою часткою ймовірно виявлені при пілотному тестуванні закономірності можна поширити і на результати трекінгових досліджень, що проводяться в період повномасштабної кампанії.

Одними з найскладніших методів, що використовують під час пілотного тестування реклами є методи фізіологічного контролю (fMRI, пупіллометрія, Eye-Tracking тощо). Методи фізіологічного контролю дозволяють визначити ефективність рекламної комунікації з точки зору привернення уваги, передачі змісту інформації, створення образу здатного викликати довіру тощо. Серед якісних рекламних досліджень, які використовують високотехнологічне обладнання також виділяють методи складних імітацій, до них відносяться: показ реклами на місці, контроль з використанням "хвостів", використання спеціально обладнаного кінозалу, прямий ефір, експериментальна торгівля. Але все ж таки одним з найскладніших методів тестування реклами сьогодні є Q-метод – метод є як якісним, оскільки використовує невеликі вибірки і тестує широкий діапазон думок, так і кількісним, оскільки дані аналізуються з допомогою складних статистичних процедур.

Таким чином, головними вимогами до пілотного тестування реклами є правильно спроектовані фактори повномасштабної рекламної кампанії на тестований ринок, включаючи ЗМІ, промо-акції, роздрібну торгівлю і т.д. Необхідно визначити чіткі критерії вимірювання ефективності реклами.

Медіапланування має бути грамотно співвіднесено типам ЗМІ, частоті показів і досяжності ЦА. Медіа розміщення реклами на носії складає більшу частину витрат на рекламу, що і обумовлює необхідність проведення медіа аудиту. Оптимальність медіа планування можна досягти розподілом цільової аудиторії по числу рекламних контактів, тобто обчислення охоптно-частотних характеристик; побудовою моделі ринку і поведінки споживачів в результаті впливу реклами.

Однак в галузі медіа історично склався підхід, заснований на роздільному плануванні реклами на носіях різних типів. Внаслідок цього більшість відомих програмних продуктів з медіа планування дозволяє проводити оптимізацію лише в рамках якогось одного типу носіїв - в пресі (Galileo, PROBA-Media), на TV (PaloMARS, TV Planet, AGB WorkStation), на радіо (Super Nova, CRATE, PROBA-Media). Ці програми "прив'язані" до конкретних баз даних маркетингових досліджень, які через різні методики збору даних формуються окремо для кожного типу носія.

Третім етапом АРД є оцінювання загальних результатів рекламної діяльності (комунікаційта та економічна ефективність) після проведення рекламної кампанії - post-hoc дослідження або пост-тестування. Будь-яке post-hoc дослідження має починатися з базового заміру під час пре-тестуванні реклами. Це дослідження проводиться до початку рекламної кампанії і є відправною точкою для подальших порівнянь. Найпростішим інструментом пост-тестування є одноразове вимірювання (не рахуючи попереднього при пре-тестуванні), яке проводиться через якийсь час після початку рекламної кампанії. Час одноразового вимірювання залежить від низки факторів, наприклад, від типу товару, що рекламується і може варіюватися від тижня до декількох місяців.

Порівняння показників з базовими дозволяє відстежити зміни, що відбулися і загалом з аналізом ринкової ситуації виявити рекламні ефекти. Суттєвими недоліками одноразового вимірювання є складність виявлення ефективності рекламної кампанії в цілому, також неможливо точно визначити термін проведення такого вимірювання через велику кількість неврахованих факторів та проведення одноразового вимірювання є економічно невигідним, оскільки питома вартість одноразових замірів на одиницю інформації свідомо вище, ніж при багаторазових.

Тому більш інформативним та доцільним практикуючі рекламисти [] вважають проведення моніторингових, або, інакше, трекінгових досліджень. Ключовими моментами трекінгових досліджень є вимірювання: ефективності контакту з цільовою аудиторією, ефективності рекламного повідомлення; ефективності позиціонування марки і зміни відношення до неї, зміни в поведінці споживачів; зміни частки ринку, продажів. Методики для проведення тренінгових досліджень різних маркетингових агентств можуть відрізнятися, але практично всі вони будуються на тому, що з певною частотою вимірюють ці показники. До того ж кожна приватна дослідницька методика може включати в себе низку параметрів дослідження і досить складний алгоритм їх аналізу. Так, і кожна окремо взята рекламна кампанія має свої конкретні цілі і завдання, отже, і головний акцент моніторингу має бути зроблений на них.

Обов'язковими для вимірювання під час пре-тестування, а потім після проведення рекламної кампанії є наступні показники комунікаційної ефективності: рівень впізнання товару, марки; рівень відомості товару, марки; рівень лояльності до товару, марки. Вимірюються всі ці показники у відносних величинах, які отримуються за бальною шкалою.

Таким чином, на нашу думку, основними вимогами до аудиту рекламної діяльності є діагностичний характер; багатовимірність аналізування результативності і ефективності реклами; застосування методів кількісного і якісного характеру під час тестування реклами; поєднання комунікаційних та економічних показників ефективності; використання комплексної системи маркетингової інформації. А визначення того, що саме потрібно тестувати, в яких умовах і яким інструментарієм є запорукою отримання підприємцем істотних переваг над конкурентами, оскільки це дає можливість отримати високу ефективність проведення рекламної кампанії.

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## ***Reindeer herding residents Eastern Tuva***

**Abstract:** This article reveals the reindeer as the manager of the inhabitants of the Republic of Tyva Todzha area. A feature article is statistical data in the form of population dynamics of deer different periods of the twentieth century.

**Keywords:** ethnicity, economic-cultural type, culture, reindeer husbandry, East Tuva.

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**Аннотация:** В данной статье раскрывается оленеводство как ведущее хозяйство жителей Тоджинского района Республики Тыва. Особенностью статьи является статистические данные в виде динамики численности оленей разные периоды XX века.

**Ключевые слова:** этнос, хозяйственно-культурный тип, культура, оленеводство, Восточная Тува.

## ***Оленеводство жителей Восточной Тувы<sup>1</sup>***

Тоджинский район расположен на северо-востоке Республики Тыва, в геоморфологическом плане здесь расположены юго-западные склоны Восточных Саян, Тоджинская котловина, Восточно-Тувинское нагорье с хребтом Академика Обручева и нагорье Сенгилен.

Тоджинская котловина (впадина) – межгорная котловина в бассейне правых притоков Большого Енисея – р. Хамсыра и Азас. Расположена

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<sup>1</sup> Работа написана при поддержке гранта РГНФ 13-11-17001.

котловина между Восточным Саяном и хребтом Академика Обручева. Длина около 150 км, высота от 800 метров на западе, до 1800 метров на востоке.

Рельеф местности – низкогорный, местами среднегорный, на западе холмисто-равнинный. Много озер (Тоджа, Маны-Холь), болот и другие.

Растительность, главным образом, таежная: лиственница, кедр, ель, сосна, в западной части – лиственные леса и злаково-осоковые луга. Оленеводческие пастбища богаты разнотравьем (сабельник болотный, лаготис малый, мытник судетский, вахта трехлистная и т.д.), злаковыми травами (лисохвост северный, шучка извилистая, овсяница алтайская, мятлик высокогорный), осоковыми травами (водяная осока, кругловатая, прямостоячая, блестящая, обертковидная), пущницей (узколистая, коротко копыльниковая), хвощами (полевой, топяной и лесной) и грибами (подберезовик, маслята, сыроежка, грузди, подосиновик, рыжики, лисички).

Уникальность оленеводства в том, что оно до настоящего времени остается не только отраслью хозяйства, но и образом жизни семей оленеводов.

Таежное оленеводство Восточной Тувы существенно отличается от тундрового. Стада небольшие: обычно по несколько десятков, сотен животных. Длинные миграции отсутствуют. Применяются «вольный» или «вольно-лагерный» способы выпаса, когда животные пасутся сами, без человека, периодически подходя к дому или лагерю оленеводов.

Оленеводство жителей Тоджинского района Республики Тыва исторически сложилось как транспортное. В работе А.А. Турчанинова «Урянхайский край в 1915 году» автор дает общее количество оленей в Тоджинском хошуне: 280 бедных по 30=8400; 400 средних по 100=40000; 120 богатых по 500=60000. Итого: 108 400 шт. [1].

В период коллективизации численность оленей было так много, что информант Андрей Колович Ак, один из основателей Тоджинского района, вспоминал, что только в совхозе Первомай (первый директор совхоза «Первомай») численность оленей достигала до 11 тысяч голов. По мнению Андрея Коловича, основными причинами сокращения поголовья оленей являются централизованное планирование, где на выполнение государственных заготовок, на убой в год отправляли до 1000 голов оленей; низкая заработная плата и пенсия, социальная незащищенность, которая толкала

людей на убой и реализацию оленины, для того, чтобы прокормить свои семьи<sup>2</sup>.

Еще Каррутерс во время своей поездке отмечал, что олени, встречающиеся в Тоджинском хошуне, бывают двух разновидностей: белые и коричневые. Белые крупнее, сильнее и ценятся дороже; ростом белые немного выше, чем коричневые – на 5-8 см.

В среднем коричневые олени ростом 102-103 см, тогда как белые – 110-112 см.

Кроме домашних оленей, водятся еще дикие олени. На сегодняшний день серьезной проблемой для жителей Тоджинского района стало увеличение численности дикого оленя. Следует обратить внимание на негативное воздействие дикого оленя на домашнее оленеводство, которые складываются из трех факторов: увод домашних оленей дикими; стравливание пастбищ и взаимная пастбищная конкуренция; сохранение очагов инфекций, а также перенос болезней домашних оленей. Во время исследовательских работ нами было замечено, что в домашних стадах оленей присутствуют примеси с дикими оленями<sup>3</sup>.

Домашние олени совершенно не пугливы, требуют мало ухода и каждый вечер возвращаются к юртам на ночлег. Все это потому, что молодых оленят тотчас после рождения привязывают около чума (жилища). Недалеко от жилища устраивают легкие навесы, под которыми протягивают веревку на колышках, к которой и привязывают молодых оленят и самок, должных телиться. Поэтому оленухи никогда далеко от стойбища не уходят, с ними держатся двухлетки и однолетки, валухи и быки.

Продуктами оленеводства являются молоко, мясо, рога. Молоко от оленей получается мало, но оно крайне густое и жирное, вероятно содержание жира значительно больше 11-12%. В среднем олень дает 3-4 чашки молока в день или 600-800 куб.см. [2].

Оленьи пастбища – это территории, расположенные в зоне тундры, лесотундры, северной тайги, растительный покров которых пригоден в качестве корма для северного оленя. Площадь оленьих пастбищ составляет 1529,6 тыс. га.

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<sup>2</sup> Информатор Ак Андрей Колович, 1936 года рождения, уроженец с. Севи Пий-Хемского района Республики Тыва.

<sup>3</sup> Информатор Демкина Светлана Алексеевна, председатель ассоциации «Тос-Чадыр».



Наибольшие площади оленьих пастбищ имеются в категории земель лесного фонда – 1449,8 тыс. га и сельскохозяйственного назначения 79,6 тыс. га, поэтому долгосрочная аренда и тем более приватизация земли под оленьи пастбища не возможны.

Общая площадь лесных насаждений не входящих в лесной фонд в составе земель сельскохозяйственного назначения составляет 215,0 тыс. га, под водой – 18,5 тыс. га, под болотами – 47,2 тыс. га и прочих земель 406,6 тыс. га (это полигоны отходов, свалки, пески, овраги, земельные участки с тундровой растительностью, не вошедшей в другие угодья, другие земли).

По данным статистики Республики Тыва (1992 г.) и Министерства сельского хозяйства и продовольствия площадь Тоджинского района составляет 44,8 тыс. кв. м. Общая площадь земельных угодий трех общин (Хамсыра, Улуг-Даг, Одуген) составляют 52605 га, из них – 17535 га сельскохозяйственных угодий, 12078 га – пастбищ, 924 га – пашни, а остальная площадь принадлежала Госпромхозу, аратско-крестьянским хозяйствам и населению.

В Тоджинском районе содержатся 77% от всего поголовья местных оленей по республике.

**Таблица 1. Динамика численности оленей в Тоджинском кожууне РТ [3]**

Год	Поголовье
1945	8100
1950	3100
1960	5800
1970	11600
1980	20744
1981	16200
1982	10300
1983	8480
1984	8489
1985	8731
1990	8100
1994	5227
1995	4469

2000	1200
2003	1340
2004	1335
2005	1339
2006	1355
2007	1164
2008	1285
2009	1598

Пик развития оленеводства относится к 1980 году. Тогда в Туве насчитывалось 20744 тысячи голов.

Перестроечная ломка самым катастрофическим образом сказалась на этой специфической отрасли животноводства республики – к 2000 году поголовье оленей сократилось до 1200 голов во всех категориях хозяйств.

**Таблица 2. Поголовье оленей Республики Тыва в 2012 году [4]**

<b>Название хозяйств</b>	<b>Начало 2012 года</b>	<b>Конец 2012 года</b>
Тоора-Хем	25	41
Адыр-Кежиг	294	343
Ий	0	0
Сыстыг-Хем	0	0
Ырбан	0	0
Хамсыра	131	158
Итого	450	542
МУП «Одуген»	578	773
ГОУ НПО ПУ 12	54	62
Итого	632	835
Всего	1082	1377

По состоянию, на конец 2012 года всего по республике имеется 1377 голов оленей.

В результате реформ периода перестройки произошло резкое сокращение поголовья оленей Восточной Тувы, чтобы сохранить поголовье, здесь практически прекращен забой животных на мясо. Администрация Тоджинского района выделяет специальные средства на стимулирование прироста поголовья, на покупку живых оленей для малооленных хозяйств и др. Информатор Лопсан-Базыр Точка, 1940 года рождения, отметил, что со стороны администрации Тоджинского района выделяемые оленеводам бинокль, рация, машина «Буран» идут не по назначению, так как бригадир оленеводческой фермы Монгуш их забрал. Кроме того, чаще всего получается, что бригадиры проблем оленеводов не знают, не имеют отношения к ним. Таким образом, можем отметить, несмотря на предпринимаемые меры, депрессия оленеводства пока сохраняется<sup>4</sup>.

Постепенное сокращение поголовья оленей Тоджинского района началось здесь задолго до начала перестройки, где недавно оленеводство было обычным, оленей не осталось уже совсем. За годы реформ этот процесс усилился. Сегодня ареал оленеводства разбился на отдельные изолированные участки, в которых содержится по несколько десятков и сотен оленей. Но и они все более уменьшаются и разобщаются. Таким образом, можно отметить, что под угрозой полного исчезновения находится порода тувинских оленей - самых крупных и выносливых транспортных оленей в мире.

В современной России олени находятся в трех видах собственности: общественной, государственной и частной. Однако на практике различия между хозяйствами с государственной и общественной формами собственности незначительны.

В общественной собственности находится большая часть оленей, ранее принадлежавших колхозам и совхозам. В результате приватизации из этих хозяйств были организованы коллективные долевые хозяйства, в некоторых случаях родовые хозяйства. Эта форма собственности является наиболее распространенной.

В частной собственности находятся личные олени населения, а также олени, принадлежащие фермерским хозяйствам, родовым общинам и другим объединениям частников.

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<sup>4</sup> Информатор Лопсан-Базыр Точка Лопсан-Базырович, 1940 года рождения, уроженец с. Адыр-Кежик Тоджинского района Республики Тыва.

Личные олени обычно принадлежат пастухам, работающим в оленеводческих хозяйствах, или их родственникам. Эти олени, как правило, выпасаются в стадах того оленеводческого хозяйства, в котором работают их владельцы. Однако владельцы личного поголовья могут вести хозяйство и самостоятельно.

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## ***The competitive behavior of small businesses in the innovation economy***

**Abstract:** The problems of the competitive behavior of small businesses in the innovation economy are considered. The features create sustainable comparative advantages of small business are showed. Conclusions are drawn on necessity to develop innovative strategies for the development of small business, utilizing effective methods of competitive behavior with the development of abilities to creative imitation.

**Keywords:** small business, innovation economy, creative imitation, competitive advantages.

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## **Конкурентное поведение малого бизнеса в инновационной экономике**

**Аннотация:** Рассмотрены проблемы конкурентного поведения малого бизнеса в инновационной экономике. Показаны особенности создания устойчивых сравнительных преимуществ малого бизнеса. Сделаны выводы о необходимости разработки инновационных стратегий развития малого бизнеса, предусматривающих использование эффективных способов конкурентного поведения с учетом развития способностей к креативным имитациям.

**Ключевые слова:** малое предпринимательство, инновационная экономика, креативная имитация, конкурентные преимущества.

**Постановка научной проблемы и ее значение.** Сегодня складывается принципиально новый контекст ведения бизнеса, при этом малое предпринимательство сталкивается со сложными проблемами, обусловленными усилением конкуренции, кардинальным изменением ее природы, источников и механизмов осуществления под влиянием многих факторов – глобализации бизнеса, повышения роли инноваций и нематериальных активов, дифференциации спроса и др. В данных условиях возникает настоятельная потребность переосмысления сложившихся форм и методов предпринимательской деятельности, разработки подходов обеспечивающих успешную их адаптацию к динамичной бизнес-среде.

**Анализ исследований проблемы.** В настоящее время среди современных теорий, различным образом интерпретирующих формирования устойчивых конкурентных преимуществ малого бизнеса, особую значимость имеет ресурсная концепция, на основе которой сложилось два ее ответвления – традиционный подход и концепция динамических способностей. В (традиционной) ресурсной концепции целью успешных стратегий стало считаться создание собственных, трудно имитируемых другими фирмами ресурсов [1, 2]. Сторонники концепции динамических способностей указывают на недостаточность обладания уникальными ресурсами и компетенциями в условиях турбулентной среды, необходимы динамические способности и соответству-

ющие процедуры позволяющие своевременно адаптировать ресурсы и компетенции к меняющимся условиям [3].

В процессе поиска эффективных способов достижения успеха исследователи сегодня обращают значительное внимание на изучение феномена инновационной конкуренции. При этом указывается на то, что сложившееся упрощенное представление о характере и содержании имитационного вида предпринимательской деятельности, способствовало недооценке ее роли в развитии конкурентных преимуществ [4, 5, 6]. Однако в целом сложившийся теоретико-методический инструментарий, остается недостаточно разработанным; он не учитывает должным образом особенности малого бизнеса.

**Цели и задачи статьи.** В настоящее время малый бизнес ещё не превратился в целевой объект теории стратегического управления при определении механизмов достижения конкурентных преимуществ. Утвердившиеся подходы в большей степени ориентированы на крупные компании, чем на изучение способностей малых предприятий добавиться стратегического успеха. В связи с этим важным является разработка теоретико-методического инструментария, позволяющего реалистично описывать процессы инновационного поведения с учетом отличительных особенностей малого бизнеса.

Изложение основного материала и обоснование полученных результатов исследования. Подход, основанный на системно-эволюционной парадигме, позволяет расширить предметное поле исследований, изучающих инновационную конкуренцию в качестве основного типа рыночного поведения малого бизнеса. Малая фирма может рассматриваться как саморазвивающаяся, эволюционная, открытая система, испытывающая постоянные воздействия внешней среды (культуры, институтов, технологий, природы и т.д.) и реагирующая на них, обладая ограниченными ресурсными возможностями, своеобразием стратегических мотивов, целей и методов ведения предпринимательской деятельности.

Формирование конкурентных преимуществ определяется во многом стадией жизненного цикла продукта. При этом последовательные улучшения от стадии зарождения до стадии зрелости могут быть представлены в виде S-образной кривой. В период зарождения движущей силой выступает шумпетерианский предприниматель, осваивающий радикальные инновации, а на последующих стадиях ключевую роль приобретает кирцнерианский

предприниматель, восстанавливающий равновесие в экономике. На начальном этапе конкурируют разные модели продукта; с выделением доминирующей модели конкуренция осуществляется в рамках разных вариантов одной модели в условиях формирующегося массового рынка. При этом прорывные инновации сменяются инкрементальными, приобретающими имитационный характер.

Современное состояние конкуренции определяют как гиперконкуренцию. Дополняя ценовую и неценовую конкуренцию, она подрывает роль барьеров, сдерживающих конкурентную борьбу: технологических, торговых, патентных, лицензионных и др. Ключевое значение для малого бизнеса приобретает способность находить слабые места у конкурентов, разрушая барьеры, и своевременно отказаться от своих устаревших преимуществ и создавать новые.

Уже с выходом в 1984 году работы «Второй индустриальный раздел» М.Дж. Пайора и Ч.Ф. Сэйбла было обращено внимание на то обстоятельство, что системные перемены в условиях предпринимательской деятельности вызвали в развитых странах если не полное изменение направленности, то, по крайней мере, ослабление тенденции роста масштабов предприятий [7]. Повышение роли малого предпринимательства в экономическом развитии связано в современных условиях не только с уменьшением влияния эффектов объемов производства и масштабов предприятий, но и с появлением различных форм синергетического взаимодействия малого, среднего и крупного бизнеса, основанного на формировании горизонтальных и вертикальных связей и реализованных в виде различных конкурентно-кооперационных структур – кластеров, целевых альянсов, предпринимательских сетей и т.д. [8]. Кроме того, происходящие перемены способствуют развитию ключевого конкурентного преимущества малого предпринимательства, заключенного в лучшем использовании ресурсов времени в связи с его высокой гибкостью и скоростью адаптации к меняющейся бизнес-среде, что, в свою очередь, обуславливает появление новых качеств в национальных экономиках [9].

Важное значение для успешного развития конкурентных преимуществ малоразмерных фирм имеет практика заимствования технологий. В связи с этим в конце 1990-х годов А. Макферсон показал, что внешнее приобретение знаний является эффективным малозатратным способом приобретения технологий, особенно для компаний малого и среднего бизнеса [6]; П. Бакли для



описания способа заимствования знаний субъектами малого бизнеса, использует понятие «стратегии трансфера технологий» [4]. Сегодня Р.Дж. Джентри, Т. Далзаел, и М.А. Джеймисон интерпретируют практику заимствования технологий и «стратегию имитации» как эффективный путь развития стартапов [10].

При анализе инновационных стратегий развития конкурентных преимуществ важным становится рассмотрение множества разнообразных вариантов инновационной стратегии как пространства, характеризующего переход от чистой имитации с помощью креативной имитации к чистой инновации. В условиях инновационной конкуренции значительно сократился временной интервал, в течении которого фирмы имитируют успешные практики лидеров. Сокращение имитационного лага и многообразие применяемых компаниями методов управления изменениями привели, как отмечают М. Самуэльсон и П. Дэвидсон, к тому, что сегодня различие между инновационными и имитационными стратегиями у предприятий во многом стираются [11]. Малые фирмы могут имитировать как продукты и услуги, а также технологии, процессы, стратегии, практики, бизнес-модели, дизайн и элементы бренда [1, 12].

Креативная имитация позволяет избежать многих недостатков, свойственных простому копированию новшества, вместе с тем она является более надежной с точки зрения формирования издержек и стратегических рисков по сравнению с моделью радикальной инновации. Она особенно важна для малых фирм, у которых нет достаточных материальных и нематериальных ресурсов и инновационных способностей. Креативный имитатор использует недостаток свойств, ошибки сегментирования и позиционирования оригинального продукта. В большинстве случаев рассматривается новый продукт не с точки зрения технологий, а с точки зрения потребителя, что и предопределяет успех имитатора на рынке [5]. Модель креативной имитации часто приводит к лучшим результатам при использовании ее малыми фирмами на динамично растущих и высокотехнологических рынках.

Время выхода на рынок является критически важным для успешности реализации инновационных стратегий. Выбор своевременного момента выхода зависит от многих обстоятельств, в том числе от стадии цикла жизни продукта и характера инновации. Так, при преждевременной имитации имитатор может и не получить ожидаемой выгоды. В свою очередь запоздалое имитирование в условиях зрелого рынка также затрудняет получение прибыли в связи с

высоким уровнем конкуренции. Имитатору важно выйти на рынок в тот момент, когда он обладает значительным потенциалом роста.

Выводы и перспективы дальнейшего исследования. Сегодня важным фактором формирования устойчивых преимуществ для малого бизнеса становится использование эффективных способов конкурентного поведения на основе развития способностей к инновациям. Однако процесс инновационно-конкурентного поведения малых фирм является весьма сложным и противоречивым; многие его аспекты остаются недостаточно исследованы. Предлагаемый подход способствует разработке инновационных стратегий, применительно к малому бизнесу адекватных реалиям. При этом целесообразно смещение научного интереса от вопросов правовой защиты инноваций к вопросам поиска условий, форм и способов осуществления креативной имитации малыми фирмами.

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## ***Sanctions for the Russian agriculture: a dreadful factor or its new birth?***

**Abstract:** The article deals with the problem of imposed sanctions for the Russian Federation and its importance for the agricultural complex whether it is going to demolish the complex or give it a new chance to raise from the ashes. This linkage is revealed with regard to products import covered by the Russian ban.

**Keywords:** sanctions, trade embargo, import substitution, agricultural support.

It is obvious that thanks to the economic crisis in the Russian Federation scenarios of present being for many people are not very optimistic - it is one thing when you can not afford a new gadget, but it is different when it comes to the elementary things of prime necessity, first of all - food.

In 2008, the world was desperately thinking what to do next, but with the increase in energy prices by 2009 the majority of citizens of our country breathed out with relief, was that justified? Now we can state with confidence that this was only the calm before the storm. A huge number of scientific articles, media publications and analytical surveys just confirm the long proven truth – oil money alone will not take you far. The time has come to face the consequences of this fact. Of course, the geopolitical situation has played an important role in the deployment of a fatal spiral; on the other hand, as many politicians and economists have noted [1], the sanctions and the food embargo response of Russia can stimulate the re-orientation of our economy - from an exporter of natural resources on the actual product manufacturer.

If truth be told, all the arguments of the Russian crisis are reduced to one thing – to sigh of Benjamin Franklin for 1 barrel and think about how you can get out with minimal losses in view of the current situation. In this context, the preservation of food sovereignty is directly correlated with the current state of the agribusiness of Russian Federation; especially acute is the question of import substitution that has been dictated by the Russian "contra-sanctions". In most cases, the concept of food security involves the provision of basic food, such as corn, potatoes, vegetables, meat, milk and eggs [2]. Providing the country's population with food in sufficient quantity and variety is a complex issue itself, involving other complex issues of food production, import dependence and export oriented food market, as well as solvency and structure of nutrition. It is obvious that the level of food security decreases with increasing imports of goods.

The following chart reflects the increase in the imported component in the structure of dairy products consumption in Russia [3]:



**Fig.1. Import of dairy products in the Russian Federation**

Dairy products are given as an example not without a reason – it is this part of the food supply that is the weakest in the food sovereignty of the Russian Federation. Milk production is closely tied to the number of cows that has been greatly reduced in the nineties. What should be noted in mind is that cattle can be meat and dairy, with about 8% of the total number of animals working in the specific 'milk' direction. Production of raw milk is about 30 million tons and has been held at the same level for several years – on a par with the amount of the milk products made. In 2014,

Russia imported 9.19 million tons of milk and dairy products – with its own production of 30.66 million tons [4]. Most of the imports come from Belarus. The level of domestic production of milk is about 80%, which is less than the target of 90% [5].

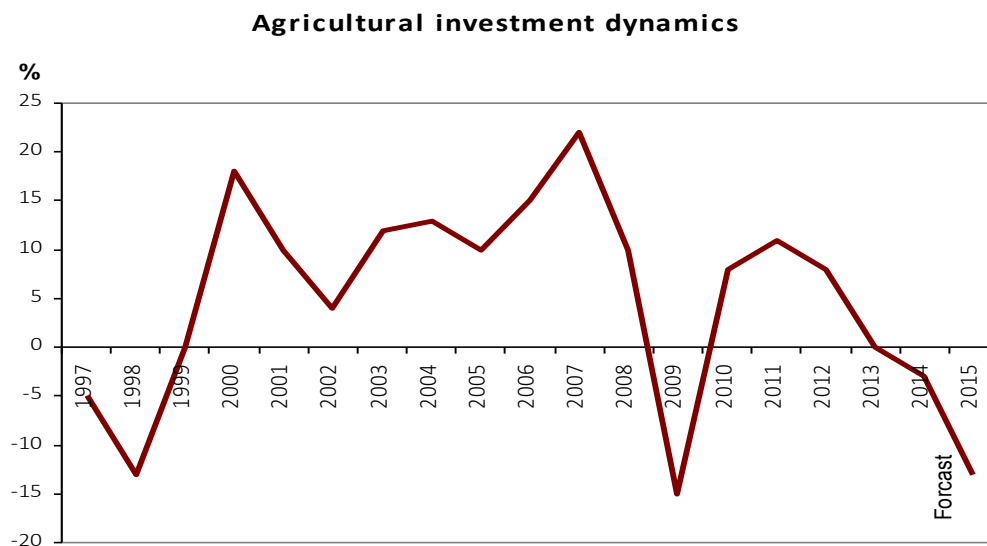
Let's see if everything is as sad as it seems. Russia introduced the embargo which has been much appreciated, on the one hand, as a second breath for the Russian agricultural producers (the most common promise was to fill the shelves with quality and healthy products), on the other hand, as a factor that lead to higher prices because, despite the investment in the agricultural sector, manufacturers cannot dramatically increase production to compensate for import (30% pork, 60% milk, etc.). Why this is so has already been mentioned: outdated equipment, lack of productive technologies, and the very inertia of the industry is palpable. For example, to grow a dairy cattle herd is clearly a question of more than a couple of months or even half a year.

As the statistics of the Russian Federation states, – gross value added (GVA) of agriculture is 3.9% of the gross value added produced in the Russian economy in 2014. Since 2002 there has been a clear tendency to reduce the share of GVA of agriculture – 5.9% to 3.9%. At first glance, it is not so critical. For example, in most developed countries, the share of gross value added is close to 2% of the total value added produced in the economy. On the other hand, in the light of the food embargo such dynamics is not an indication of progress. The analysis of the dynamics of the past 12 years of other indicators characterizing the development of agriculture in these years is also of particular interest. So, during the period under review the proportion of agricultural land in possession of agricultural organizations has decreased - from 77.3% (at the beginning of 2003) to 62.7% (as of early 2014). But the proportion of farmland at the disposal of the population has significantly increased – from 13.9 to 24.3%. At the same time about half of the land is not owned by the population, and is available for rent by agricultural organizations or for temporary use by municipalities. Thus, the conclusion is obvious that the simultaneous growth of agricultural population and population decline in the share of manufactured products formally tells us about reduction of the efficiency of agricultural production in households. Most likely, people began to spend less resources (and labor, and material) on processing of their own farmland.

As for the structure of Russian agriculture in terms of crop production, it is still dominated by cereals (mainly wheat and barley, and maize - in 2002 its gross yield

increased by 5.5 times, and in 2014 the share of maize in the total amount of cereals was 11.6%), sugar beets, potatoes and vegetables. A Russian cattle breeding is still undergoing a prolonged crisis. So, on January 1, 2014 it included 18.7 million heads. A decade ago, it was 25.1 million heads. Thus, the reduction was 25.5% (including the number of cows by 19.8% – from 11.1 million – to 8.9 million cows). Russian agriculture is significantly inferior in efficacy if compared with other developed countries. This situation was typical 10 years ago, and is now. The performance of productivity reflects it the best. Although yields, for example, wheat and potatoes have grown over 10 years in Russia, in developed countries this figure has not remained the same either. A comparison with the Scandinavian countries and Canada still remains not in Russia's favor, confirming the hypothesis that the climate is not the decisive factor in achieving high yields. An important role is also played by the size and orientation of the target cost agriculture. The average yield of potatoes, for example, over the past period in Sweden and Canada was about 300 kg/hectare, while in Russia – an average of 130 kg/hectare.

Of course, public access to information world economy leads to certain conclusions. We can assume that the failure of agriculture in Russia is due to lack of means of the state and other stakeholders.



**Fig. 2. Investment dynamics with a forecast for 2015 (Sources: Rosstat (the official Russian statistics site), MER prognosis)**

Relying again on the data of Rosstat, no comments are required. As for the dynamics of the ratio of government support and the value of production, for 10 years Russia had significantly been lagging behind other countries in this regard, has finally caught up with them [7]. So, if in 1999-2001 state support for agricultural production in the Russian Federation was on the average 5.3% of the cost of production, in 2010-2012 the figure was already 21.3%. In the same period in Canada the figure was 21.9% in the US – 39.2%, in the EU – 25.9%. On the other hand, while state support of 1 liter of milk in the Russian Federation in the amount of 25% is within the "dreams" agricultural producers, in the EU it is 35-40%, in the US even more – 75%. Russia is catching up with developed countries in the level of state support of agriculture (on average), but it has no significant impact on its competitiveness in the global and domestic markets. This partly refutes the widespread thesis about the insignificance of the state support of agriculture in Russia, compared with developed countries. But the very conditions for receiving state support in Russia are quite tough and inconsistent (especially in the context of its membership in the WTO). It can be said with certainty that some of them are not feasible for the majority of farmers. So in order to get a subsidy in the dairy sector from 2016 it will be necessary that each one hundred dairy cows give birth to 80 calves a year. Farmers now say that this condition is hardly feasible even for large agricultural enterprises, not to mention the small farms. At best, 40% of milk producers will be able to achieve these indicators; the rest will be left without support [8].

Based on the above information we can state the following: agriculture is struggling to cope with the import function assigned to it in view of the sanctions and the trade embargo. There are many reasons but the following four are the main, in our opinion:

1. Resource export orientation of the Russian Federation is pushing the development of agriculture to the background;
2. The imbalance between state support of the industry and its development;
3. Underdeveloped incentive system to attract labor resources into the agriculture;
4. The inefficiency of the executive bodies in the field of agriculture.

Let's pay the most attention to the last paragraph.

In a crisis situation, the authorities are trying to optimize costs. [9] Most of the officials of the Russian Federation subjects are willing to reduce staff by 5-20% or



trim their content, according to the newspaper "Kommersant". However, what is really going on in the Russian regions is the subject of a separate study. At the same time, based on the data about the salaries of federal officials, Rosstat recorded the average income of an employee of the Ministry of Agriculture in the amount of 88 thousand 250 rubles. It turns out that using the simple arithmetic tools; we can confidently state that the salaries of officials grew much faster than the incomes of other Russians. Thus the average salary in the Ministry of Agriculture for the year increased by 41%. The main office were among those where wages rose more rapidly. Taking into account the maximum number of employees of the central apparatus of the Ministry of Agriculture of the Russian Federation in the amount of 707 units (without personnel for the protection and maintenance of buildings), the average payroll only for this structure is 973 million rubles. (As amended by Decree of the Government of the Russian Federation from 27.01.2010 N 31).

In the context of the above, consider the curious information - audit, but rather expert-analytical activities "Analysis of the Use of the Federal Budget Directed in 2012 at the Implementation of the State Program of Agricultural Development and Regulation of the Market of Agricultural Products, Raw Materials and Food for 2008-2012 Years and Assessment of the Achievement of its Objectives" [10]. According to the auditor Bateau Zhargal Zhambalnimbuev, out of the nine targets of the state program only one has been carried out – "The Disposable Resources of Households in Rural Areas." Its implementation was 116.8%. All other parameters that characterize the dynamics of the industry have not been achieved, despite the fact that the state program was funded at 116.4% (actual funding amounted to 653 billion rub. instead of the planned 551.3 billion rub.). "In general, the implementation of the state program for 2008-2012 can not be called a success, because you have reached only 60% of the established indicators," – said Bateau-Zhargal Zhambalnimbuev.

The auditor noted that the key indicator of the state program – "to ensure the average annual growth in agricultural production" – has not been fulfilled, which amounted to 3.4% in the approved plan of 4%. Indices of animal and plant products amounted to 114.9% and 114.6%, respectively, with the approved plan of 127.7% and 115.9%. A similar trend is also recorded with indicators such as making animal products, milk and infrastructure development in rural areas (in fact turned out to

perform at a level of about 60%). The costs of the federal budget for all of the above areas were significantly increased compared with planned.

It is logical to assume that, in terms of the budget deficit of the Russian Federation, the Ministry of Agriculture official salary of 88 thousand rubles with only the head and the number of structures in the amount of 707 people with the implementation of the state program on the development of agriculture by 60% on the basic indicators, targets and overspending the budget by 16% (to 102 billion rub.) forms a fairly pessimistic scenario. Throw in the average salary of workers of agriculture – 18.349 rubles in the Russian Federation (on 01.11.2014) [11] and 30.5 thousand rubles for the Moscow Region and Krasnodar Territory (on 12.17.2014) and obtain a "perfect storm" for food security in the light of the development of agriculture of the Russian Federation. Unfortunately, even the savings on wage cuts of 10% promised by the authorities, do not fix the situation. The rhetorical question: "Why should be people paid if they are not doing their job?" remains open.

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### ***The degree of inheritance live weight at cross-breed goats soviet their wool breed at different forms of recruitment in the Republic of Tyva***

**Abstract:** Results of research work on studying hereditary transfer of fixed - economically valuable features of the received mixedbred offspring goats soviet their wool breed at different forms of selection.

Us were conducted study on study of the hereditary issue main sign beside posterity nanny goats soviet sorts in condition of the Republic Tyva. We could reveal value and issue hereditary quality on the main sign, as living mass. And for decision of this question in 2009 was put delivered purpose - define the degree of the inheritance of the alive mass beside got posterity under different forms of the selection.

**Keywords:** Tuva hybrid goats soviet their wool breed, heredity, weight, selection, breeding.

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### ***Степень наследования живой массы у помесных коз советской шерстной породы при разных формах подбора в условиях Республики Тыва***

**Аннотация:** Приведены результаты научно-исследовательской работы по изучению наследственной передачи основных – хозяйственно полезных признаков, как живая масса у полученного помесного потомства коз советской шерстной породы при разных формах подбора.

**Ключевые слова:** тувинские помесные козы советской шерстной породы, наследственность, живая масса, подбор, селекция.

О наследственной основе животного можно судить путем изучения его конституции и продуктивности, так как развитие продуктивных качеств обусловлено наследственностью данного организма. Прежде всего, для верного суждения о наследственных качествах племенной ценности животных, можно определить коэффициент наследуемости [1].

Коэффициент наследуемости помогает также прогнозировать степень улучшения селекционируемых признаков у потомства по сравнению с родителями [2].

Нами проводилось исследование по изучению наследственной передачи основных селекционных признаков у помесного потомства коз советской шерстной породы в условиях Республики Тыва. Для выявления племенных достоинств и передачи наследственных качеств по основному селекционному признаку, как живая масса. Была поставлена цель – определить степень наследования живой массы у полученного потомства при разных формах подбора.

### **Материал и методика исследований**

Чтобы определить степень передачи наследственных свойств у козлов-производителей мы выбрали два метода: метод - «дочь-мать», когда сопоставляются качества дочерей с их матерями, и метод – «дочери сверстницы», когда среднюю продуктивность дочерей оцениваемого производителя сравнивали со средней продуктивностью сверстниц других проверяемых производителей при разных формах подбора [3].

Наиболее важным селекционируемым признаком коз является живая масса. Поэтому по степени наследования этого признака определялись племенные достоинства производителей. В возрасте 2,5 года определена живая масса у их дочерей по 50 голов от каждого производителя.

В наших исследованиях для определения степени передачи наследственных признаков при разных формах подбора в опыте участвовали помесные козوماتки советской шерстной породы по 100 голов в каждой группе.

В основном мы остановились на методе «дочь-мать» поскольку потомство наследует свои качества и от отца, и от матери. Иногда прямо сопоставить дочерей по их продуктивности с отцом невозможно в силу ограниченности признака по полу.

По данным Ерохина А.И. (2001), коэффициент наследуемости основных селекционируемых признаков у овец и коз в среднем колеблется в пределах: живая масса тела 0,3-0,5, настриг невыттой шерсти - 0,1-0,5, настриг выттой шерсти 0,2-0,6, плотность шерстных волокон на 1см (масса шерсти) - 0,4-0,6 [4].

Имеется несколько методов определения коэффициента наследуемости. Наиболее часто используются методом определения корреляционных признаков с учетом влияния лишь одного из родителей – матери. Поэтому полученный коэффициент регрессии дочерей по матерям умножается на 2.  $h = 2 r'$ , где  $h$  - наследуемость, выраженная в долях единицы или в %;  $r'$  – коэффициент корреляции между показателями признака у дочерей и их матерей.

Степень, или коэффициент, наследуемости определялся в долях единицы – от 0 до 1,0 [5].

Для выявления лучших и худших племенных достоинств животных, а также и степени наследования живой массы, определялась живая масса дочерей в весеннее и осеннее время. Особое внимание уделялось осенним данным, так как в октябре животные подопытных групп достигли возраста матерей.

Результаты наших исследований по изучению динамики живой массы коз при круглогодичном пастбищном содержании показывают, что рост и развитие коз в разном возрасте и в различных условиях изменяется в довольно широких пределах. Разница между осенней и весенней живой массой у взрослых животных достигает более 30%.

Основной целью подбора является получения потомства с высокими показателями наследуемости живой массы. В результате проведенных исследований было установлено, что более высокий коэффициент наследуемости живой массы отмечен у потомства, полученного в результате однородного подбора (табл 1).

При таком высоком коэффициенте наследуемости можно эффективно вести отбор по фенотипу. У потомства, полученного в результате разнородного подбора, показатель наследуемости был невысоким и в этом случае, может быть, отбор по фенотипу был малоэффективным. На основании этого можно предположить, что для достижения высокой степени наследуемости живой массы нужно спаривать животных с одинаковой продуктивностью.

**Таблица 1. Коэффициент наследуемости живой массы дочерей в возрасте 2,5 лет при разных формах подбора**

Живая масса родителей		Вариант подбора	Живая масса дочерей, кг (n=50)	Отношение массы дочерей к массе матерей, %	Коэффициент
♂	♀				$h^2$
60,62 и 65,78	59,4±0,47	однородн	52,5±0,78	91,5	0,456
70,32 и 72,46	50,0±1,4	разнород	44,6±0,61	89,2	0,315

Несмотря на экстремальные условия зимовки, подопытные животные обеих групп перенесли ее вполне удовлетворительно.

В результате исследований по изучению степени наследуемости живой массы между родителями и потомками в однородном варианте скрещиваний установлено, что коэффициент наследуемости составляет 0,46, в разнородном варианте – 0,32. В обоих вариантах скрещивания продуктивность матерей в точности не повторялся в дочернем поколении, а была ниже на 4,9 кг у дочерей в однородном варианте скрещиваний, в разнородном 5,4 кг.

В однородном варианте подбора лучшие матери дали менее продуктивных дочерей, чем они сами, а от матерей, худшей продуктивности получили потомство худшей наследуемости по живой массе, и менее продуктивных, чем сверстники, полученные в однородном варианте скрещиваний. Полученные дочери в разнородном варианте скрещивания не достигли уровня продуктивности своих родителей на 5,4 кг или 12,1%, а в однородном варианте 4,9 кг или 9,3%.

Отношение массы дочерей к массе матерей при однородном подборе, было выше, чем разнородном, с разницей на 2,3%.

**Результаты применения разных форм подбора на живой вес помесных козوماتок.** Подбор является наиболее сложным и теоретически наименее разработанным вопросом племенного дела. О принципах и методах подбора существуют принципиальные разногласия, некоторые немецкие ученые предпочтение отдают разнородному подбору, а английские ученые - поклонники однородного спаривания.

Применение однородного и разнородного подбора на помесных козوماتках очень важно, так как оно способствует изменению продуктивных качеств в нужном направлении, в большей степени, чем скрещивание. Если долго и целенаправленно вести селекцию, то такая система подбора может привести к повышению и закреплению наследственных качеств племенных животных. Кроме этого, на темп селекции большое значение оказывают проверенные козлы - производители по качеству потомства. В связи с этим нами устанавливалась эффективность применения разных форм подбора на помесных козوماتках.

Живая масса потомства коз 2,5-летнего возраста полученного в результате разных форм подбора, представлена в таблице 2.

Однородный вариант скрещивания помесных козوماتок с подобранными козлами производителями способствовал получению крупных потомков с более высоким коэффициентом наследуемости живой массы.

**Таблица 2. Живая масса дочерей в возрасте 2,5 лет в зависимости от живой массы родителей**

Живая масса родителей		Вариант подбора	Всего оцененных дочерей	65-60 кг отличная		59-50 кг хорошая		49-40 кг средняя	
Отцы	Матери			голов	%	голов	%	голов	%
60,62 и 65,78	59,4±0,47	Однородный	50	14	28	19	38	17	34
70,32 и 72,46	50,0±1,4	Разнородный	50	5	10	23	46	22	44

Среди дочерей в обоих вариантах скрещивания максимальная живая масса (отличный) более 60 кг имели всего 19 козочек, из них 28% получено потомство в однородном подборе, что на 18% больше чем сверстники.



При спаривании крупных производителей с мелкими козوماتками отмечается небольшое влияние крупных отцов, из них получено потомство с отличной и хорошей живой массой всего 56%.

А при спаривании животных одинаковой живой массой наибольший процент – это 66 от эффекта отбора получили потомство в однородном подборе, что на 10% больше, чем полученное потомство в разнородном варианте скрещиваний.

### **Выводы**

Таким образом, в результате изучения выявлено, что при подборе наиболее сходных животных по продуктивности степень наследуемости выше, чем при гетерогенном подборе.

Полученные данные указывают на то, что помесные козы советской шерстной породы могут передавать наследственные качества потомству по живой массе. При этом важную роль играет однородный подбор, который обеспечивает получение потомства с большей живой массой по сравнению со сверстниками, полученными в разнородном подборе.

Для поддержания и дальнейшего усиления ценных качеств, и в первую очередь увеличения степени наследуемости живой массы у полученного потомства в каждом козоводческом хозяйстве мы рекомендуем применять метод однородного подбора. При этом необходимо обращать самое пристальное внимание на однородность спариваемых животных.

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### ***Human migration behavior in the regions of Belarus as the reflection of metropolisation and regionopolisation processes***

**Abstract:** The influence of center-periphery processes of metropolisation and regionopolisation on human migration behavior in Belarus has been researched in the article. The main migration centers of gravity are the regions where the capital of Belarus and cities-regionopolises are situated as they are the centers of intraregional systems of settlement, husbandry and environmental management.

**Keywords:** center-periphery processes, metropolisation, regionopolisation, human migration, regional growth.

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### ***Миграционное поведение населения регионов Беларуси как отражение процессов метрополизации и регионополизации***

**Аннотация:** В статье рассматривается влияние центр-периферийных процессов метрополизации и регионополизации на миграционное поведение населения Беларуси. Основными центрами миграционного притяжения населения Беларуси являются регионы, в которых расположены столица Беларуси

г. Минск и города-регионополисы, выступающие центрами внутриобластных систем расселения, хозяйствования и природопользования.

**Ключевые слова:** центр-периферийные процессы, метрополизация, регионополизация, миграции населения, региональное развитие.

Миграционное поведение населения – субъективный фактор миграции, который отражает как объективные социально-экономические условия, сложившиеся на той или иной территории, так и индивидуальные реакции населения на эти условия. По мнению академика Т.И. Заславской, решение о миграции – итог взаимодействия личности и окружающей среды [1, с. 55], поскольку в процессе миграций удовлетворяются миграционные потребности населения, формирующиеся в результате противоречия между реальными потребностями населения и степенью их удовлетворения.

В условиях активного протекания в Беларуси центр-периферийных процессов метрополизации и регионополизации миграционное поведение населения может выступать в качестве одного из индикаторов их проявления.

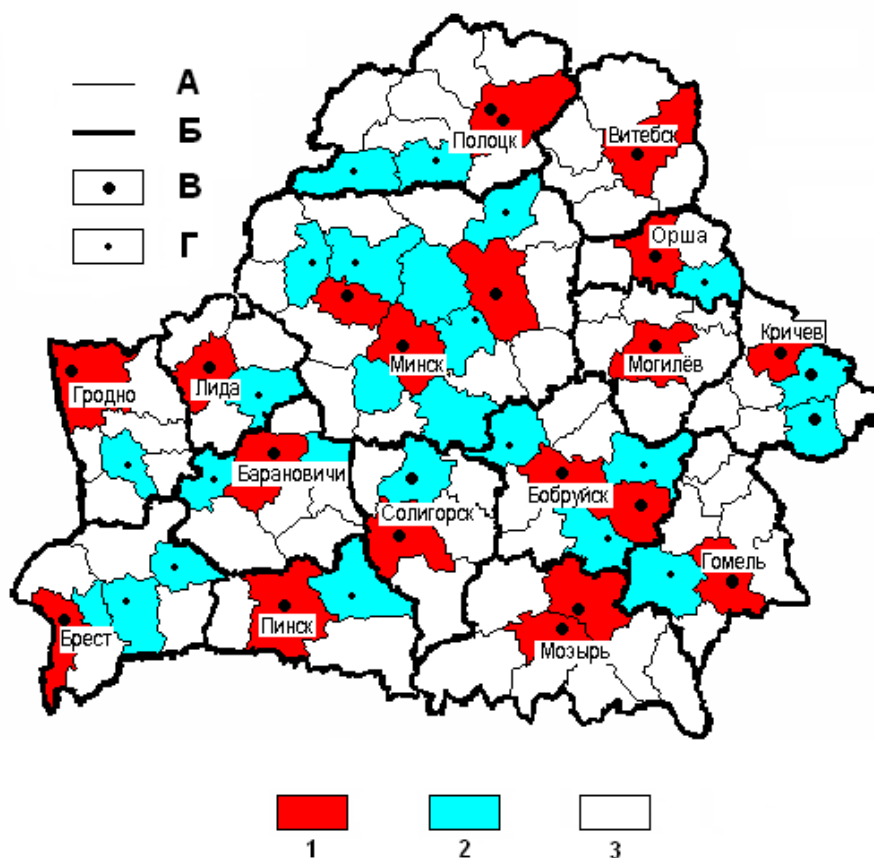
Под метрополизацией, в данном исследовании, понимается центр-периферийный процесс, протекающий на страновом уровне, в результате которого происходит концентрация населения, экономического потенциала, природопользования и повышения значимости главного городского центра страны в её социально-экономическом, демографическом, экологическом и социокультурном развитии. Как правило, центром метрополизации – городом-метрополисом является столица государства. В Беларуси таким центром является столица страны город Минск. В результате метрополизации Минск на начало 2015 г. концентрировал 20,4 % всего и 26,5 % городского населения Беларуси, доля ВРП Минска в ВВП страны в 2014 г. превысила 24,9 % [2].

Регионополизация или региональная метрополизация – центр-периферийный процесс, протекающий на уровне крупных внутристрановых регионов, в результате которого повышается численность населения, растёт экономический потенциал, происходит концентрация процессов природопользования в главном городе региона – регионополисе относительно соответствующего внутристранового региона [3]. Внутристрановые регионы при этом практически совпадают с крупными внутристрановыми системами расселения, которые в

силу единства систем расселения, хозяйствования и природопользования могут быть названы социально-эколого-экономическими районами (СЭЭР) [4].

В Республике Беларусь к началу 70-х годов XX в. исторически сложилась система из 15 СЭЭР (рис. 1). В каждом из СЭЭР Беларуси можно выделить один или несколько регионополисов, что определяется моноцентричностью или полицентричностью СЭЭР.

В процессе регионополизации СЭЭР происходит расслоение входящих в них административных районов на районы экономического ядра (ключевые регионы), экономической полупериферии (районы межрайонного значения) и экономической периферии (базовые районы) [5].



Границы: А – административных районов,  
 Б – социально-эколого-экономических районов.  
 Города: В – регионополисы, экс-регионополисы (Борисов, Молодечно),  
 квазирегионополис (Жодино). Г – субрегиональные центры.  
 Районы: 1 – экономического ядра, 2 – экономической полупериферии,  
 3 – экономической периферии.

**Рисунок 1. Распределение районов экономического ядра, экономической полупериферии и периферии Беларуси в границах СЭЭР [5]**

Для исследования миграционных процессов в Беларуси использовались данные о миграционном приросте (убыли) населения за период с 2005 г. по 2014 г., т.е. за 10 лет в разрезе 118 административных районов – базовых единиц административно-территориального устройства страны. При этом г. Минск и города областного подчинения рассматривались в составе административных районов, центрами которых они являются (города Брест, Гродно, Могилёв, Бобруйск, Гомель, Пинск, Барановичи, Витебск). Города областного подчинения Жодино и Новополоцк включались, соответственно, в Смолевичский и Полоцкий районы.

В основу изучения миграционного поведения населения регионов Беларуси был положен показатель «среднегодовое сальдо миграций», рассчитанный за период с 2005 г. по 2014 г. в чел. / на 1000 чел. При положительном значении этого показателя, в том или ином регионе наблюдался миграционный прирост населения, при отрицательном значении – миграционная убыль населения.

Внешний миграционный прирост населения Беларуси за 2005-2014 гг. был положительным и составил 88,4 тыс. чел. В результате за счёт внешних и внутренних миграций миграционный прирост населения в регионах Беларуси составил 375,7 тыс. чел., а миграционная убыль населения – 287,3 тыс. чел. Внешний миграционный прирост смог компенсировать естественную убыль населения страны на 35,3 %.

Протекание миграционных процессов в районах экономического ядра, полупериферии и периферии отражает таблица 1. Если в большинстве районов экономического ядра миграции стали главным фактором роста населения, в районах экономической полупериферии динамика численности населения определяется естественной убылью населения, то в большинстве районов экономической периферии миграционный отток населения является главным фактором депопуляции их населения. При этом за 2005-2015 гг. в стране не было ни одного административного района, в котором главным фактором роста численности населения был бы его естественный прирост.

Максимальный среднегодовой отток населения более 1,5 промилле за весь период с 2005 г. по 2014 г. имели Дрибинский, Шарковщинский, Лельчицкий, Зельвенский, Мостовский, Свислочский, Хотимский и Россонский

районы. Последний район с 2012 г. является наименее населённым районом Беларуси.

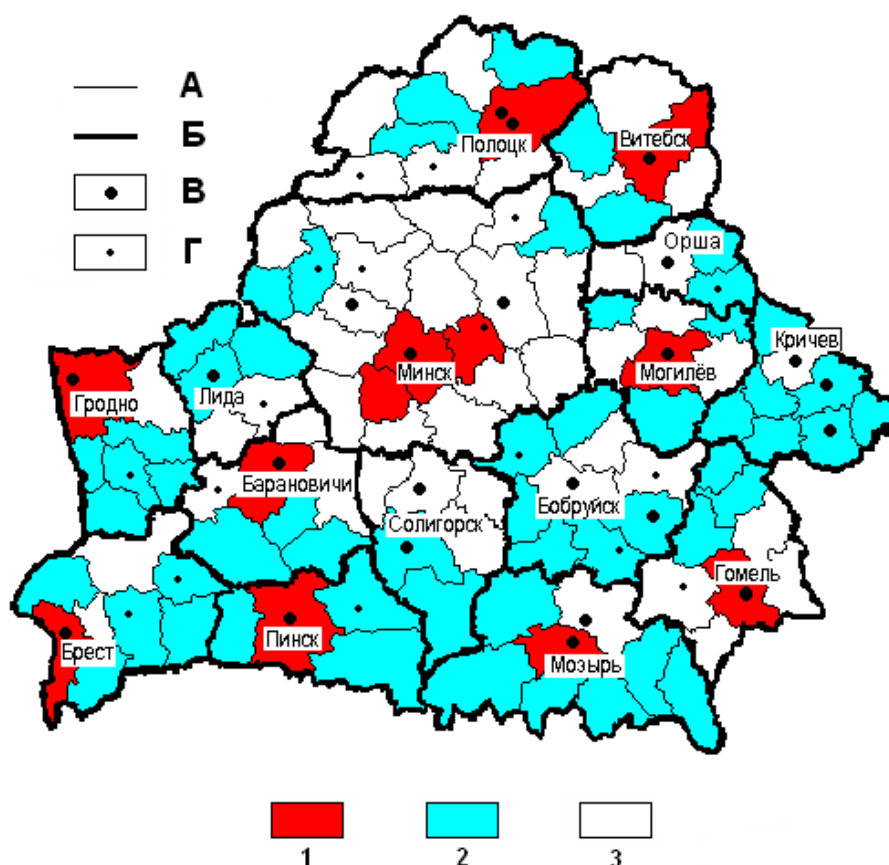
Миграционные процессы за 2005-2015 гг. стали главным фактором изменения численности населения 68-ми из 118-ти административных районов страны. Причём в 12-ти административных районах миграционный прирост стал главным фактором роста численности населения, а миграционная убыль в 56-ти районах стала главным фактором депопуляции населения (см. табл. 1).

**Таблица 1. Протекание миграционных процессов в районах экономического ядра, экономической полупериферии и периферии Беларуси в 2004-2015 гг.**

	Районы экономического (ой)			Все районы
	ядра	полупериферии	периферии	
Число районов	19	25	74	118
Число районов, где миграционные процессы стали:				
главным фактором роста населения	10	2	-	12
главным фактором депопуляции населения	3	10	43	56
Число районов, где динамика численности населения определяется естественной убылью населения	6	13	31	50
Миграционный прирост населения за 2004-2014 гг., тыс. чел.	369,3	6,2	0,2	375,7
Миграционная убыль населения за 2005-2014 гг., тыс. чел.	24,9	60,3	202,1	287,3
Среднегодовой миграционный прирост (убыль) населения за 2005-2014 гг., чел. / 1000 чел.	5,6	-3,6	-10,0	0,9
Доля в населении на начало 2015 г., %	66,0	14,7	19,3	100,0
Темпы роста численности населения на начало 2015 г. к началу 2006 г., %	104,0	91,7	82,5	97,2

*Примечание: Рассчитано по [6, 7].*

Первую группу образуют районы экономического ядра, в которых расположены региональные центры-регионополисы и Минск, а также районы его пригородной зоны (Дзержинский, Смолевичский и Логойский), отнесённые к районам экономической полупериферии. Районы второй группы преимущественно относятся к районам экономической полупериферии и периферии (рис. 2).



Границы: А – административных районов,

Б – социально-эколого-экономических районов.

Города: В – регионополисы, экс-регионополисы (Борисов, Молодечно), квазирегионополис (Жодино). Г – субрегиональные центры.

Районы: 1 – миграционного прироста населения, 2 – миграционной убыли населения, 3 – естественной убыли населения.

**Рисунок 2. Распределение районов Беларуси по основным факторам изменения численности их населения: миграционному приросту, миграционной и естественной убыли за 2005-2014 гг. в границах СЭЭР**

За 2005-2014 гг. миграционный прирост населения отмечался в 15 административных районах Беларуси, которые можно разделить на три основные группы: регион метрополиса (Минский район с Минском) и районы его пригородной зоны (Смолевичский, Дзержинский, Логойский); регионы регионополисов, в которых размещаются города-центры СЭЭР (Гомельский, Гроднен-

ский, Брестский, Витебский, Могилёвский, Полоцкий, Барановичский, Мозырский, Пинский и Бобруйский районы) и Ветковский район Гомельской области.

Ветковский район Гомельской области, расположен в непосредственной близости от Гомеля и является одним из наиболее пострадавших административных районов Беларуси от радиоактивного загрязнения после катастрофы на Чернобыльской АЭС в 1986 г. Миграционный прирост в этом районе связан с программами привлечения мигрантов в наиболее пострадавшие от радиоактивного загрязнения регионы для их хозяйственной реабилитации. О низкой эффективности подобных мероприятий свидетельствует ограниченное число переселенцев в этот и другие постчернобыльские регионы. За последние десять лет миграционный прирост населения в Ветковский район составил всего 235 чел., причем за последние пять лет в районе отмечалась механическая убыль населения.

Наиболее высокая миграционная привлекательность в Беларуси у г. Минска и Минского района. За 2005-2014 гг. миграционный прирост Минска составил 154,3 тыс. чел., Минского района – более 42,0 тыс. чел. Пригородные регионы столичного мегаполиса – Дзержинский, Смолевичский и Логойский районы – имели положительное сальдо миграций и смогли привлечь соответственно 2,6 тыс., 2,1 тыс. и 0,5 тыс. мигрантов. Таким образом, столица Беларуси и пристоличный метрополитенский ареал сконцентрировали 201,4 тыс. чел. или 53,6 % всего миграционного прироста населения Беларуси за 2005-2014 гг. Это свидетельство высокой привлекательности столицы как места расселения в сравнении с другими регионами страны и доминирования метрополитизации над процессами регионополитизации, поскольку на остальные 11 административных районов Беларуси, 10 из которых регионы регионополисов, пришлось 46,4 % миграционного прироста страны.

В границах Минского метрополитенского ареала можно говорить о точечной метрополитизации (рост населения Минска) и площадной или ареальной метрополитизации (рост населения Минского, Смолевичского, Логойского и Дзержинского районов). Точечная метрополитизация остаётся основным видом метрополитизации в границах Минской агломерации, на неё приходится более  $\frac{3}{4}$  всего миграционного прироста населения в абсолютном выражении, но в расчёте на тысячу жителей темпы привлечения мигрантов в пригородах столицы существенно выше.



Учитывая положительное сальдо естественного прироста населения в Минске и Минском районе за 2005-2014 гг. в объёме 37,7 тыс. чел., наблюдающееся на фоне депопуляции населения страны, можно утверждать, что метрополизация – главная доминанта трансформации территориальной структуры расселения, хозяйствования и природопользования Беларуси. Последнее утверждение основано на представлениях о неразрывной связанности процессов расселения, хозяйствования и природопользования. Минск и его агломерация – главный полюс расселения и экономической жизни страны. В границах Минской агломерации (г. Минск, г. Жодино, Минский, Логойский, Дзержинский, Смолевичский районы) на начало 2015 г. было сосредоточено 2332,4 тыс. чел. или 24,6 % всего населения страны. Следует отметить, что Минская городская агломерация активно формируется и на некоторых территориях соседних Пуховичского, Червенского, Узденского, Воложинского и Молодечненского районов.

Возвышение Минска относительно других городских центров Беларуси – свидетельство моноцентричной модели территориального развития страны, которую нельзя признать рациональной с социально-экономических и экологических позиций. Страна приобрела все черты макроцефальности территориальных структур расселения, хозяйствования и природопользования [2].

Регионы-регионополисы с положительным миграционным приростом населения имели положительное сальдо миграций в объёме 173,0 тыс. чел. (46,0 % миграционного прироста Беларуси за 2005-2014 гг.). Особенно высокую миграционную привлекательность имеют районы, центрами которых являются областные столицы: Гродно, Брест, Гомель, Витебск и Могилёв. В районах, которые возглавляют вышеназванные города, положительное сальдо миграций за 2005-2014 гг. составило около 154,0 тыс. чел. (43,1 % миграционного прироста Беларуси). Миграционная привлекательность других регионополисов, таких как Бобруйск, Пинск, Барановичи, Полоцк-Новополоцк, Мозырь-Калинковичи, существенно ниже (2,9 % миграционного прироста Беларуси).

Миграционная привлекательность большинства регионов, в которых расположены города-регионополисы, свидетельствует, что процессы регионополизации, также оказывают существенное влияние на трансформацию территориальных структур расселения, хозяйствования и природопользования Беларуси, но это влияние заметно ниже, чем влияние процессов метропо-

лизации. Один Минск привлекает мигрантов больше, чем все 10 регионов страны с миграционным приростом населения.

Миграционная убыль населения отмечается только в четырёх центрах СЭЭР Беларуси: Солигорске, Орше, Лиде и Кричеве.

Активный рост ряда регионов и метрополиса Минска за счёт мигрантов привёл к тому, что в возглавляемых ими СЭЭР миграционный прирост стал главным фактором роста численности их населения. Это характерно для Минского (миграционный прирост больше естественной убыли населения по региону в 7,2 раза), Гродненского, Гомельского, Витебского и Брестского СЭЭР (табл. 2).

**Таблица 2. Миграционный прирост (убыль), концентрация населения в региональных центрах и демографический потенциал СЭЭР Беларуси**

СЭЭР	Миграционный прирост (убыль) населения за 2005-2014 гг., тыс. чел	Среднегодовой миграционный прирост населения за 2005-2014 гг., чел. /1000 чел.	Доля регионального центра в населении СЭЭР на начало 2015 г., %	Доля в населении страны на начало 2015 г., %
Брестский	6,9	1,0	48,0	7,4
Барановичский	-17,1	-3,4	37,5	5,0
Пинский	-17,6	-4,6	37,4	3,9
Витебский	14,2	2,8	73,6	5,4
Оршанский	-9,5	-3,6	53,6	2,6
Полоцкий	-8,0	-1,9	48,1	4,2
Гомельский	28,9	3,5	64,2	8,7
Мозырский	-17,5	-5,4	49,8	3,2
Гродненский	11,9	2,0	60,0	6,3
Лидский	-19,0	-6,9	39,1	2,7
Минский	163,9	5,2	60,7	33,7
Солигорский	-13,5	-4,0	53,1	3,3
Могилёвский	5,1	0,9	69,7	5,7
Бобруйский	-22,7	-3,7	36,7	6,3
Кричевский	-17,8	-10,5	38,3	1,6
Респ. Беларусь	88,4	0,9	55,3	100,0

*Примечания: 1. В качестве региональных центров Мозырского и Полоцкого СЭЭР рассматривались парные города: Полоцк-Новополоцк, Мозырь-Калинковичи. 2. В качестве региональных центров полицентрических Солигорского и Кричевского СЭЭР рассматривались, соответственно, города: Солигорск и Слуцк; Кричев, Климовичи и Костюковичи. 3. Экс-регионополисы Молодечно и Борисов в качестве региональных центров Минского СЭЭР и квазирегионополис Жлобин в качестве регионального центра Бобруйского СЭЭР не рассматривались. 4. В качестве региональных центров Республики Беларусь рассматривались региональные центры всех СЭЭР. 5. Рассчитано по [6, 7].*

Массовый отток мигрантов стал главной причиной депопуляции населения Бобруйского, Мозырского, Лидского, Пинского и Кричевского СЭЭР, что является свидетельством их социального неблагополучия.

В остальных пяти СЭЭР Беларуси депопуляция населения наблюдается по причине естественной убыли их населения (Могилёвский, Полоцкий, Оршанский, Барановичский, Мозырский СЭЭР).

Опасность стагнации или угасания региональных центров в условиях поляризованного развития Беларуси заключается в возможности формирования обширных зон экономической депрессивности, поскольку угасание центра губительно для окружающих её периферийных территорий. Исходя из исключительно высоких темпов миграционной убыли населения можно говорить о формировании подобной депрессивной зоны на востоке Могилёвской области в границах Кричевского СЭЭР.

Сочетание процессов метрополизации и регионополизации, их соизмеримая интенсивность, если её измерять миграционным приростом населения, свидетельствует о том, что в стране сохраняются шансы перехода к полицентричной модели территориального развития, что более соответствует задачам устойчивого развития, предполагающим снижение остроты межрегиональных диспропорций между столицей и другими регионами страны. Следовательно, народу и правительству Беларуси, для осуществления региональной политики, предстоит сделать выбор и определиться, какая модель территориального развития страны предпочтительнее: сверхконцентрация населения и экономического потенциала в столице и её пригородах или развитие городов-регионополисов, относительно равномерно распределённых по территории государства?

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### ***Technique of development of control procedures formations of the maintenance costs of subjects of housing and communal services***

**Abstract:** From the point of view of formation of cost of services in water supply and water disposal by subjects of housing and communal services the problem of classification and distribution of the maintenance costs is actual. Besides the greatest difficulties arise at their classification and distribution especially regarding implementation of costs of capital repairs of objects of fixed assets of production appointment.

**Keywords:** expenses, indirect expenses, prime cost, rates of distribution of indirect expenses, services of water supply and water disposal.

The requirement of internal control's implementation of economic activities' facts is stated article 19 of the Federal law of December 6, 2011 № 402-FZ "On accounting". It should be noted that the requirements for the system of internal control also existed earlier, however, this law takes the system of internal control of the discharge from recommended to the level of mandatory requirements for all business entities, including housing utilities.

From the point of formation of cost of services for water supply and sanitation subjects of housing and communal services the problem of costs' classification and distribution is actual. The greatest difficulties arise in their classification and distribution, especially in the part of implementation of costs on capital repair of main

assets of manufacturing purpose by housing and communal service subjects, providing services of sewerage and water supply.

The problem of changing the order of assignment of total operating costs specific considering the specific of providing sewerage and water supply services by the subjects of housing and communal services (in particular when length of water supply or wastewater routes is being increased or when second bodies of boreholes are being drilled) arises, as this has an impact on what classified service group to include the costs of:

- overhaul with subsequent allocation of costs for production cost of water services and sanitation;
- the reconstruction (modernization) with the definition as the source of financial supply for these costs the profit that remains at the disposal of the subject of housing utilities.

In order to improve the competitiveness subjects of housing utilities can use a progressive system of accounting for expenditures and cost calculation of services and activities – the concept of life-cycle products or an earlier variant – accounting of target costs (Target Costing). The usage of the "matrix of life cycle resources" is aimed, primarily, at improving the substantiation in relation to any resource solutions to both current and long-term [1. p. 378].

Problems of the classification and distribution of total operating costs by the subjects of housing utilities, providing water and wastewater, can be solved by our method of development of control procedures of formation and distribution total operating cost, which consists of the following steps [2]:

1. Getting the possibility of usage of resources and adoption of decisions on the formation of total operating cost (the resource can be obtained from outside or created inside of a business entity). In this case it is necessary:

- to provide accurate financial and management information and reporting;
- to comply the current legislation, external standards and regulations;
- to provide the efficiency and effectiveness of operating activities.

2. A detailed study of options for the use of the resource in order to implement total operating costs (in the repair of water pipes, etc.). Within this phase it is possible to distinguish the components:

- preparation of the resource for use and maintenance of resource able, suitable for operation;

- exploitation (usage) of the resource for its intended purpose;
- restoration of the resource, if necessary.

At this stage it is possible to apply the following tools of documentation (information fixation) [3]:

- organizational chart (describes the relationship between structural subdivisions of the subject of housing utilities in process of implementation of total operating costs);
- hierarchical design implementation of total operating costs (understanding of patterns and relations of the whole process of formation of total operating costs);
- detailed sequence of all operations on the implementation of total operating costs and channels of movement of the documents.

3. Modeling of the process of implementation and the distribution of total operating costs.

The purpose of this stage is the submission of the process in graphical form, more convenient for analytical processing of the received information. The developed model should reflect the structure of the process of the emergence of distribution of total operating costs, details of the compliance and consistency of workflow. The process of stimulation can be reflected in table 1:

**Table 1. Matrix of the life cycle in relation to the resource**  
**"Total operating costs"**

Types of resources	The opportunity of use of a resource	The use of the resource			Retirement resource
		Preparation for use and maintaining of readiness for use	Exploitation	Restoration and modernization	
Labor	The cost of recruitment	The cost of training, uniforms, etc.	The cost of wages and deductions for social needs	Costs professional development, learning new technologies, etc.	Costs of severance pay at dismissal
Material	The costs of acquisition, delivery	Storage costs	The cost of transportation to the place of use, etc.	-	Acquisition costs of resources used instead
Fixed assets (machinery, equipment)	Rental costs	The cost of maintenance (maintenance)	Costs fuel and energy depreciation	Repair costs	Costs for search

In the base of this method is the management idea – when adopting any decision about the resource it is necessary to take into account all the costs that arise at each stage of its life cycle.

This is followed graphically to reflect the risks and control procedures at diagrams of the process, in the following order:

- risks and control procedures that cover these risks are identified;
- risks and control procedures are reflected on the charts in places where they arise. In this case their consistent numeration is being made;
- filling the table with the description of risks according to the following form.

The result of simulation are the approved charts of the process of formation and distribution of total operating costs with control procedures' graphical display.

4. Classification and description of the risks of the process of the formation and distribution of total operating costs for determination of nonstable parts of the process, identification of critical risk factors and determination the main threats for the subjects of housing and public utilities, providing water and wastewater, Formation of the risks' library.

5. Definition and documentation of control procedures of the process of formation and distribution of total operating costs for detection and documentation of control procedures using a risk matrix and control. Approved matrix is communicated to all staff involved in the process.

Thus, theoretical approaches and provided practical recommendations can be used in the formation and distribution of total operating cost and effective system of internal control by the subjects of housing and communal services, providing in-sewerage and water supply. Particularly, during the creation of local normative legal base of the organization, during the development of the internal control system, during the further research and methodological studies of the running of the internal control system.

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## ***Characteristic elements of the complex of marketing communications***

**Abstract:** This article is devoted to the elements of the complex of marketing communications. The article describes and analyzes the features of marketing communications, presents the advantages and disadvantages of major advertising media.

**Keywords:** marketing communications, advertising, sales promotion, personal selling, direct marketing.

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## ***Характеристика елементів комплексу маркетингових комунікацій***

**Анотація:** Дана стаття присвячена характеристиці елементів комплексу маркетингових комунікацій. В статті розкриті та проаналізовані особливості

маркетингових комунікацій, подані недоліки та переваги основних засобів реклами.

**Ключові слова:** маркетингові комунікації, реклама, стимулювання збуту, персональні продажі, прямий маркетинг.

**Постановка наукової проблеми та її значення.** Основними інструментами маркетингових комунікацій є: реклама, персональні продажі, комплекс стимулювання збуту, пабліситі і паблік рілейшнз, прямий маркетинг. Важливого значення набувають маркетингові комунікації як інструменти конкурентної боротьби в сучасних економічних умовах [1].

Ототожнювання маркетингових комунікацій з просуванням товарів і послуг на ринку, що спостерігається останнім часом, є помилковим трактуванням їх сутності, а це призводить до неефективного застосування маркетингових комунікацій підприємствами [2]. Тому важливим і необхідним є проведення досліджень, пов'язаних з вивченням характеристик окремих елементів маркетингових комунікацій та визначенням їх ролі у підвищенні ефективності діяльності підприємства.

**Аналіз досліджень даної проблем.** Дослідженню маркетингових комунікацій та окремих елементів системи маркетингових комунікацій присвячено багато наукових праць та статей. Питанням становлення і розвитку теорії маркетингових комунікацій та практики управління ними присвячено чимало фундаментальних праць відомих фахівців.

Теоретичні питання з цієї проблематики в межах загальної теорії маркетингу ґрунтовно розроблені в працях таких зарубіжних та українських учених як Н. Андерсон, Н. Гованні, Я. Гордон, Е. Гуммессон, Д. Джоббер, Ф. Котлер, Т. Левітт, Л. Маттссон, В. Прауде, Д. Аакер, Дж. Бернет, С. Блек, А. Дейан, Г. Картер, І. Альошина, Б. Борисов, І. Вікентьєв, Є. Голубкова, Є. Попов, Т. Примак, Г. Рижкова, Є. Ромат, Н. Ведмідь, Т. Діброва та ін.

**Мета та завдання статті** полягає в наданні детальної характеристики елементів комплексу маркетингових комунікацій та дослідженні їх особливостей.

**Виклад основного матеріалу та обґрунтування отриманих результатів дослідження.** Американська маркетингова асоціація надає таке визначення: реклама – це будь-яка оплачувана форма неособистого представлення та просування ідеї чи послуги від імені відомого спонсора.

У. Уельс, Дж. Бернет, С. Моріарті [3] висловлюються про поняття реклама так: «Реклама – це оплачувана неособиста комунікація, що здійснюється ідентифікованим спонсором, який використовує засоби масової інформації, в тому числі і інтерактивні, для того щоб переконати цільову аудиторію в чомусь або вплинути на неї певним чином».

Розширене і доволі повне визначення дають рекламі відомі російські спеціалісти в галузі маркетингу, автори базового підручника Т. Маслова, С. Божук та Л. Ковалик [4]: «Реклама – це інструмент комунікаційної політики, що базується на використанні не особистісних форм комунікацій, які призначені невизначеному колу осіб, здійснюється за допомогою платних засобів поширення інформації з чітко вказаним джерелом фінансування, формують та підтримують інтерес до фізичних, юридичних осіб, товарів, ідей та сприяють їх реалізації».

Найбільш повне визначення реклами, на нашу думку, надає український науковець Ромат Є.В. [5]: «Реклама – це вид соціальної масової комерційної комунікації, яка формується та оплачується конкретним рекламодавцем. Вона направлена на просування об'єктів рекламування (товару, послуги, іміджу, ідеї, особистості, підприємства і т.д.) потенційним покупцям, визначений склад яких є невизначеним».

Ціллю комунікації є формування визначеної психологічної установки в одержувачів рекламного повідомлення відносно об'єкта рекламування [6].

У США й інших промислово розвинених країнах термін "реклама" (advertising) означає рекламні оголошення в засобах масової інформації (у пресі, по радіо, телебаченню, на щитовій рекламі) і не поширюється на заходи, що сприяють продажам, — "сейлз промоушн" (sales promotion), престижні заходи, націлені на завоювання доброзичливого ставлення громадськості, — "паблік рілейшнз" (public relations), а також на специфічну область рекламної діяльності, що бурхливо розвивається в останній час, суть якої полягає в спрямованих зв'язках виробника зі споживачем — "директ-маркетинг" (direct-marketing).

У вітчизняній практиці, на відміну від західної, поняття реклами ширше. До неї відносять виставочні заходи, комерційні семінари, пакування, друковану продукцію, поширення сувенірів та інші засоби стимулювання торговельної діяльності.

Під рекламою, згідно з Законом України "Про рекламу", розуміється спеціальна інформація про осіб чи продукцію, яка розповсюджується в будь-якій формі і в будь-який спосіб з метою прямого або опосередкованого одержання прибутку [7].

Головна мета реклами — формування (збільшення) попиту на товар, розширення (втримання) частки ринку і підвищення ефективності діяльності підприємства. Реклама забезпечує популярність товару, інформування покупців та інших аудиторій про підприємства, товари, якість, новинки; вплив на споживачів і спонукання їх до купівлі; нагадування про товари підприємства протягом тривалого періоду; зберігання прихильності до товару або до підприємства. Завданням реклами може бути створення позитивного іміджу, стимулювання активізації збуту, презентація нового продукту, вихід на новий ринок, розширення уявлень споживачів про мету і способи можливого використання продукту, позиціювання товару тощо.

Реклама як процес має чотири складові:

- Рекламодавці — це виробники товарів, оптові та роздрібні торгові підприємства, фірми;
- Рекламні організації, підприємства, агентства, в яких повинні бути кваліфіковані фахівці, маркетологи, менеджери з реклами, здатні на високому рівні здійснювати рекламну діяльність. Вони працюють за замовленням рекламодавців;
- Засоби реклами (канали поширення реклами). Є багато засобів реклами: усна, радіореклама, проспекти, каталоги, буклети, рекламні листки, світлова реклама, оголошення, телевізійна реклама, рекламні подарунки, сувеніри, упаковка, виставки, ярмарки тощо;
- Споживачі реклами — це цільова аудиторія, на яку буде спрямовано рекламний вплив.

Засоби реклами достатньо широкі й різноманітні, тому різними авторами приводиться різна їх класифікація. Так, доктор економічних наук, професор Ф.Г. Панкратов класифікує їх за такими ознаками [8]:

- За призначенням рекламні засоби можуть бути розраховані на оптових та роздрібних покупців, на певні групи населення (чоловіки; жінки; діти; особи, що ведуть домашнє господарство; спортсмени; туристи; школярі; фермери тощо);

– За місцем застосування рекламні засоби поділяються на внутрішні, що використовуються безпосередньо на самому роздрібним торговому підприємстві, та зовнішні, що розташовані поза роздрібним або оптовим підприємством;

– В залежності від характеру технічних засобів, що використовуються для поширення реклами, розрізняють такі види реклами: вітринно-виставочна, реклама в ЗМІ (реклама в пресі, аудіовізуальна, радіо- і телереклама) друкована реклама тощо.

Реклама відіграє істотну економічну роль, однак має як позитивні, так і негативні сторони (табл. 1).

**Таблиця 1. Позитивні та негативні сторони реклами**

<b>Позитивні сторони</b>	<b>Негативні сторони</b>
<b>Вплив на економіку</b>	
<ul style="list-style-type: none"> <li>• Сприяє зростанню економіки</li> <li>• Підтримує конкуренцію</li> <li>• Інформує споживачів</li> </ul>	<ul style="list-style-type: none"> <li>• Марнотратна, призводить до виснаження ресурсів</li> <li>• Сприяє монополізації</li> <li>• Є чинником нецінної конкуренції</li> </ul>
<b>Вплив на промисловість</b>	
<ul style="list-style-type: none"> <li>• Розширює ринки для нових товарів</li> <li>• Сприяє розвитку конкуренції між підприємствами</li> </ul>	<ul style="list-style-type: none"> <li>• Створює бар'єри для виходу на ринок</li> <li>• Може послабити конкуренцію між підприємствами</li> </ul>
<b>Вплив на підприємство</b>	
<ul style="list-style-type: none"> <li>• Забезпечує зростання грошових надходжень пропорційно до обсягу діяльності</li> <li>• Знижує міру ризику в маркетинговій діяльності</li> </ul>	<ul style="list-style-type: none"> <li>• Призводить до зростання витрат і цін</li> </ul>
<b>Вплив на споживача</b>	
<ul style="list-style-type: none"> <li>• Забезпечує інформацією про підприємство, товар, якість і є засобом контролю за якістю</li> <li>• Сприяє формуванню попиту і стимулює підвищення життєвого рівня населення</li> </ul>	<ul style="list-style-type: none"> <li>• Дає некорисну інформацію</li> <li>• Утруднює вибір, якщо акцентує увагу на дрібних відмінностях товарів</li> </ul>

Персональні продажі являють собою особисту форму комунікації з потенційним покупцем за допомогою бесіди з метою продажу товару, що пропонується. Особистий продаж здійснюють поетапно за моделлю процесу особистого продажу, поданою на рис. 1.

Особистий продаж є дієвим елементом комплексу просування товарів, оскільки підприємству не потрібно формувати повідомлення для споживача

заздалегідь; торговий представник у процесі спілкування може оцінити потреби споживача і відповідно сформулювати звернення до нього, оцінити його реакцію і відповідно змінити свою стратегію; якщо продаж товару не відбувся, то в безпосередньому контакті покупець дізнається про товар і згодом може його купити.



**Рис. 1. Модель процесу особистого продажу**

Технологія персонального продажу передбачає вибір методу здійснення продажу. Це можуть бути: ділові переговори, презентації, телемаркетинг, багаторівневий маркетинг, демонстрації тощо.

Комплекс стимулювання збуту являє собою набір різноманітних методів стимуляційного впливу, що спонукають до купівлі або продажу товарів і послуг. Стимулювання збуту спрямовано на вже інформованих про товар споживачів, можливо, на особистому досвіді знайомих з його споживчими властивостями. Діяльність стимулювання збуту має особливо важливе значення, коли на ринку багато конкурентних товарів, мало відмінних за своїми споживчими властивостями, тож у покупців немає особливих підстав для переваги, а стимулювання збуту обіцяє покупцеві відчутну вигоду. Однак, якщо систематично проводити стимулювання збуту, то покупці можуть пов'язувати це з погіршенням якості товарів [9].

Висновки та перспективи подальшого дослідження. Для успішної роботи на ринку підприємству недостатньо виробити якісний товар і встановити прийнятну і доступну ціну для цільових споживачів. Компанії повинні також передавати інформацію своїм покупцям і ретельно проводити відбір такої інформації. Для цього у розпорядження компанії є комплексна система маркетингових комунікацій. Часто маркетингові комунікації ототожнюють з просуванням продукції, що призводить до помилкового розуміння їх сутності і, як наслідок, до нераціонального застосування потенціалу маркетингових комунікацій у ринковій діяльності підприємств.

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## ***New drivers of economic growth in Russian economy***

**Abstract:** New drivers of economic growth in Russia and the mechanism of their realization – new forms of public-private partnership are proved in the article. The review presents forms and typical errors in implementation of public-private partnership in the Russian regions. The detailed analysis of the effect from introduction of the new public-private partnership forms in Russia is carried out.

**Keywords:** public-private partnership, economy, management, investments, economic growth, regions of Russia.

According to Rosstat growth of gross domestic product of Russia in 2014 was slowed down to 0,6 % from 1,3 % in 2013. Minister of Economic Development of the Russian Federation A. Ulyukayev during 2013-2014 called «a consumer demand along with an investment demand and export» as drivers of growth of the Russian economy. But, are they actual in new conditions of Russian development?

According to the report of the United Nations conference on trade and development (UNCTAD) direct foreign investments into Russia fell to 70 %, to \$19 billion in 2014. Authors of research called as the reasons of decrease investors interest to the country - sanctions against Russia and negative prospects of economy growth. Real disposable income decreased for 1,8 % in March 2015 in comparison with the same period of previous year, and decreased for 1,4 % in the first quarter of 2015. Dynamics of the foreign trade turnover and export also is not positive [3]. Thus, modern conditions of Russian economic policy realization demand new drivers of economic growth activation. According to the Finance Minister of Russia A. Siluyanov that «the private investor» as which institutional investors, and also small and medium business can act is necessary to restart economic growth to us [3]. According to the



author, for involvement of private investors it is necessary to staticize state-private partnership forms (SPP).

An international practice of SPP shows that SPP-contracts can be carried out not only for implementation of infrastructure projects as it occurs generally in Russia, but also in the most various branches, for example, transport, housing and communal services, ecology, real estate, public order and safety, telecommunications, financial sector, education. A large number of projects on the basis of SPP in the specified branches was complete and installed in Great Britain. The wide disseminating of the state and private business cooperation is observed in France, Germany, Spain and Hungary. Some projects of SPP are at a stage of planning in Poland and the Czech Republic [4].

We will analyze the Russian experience of SPP realization on the basis of Russian regions research on a level of SPP development which has been carried out by the Economic Development Ministry of the Russian Federation, the Center of state-private partnership development with support of Commerce and Industry Chamber of the Russian Federation for 2014-2015 [5]. According to this data, experience with SPP projects is available in 68 subjects of the Russian Federation, but in 17 subjects of the Russian Federation such projects were not initiated at all. 48 % of projects are at an investment stage, 4 % of projects are just at a finishing stage and 16 % of projects are transferred in an operational stage. 50 % of projects belong to the municipal sphere, 73 % are realized in the concession agreement form. The greatest number of municipal and power infrastructure projects is realized in settlements with population less than 5 thousand people. The majority of projects are construction (reconstruction) and operation of heat supply, water supply and water disposal object. A lot of projects in the social sphere are realized in settlements with population more than 20 thousand people and the main field of their activity is a health care.

According to authors of research (and the author of article is agree with them), major factors of SPP development are institutional environment development, experience of SPP projects implementation and investment appeal of regions. Following the results of 2014 the average level of state-private partnership development in the Russian regions did not change in comparison with 2013 [5].

Russian leading regions on SPP development are St. Petersburg, the Republic of Tatarstan, Moscow, Novosibirsk, Nizhny Novgorod and Leningrad area.

Large concession projects in the transport sphere are realized in Moscow. In the Leningrad region implementation of projects in the health care and physical culture sphere is begun. The Republic of Tatarstan realizes projects of the municipal sphere and in health care. The Kaluga region is carried to regions with the average level of SPP development, at these regions the average level of investment appeal, and the institutional environment is sufficient only for projects replication.

The institutional environment development estimate on the basis of existence and quality of the regional legislation in SPP sphere. The law of the subject of the Russian Federation participation in SPP is realized in 68 subjects of the Russian Federation, but according to the experts only in 4 regions (4,7 %) it is effectively. Effective regions are St. Petersburg, Tomsk region, Yamalo-Nenets Autonomous Area and Sverdlovsk region. High quality is appropriated to the normative legal acts establishing an operating procedure with SPP projects just in 10 regions (11,76 %) (Republic of Bashkortostan, Belgorod region, Voronezh region, Leningrad region, Novgorod region, Rostov region, Samara region, St. Petersburg, Sakhalin region, Yaroslavl region). The structures responsible for SPP development are created in 76 regions of Russia (89,4 %). Thus experts estimate work only 12 of them on "well" and "perfectly". That speaks about need of change of the Russian legislation for SPP sphere.

The subjects recognized as leaders on development of the institutional environment in the SPP sphere is a Leningrad region, the Yaroslavl region, the Komi Republic, the Republic of Sakha. It is necessary to study experience of these regions for development actions for institutional environment improvement of the region in SPP sphere. Lack of the necessary institutional environment negatively influences on prospects of investments attraction to SPP projects and doesn't allow to build a uniform state policy of the subject on development of the SPP sphere.

Quality of SPP projects in the Russian regions characterizes that fact that every fifth concession competition prepared in Russia did not realize. This is a reason of poor quality of projects study and insufficient authorities activity at interaction with the private sector. Experience of start SPP projects in various branches of infrastructure is positively estimated in the Moscow, Novosibirsk area, the Republic of Tatarstan, subjects of the Far East federal district.

For SPP projects are characteristic some typical mistakes [6]:

- there is no task or it does not correspond to requirements;

- requirements to participants of the competition are established not provided by the law on concessions;
- there is no description of a object condition or it does not correspond to requirements;
- the computing program by calculation of the discounted gross revenue is incorrectly used. This conducts to overestimate of the investment limiting volume;
- competitive documentation doesn't take place on the Internet;
- there are no separate essential conditions of the concession agreement;
- the concession agreement established obligations on granting a subsidy, at the same time, the size of subsidies in the agreement is not specified;
- conditions of the concession agreement join the prices, values, the parameters which are not relating to long-term, used for calculation of discounted revenue;
- the order of the concessionaire reimbursement at the moment of the agreement termination, is formally defined. This is a reason of a non-return risk to the investor of invested funds or unreasonable budgetary expenses.

So the main idea is a need of training and teams formation on SPP projects implementation in each region.

The first steps on SPP legislation improvement are begun in Russia. The provisions in the «Law on concession agreements» providing possibility of the concession agreements conclusion at the initiative of private partners come into force since on May 1, 2015. Also the form of the proposal of the potential concessionaire about the conclusion of concession agreement is approved by the Government of the Russian Federation [7].

The federal law No. 388 «About industrial policy in the Russian Federation» which enters the new mechanism of state-private partnership – the special investment is accepted on December 31, 2014. Scope of the special investment contract is industrial production, and the purpose is a creation and modernization of industrial production [8]. As a result the state (Russian Federation) counts on:

- increase in industrial output production which doesn't have analogs, made in the territory of the Russian Federation;
- industries development having priority value for social and economic development of the Russian Federation;
- introduction of the best available technologies in industrial output production;

- creation and development of hi-tech production;
- production localization in the territory of the Russian Federation in a certain volume;
- creation of industrial infrastructure objects.

In this case the private investor can apply for some advantages:

1. privileges on taxes, collecting and privileges on customs payments;
2. privileges on payment of a rent for using the state or municipal property, including the land plots;
3. other privileges and the preferences established by operating at the moment of the contract conclusion by the legislation;
4. guarantees from adverse changes of the current legislation.

Russian Federation or subject of Russian Federation acts as the public partner in the special investment contract. An investor (the legal entity or the individual businessman) acts as the private partner. The special investment contract consists in the standard forms approved by the Government of the Russian Federation for separate industries. In this case the investment project has to correspond to one of the following requirements:

1. the investment project is included in the List of complex investment projects in the priority directions of the civil industry which is formed according to the Government Resolution of the Russian Federation from January 03, 2014 of No. 3;
2. the investment project is the investment project on creation of the new industrial enterprise and development at the created industrial enterprise of industrial output release;
3. the investment project is the investment project on modernization of the industrial enterprise and development at the modernized enterprise of industrial output release;
4. the investment project provides introduction of the best available technologies during implementation of the measures plan on environmental protection or programs of ecological efficiency increase.

The main economic effects of the SPP agreement is receiving property in a state ownership, but the main economic effect for the state from the special investment contract is industrial production development on territories of the Russian Federation and, as a result, creation of the additional product, new workplaces and tax revenues.

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### ***Transparency of credit institutions during the crisis as the key to successful development of the economy on the example of the Russian Federation***

**Abstract:** The article covers certain features of credit cycles as well as complex impact on investors and depositors preparing to finance and invest. The object of research is a depositor with his propensities since that is the basic factor of credit transactions.

**Keywords:** accounting, transparency of information, credit institutions, economic crisis, banks.

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### ***Прозрачность кредитных организаций в кризисный период как залог успешного развития экономики на примере Российской Федерации***

**Аннотация:** В данной работе автором была предпринята попытка доказательства связи открытости и правильности финансовой отчетности кредитных организаций с их благотворным влиянием на пути выхода из сложных экономических и финансовых условий, сложившихся в экономике страны.

**Ключевые слова:** бухгалтерский учет, открытость информации, кредитные организации, кризис, банки.

Актуальность данной темы состоит в том, что именно бухгалтерская отчетность как никакой другой документ раскрывает информацию о проводимых кредитной организацией операциях. Именно этот факт определяет

отчетность как инструмент, активно используемый инвесторами, которые в свою очередь преследуют цель достижения прибыли от собственных вложений. Таким образом, именно принцип открытости в конечном итоге и определяет склонность инвестора вложить деньги, отражая тем самым уровень доверия инвестора к организации.

В данной работе автор попытался проанализировать собранные на официальных ресурсах данные, а также информацию, предоставленную системой профессионального анализа рынка и компаний СПАРК. Автором были использованы следующие методы:

- сравнительный анализ;
- метод группировки;
- экспертный опрос;
- графический метод и другие.

В своей работе автор предпринял попытку глубокого анализа бухгалтерской отчетности кредитных организаций Российской Федерации. В период текущего кризиса приток возможных инвестиций особенно важен для предприятий, но непрозрачность отчетности российских кредитных организаций может отпугнуть позитивные ожидания участников рынка. Банковская система переживает кризис и недостаток ликвидности. Собранная по бухгалтерским отчетам информация позволяет определить степень открытости отчетности банков.

Новизна работы обусловлена особыми экономическими условиями, с которыми сегодня пришлось столкнуться Российской Федерации. Банковская система в лице кредитных организаций прилагает значительные усилия для того, чтобы не потерять свою привлекательность. Лишь в условиях кризиса, когда инвесторы становятся особенно восприимчивыми к любой информации, можно выявить значимость принципа открытости бухгалтерской отчетности по отношению к внешним условиям.

Вопрос открытости банковской отчетности всегда был важной частью банковской политики в целом. Различные межбанковские организации (в том числе Ассоциация региональных банков и др.) рассматривают этот вопрос, стремясь осуществить попытку сделать отчетность более открытой через создание своих законодательных актов. На межнациональном уровне данный принцип прорабатывается не менее основательно: международные стандарты Базель-I, Базель-II, Базель-III также отражают сопричастное отношение по

этому вопросу. В российском законодательстве принцип открытости с теоретической стороны рассматривается в Положении Банка России N 385-П и некоторых других нормативно-правовых актах.

Данное исследование может представлять теоретический интерес для кредитных организаций и непосредственно экономистов и бухгалтеров.

**Основная часть.** Открытость бухгалтерского учета банка является одним из важнейших принципов, который, согласно положению Банка России<sup>1</sup>, представляет собой достоверное отражение операций кредитных организаций. Отчеты, составленные на базе открытости должны быть понятными информированным пользователям и кроме того лишены какой бы то ни было двусмысленности или неточности.

Открытость банковской отчетности дает возможность вкладчикам и кредиторам анализировать, какой степенью устойчивости обладает банк и можно ли ему доверять. Актуальность данного вопроса неоспорима: во-первых, коммерческие банки должны предоставлять отчетность внешним пользователям, которые крайне заинтересованы в предоставляемой информации, поскольку в период финансово-экономического кризиса эти данные играют огромную роль, убеждая клиентов организации в устойчивости или наоборот, подавая сигналы о том, что организация стоит на грани банкротства. Во-вторых, отчетность банков проверяется Банком России, который ставит перед собой целью поддержание устойчивости банковской системы страны в целом, а для объективного анализа мегарегулятору необходима та отчетность, которая отвечала бы требованиям открытости и прозрачности. Все эти факторы в совокупности подчеркивают, насколько актуален вопрос об открытости банковской отчетности, которая является первоисточником и в некотором смысле индикатором состояния кредитной системы.

Большинство российских банков провозглашают, что следуют принципу открытости в своей отчетности. Некоторые из кредитных организаций отводят открытости место среди основных целей, другие – говорят об открытости в тех ценностях, которым следуют. Так, например, коммерческий банк «МАСТ-Банк» в своей миссии особо отмечает важность открытости и прозрачности, которые

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<sup>1</sup> "Положение о правилах ведения бухгалтерского учета в кредитных организациях, расположенных на территории Российской Федерации" (утв. Банком России 16.07.2012 N 385-П (ред. от 22.12.2014)).



используются в его деятельности, а также подчеркивает значимость своевременного и правдивого информирования пользователей о произведенных операциях и отчетности в целом<sup>2</sup>. Другой коммерческий банк – «Петрокоммерц» отмечает, что в своей деятельности руководствуется политикой максимальной открытости, предоставляет все доступные источники для раскрытия информации о своих операциях, а также выполняет все требования законодательства для ознакомления внешних пользователей со своей отчетностью<sup>3</sup>. Из приведенных данных можно сделать вывод, как важно отдельным банкам получить доверие внешних пользователей, и именно поэтому на своих официальных источниках банки стремятся отметить принцип открытости как основной в своей деятельности.

В 2007 году Ассоциация региональных банков, учитывая многосторонние аспекты банковской деятельности, предложила на рассмотрение проект Кодекса безупречной банковской практики, который должен был повысить уровень культуры деятельности банка, ответственности перед обществом и доверия со стороны внешних пользователей. Проект кодекса подразумевал дальнейшее обсуждения и совершенствование. Через год, в 2008 году, был опубликован Кодекс этических принципов банковского дела. Данный Кодекс отмечает гражданский долг кредитных организаций перед обществом, а также провозглашает принципы открытости, доступности и прозрачности публикуемой в отчетности информации, которым должны следовать все кредитные организации страны.

По состоянию на февраль 2015 года к данному Кодексу присоединилось 122 кредитных организации. Автором были проанализированы периоды этого присоединения. Пик организаций в процессе присоединения приходится на 2010 год – посткризисный период. В 2010 году к Кодексу присоединились 33 организации. С 2010 до 2012 года активность присоединяющихся организаций постепенно снизилась и лишь немного подросла к 2013 году (14 организаций). С этого момента количество присоединенных организаций постепенно снижается. Возможно сделать вывод о том, что в сложных финансовых условиях и опасных для банковской системы положениях, кредитные

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<sup>2</sup> Официальный сайт коммерческого банка «МАСТ-Банк» - <http://www.mastbank.ru/about/mission> (Дата обращения: 08.03.2015).

<sup>3</sup> Официальный сайт коммерческого банка «Петрокоммерц» - <http://www.pkb.ru/about/summary/ethics> (Дата обращения 08.03.2015).

организации не стремятся учитывать этические принципы в своей деятельности и не принимают на себя новых обязанностей и требований по открытости и прозрачности в отчетности.

Банки обязуются исполнять раскрытие информации исходя из двух основных моментов. С одной стороны, подавляющее большинство банков сегодня существуют в форме акционерных обществ (акции обращаются на бирже), что обязывает их раскрывать информацию о своем финансовом положении.

Так, седьмая глава Федерального закона от 22.04.1996 N 39-ФЗ (ред. от 21.07.2014, с изм. от 29.12.2014) "О рынке ценных бумаг" под названием «О раскрытии информации на рынке ценных бумаг» обязывает банки раскрывать информацию о всех существенных фактах и сведениях о действиях, об операциях, которые кредитная организация исполняет. В соответствии с 39–ФЗ, эти данные должны размещаться на официальном сайте, в СМИ, лентах новостей, а также направляться в соответствующие органы государственной власти, то есть в открытых источниках.

Также к банкам относятся соответствующие требования и рекомендации со стороны Банка России. Так, Указание Банка России от 25.10.2013 N 3081-У "О раскрытии кредитными организациями информации о своей деятельности» обязывает банки предоставлять определенные сведения, отвечающие принципам прозрачности и открытости, что четко регулируется и анализируется мегарегулятором. Говоря о международных стандартах, отметим Базель-2, который в отдельном разделе «Рыночная дисциплина» настаивает на том, что банки обязаны предоставлять отчетность без любого рода недостоверной информации.

Таким образом, представляется возможным отметить тот факт, что с точки зрения законодательства принцип открытости банков регулируется достаточно серьезно как со стороны российского законодательства, так и международного.

Джордж Сорос сказал следующее о мнительности инвесторов и их подверженности негативному влиянию: "Алхимики сделали большую ошибку, пытаясь превращать простые металлы в золото с помощью заклинаний. С химическими элементами алхимия не работает. Но она работает на финансовых рынках, поскольку заклинания могут повлиять на решения людей, которые формируют ход событий". Из данной цитаты можно сделать один

вывод - у банка, который нуждается в инвестициях, все "маячки", которые использует инвестор для анализа организации, должны пребывать в идеальном состоянии, чтобы уменьшить негативные ожидания со стороны общества. Но, к сожалению, реалии в России несколько иные.

В последнее время Центральный Банк Российской Федерации все чаще осуществляет отзыв лицензий у кредитных организаций в силу непрозрачности и недостоверности соответствующей бухгалтерской документации. В данной статье рассмотрены основные схемы, используемые банками для сокрытия негативных результатов работы, недобросовестных действий руководства и прочего за счет использования статей своей бухгалтерской отчетности и махинаций.

**Выводы.** Говоря о принципе открытости бухгалтерского учета, следует отметить его важность для всех субъектов, имеющих отношение к выпускаемой бухгалтерской отчетности. С одной стороны, кредитная организация сама должна быть заинтересована в предоставлении достоверной информации по итогам бухгалтерской деятельности, поскольку это позволяет проводить верный анализ полученных результатов и корректировать будущую деятельность, основываясь на достоверных показателях. С другой стороны, открытость позволяет кредитной организации не вводить внешних пользователей в заблуждение и не создавать двусмысленности при трактовке проводимых операций. Это, во-первых, делает процесс привлечения инвесторов более объективным и здоровым. Во-вторых, открытость повышает статус организации, вследствие чего она может претендовать на высокую степень доверия со стороны как общества, так и государства.

Автором были рассмотрены законодательные и теоретические аспекты данного принципа. Кроме того, был проведен анализ того, как принцип открытости осуществляется на практике в нашей стране. При рассмотрении процесса присоединения банков к правилам, провозглашающим открытость, автором были выявлены некоторые закономерности. При появлении данного рода правил значительное количество кредитных организаций проявили желание присоединиться к ним, что говорит об общей оптимистичной нацеленности банков на раскрытие достоверной информации о ведении бухгалтерской отчетности. Однако в кризисный и посткризисный период количество желающих следовать повышенным правилам открытости постепенно снижается и уже не достигает начальных значений. Это говорит о том

факте, что в кризисный период по определенным причинам склонность кредитных организаций к заверению об открытости своих отчетностей снижается на определенную величину. Автором было также отмечено отсутствие отчетностей в период кризиса 2014 – 2015 гг. у некоторых банков, по рейтингу входящих в десятку лидирующих по показателям активов, что, несомненно, заставляет ставить определенные вопросы относительно этих организаций. Кризисный период, кроме перечисленного выше, зачастую вынуждает кредитные организации прибегать к применению различных схем для увода своих отчетностей за пределы открытости. Авторами эти схемы были также рассмотрены, после чего был сделан вывод о жизнеспособности этих методов применительно к России, а также об усилении активности применения подобных схем в кризисный период.

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***Theoretical and methodological approaches to the  
assessment of the oil industry complex impact on the  
natural environment of the mountain region  
(on the example of the Chechen Republic)***

**Abstract:** The analysis of works of domestic and foreign scientists on the assessment of the impact of oil industry complex natural-anthropogenic environment. The main theoretical and methodological approaches to the analysis and evaluation of the influence of objects of the oil industry on the natural environment.

**Keywords:** geo-environmental assessment, oil, natural environment, technological transformation, mountain landscapes, development of new oil fields.

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***Теоретико-методологические подходы к оценке  
воздействия нефтепромышленного комплекса на  
природно-антропогенную среду горного региона  
(на примере Чеченской Республики)***

**Аннотация:** Проведён анализ работ отечественных и зарубежных учёных, посвященных оценке воздействия объектов нефтепромышленного комплекса на природно-антропогенную среду. Выделены основные теоретико-методологические подходы анализа и оценки влияния объектов нефтяного комплекса на природную среду.

**Ключевые слова:** геоэкологическая оценка, нефтепромышленный комплекс, природная среда, техногенная трансформация, горные ландшафты, освоения нефтяных месторождений.

**Введение.** На международной конференции по окружающей среде и развитию (Рио-де-Жанейро, 1992) горные регионы отнесены к хрупким экосистемам, и их исследования признаны приоритетными в XXI в. Горы представляют собой особый тип географической среды с высоким уровнем ландшафтного и биологического разнообразия. Общеизвестна динамичность горных территорий, чувствительность к внешним воздействиям (Troll, 1955; Гвоздецкий, Голубчиков, 1987; Beniston et al., 1997; Theurillat & Guisan, 2001; Dirnbock et al., 2003).

**Цель работы** – выявить приоритетные теоретико-методологические подходы к комплексной геоэкологической оценке воздействия нефтяного комплекса на природно-антропогенную среду горного региона.

**Материалы и методы.** Материалами для написания статьи послужили исследования проводимые автором по оценке воздействия объектов нефтепромышленного комплекса на природно-антропогенную среду Чеченской Республики.

**Результаты исследования и их обсуждение.** Основываясь на результатах современных отечественных и зарубежных научных исследований, можно выделить три основных подхода к оценке воздействия объектов нефтяного комплекса на природно-антропогенную среду: 1) технологический, в котором на первый план выдвигается анализ специфики нефтедобычи, в частности, особенности технологического процесса и масштабы воздействия на природную среду; 2) эколого-геохимический, в котором упор делается на закономерностях геохимических процессов, происходящих в ландшафтах и обусловленных воздействием нефтяного комплекса; 3) комплексный анализ и геоэкологическая оценка воздействия нефтяного комплекса на природно-антропогенную среду.

Преобладают, в основном, первые два подхода, в то время как комплексный геоэкологический анализ представлен преимущественно работами последних 10-15 лет, когда методология геоэкологического анализа начала приобретать междисциплинарное значение.

Концептуальные рамки и приоритетные теоретико-методологические подходы к комплексной оценке воздействия нефтяного комплекса на природно-антропогенную среду горного региона в рамках третьего подхода базируются на анализе и учете следующих физико-географических, геоэкологических и социально-географических особенностей: горности территории и ландшафтов, специфики нефtezалегания в горах, характера освоения нефтяных месторождений, зависящего как от горной ландшафтной структуры, так и от залегания нефтепластов, характера расселения, традиционного хозяйствования и землепользования, а также динамики других типов хозяйственного освоения.

Особо следует подчеркнуть учет фактора горности региона, в котором осуществляется нефтедобыча. В мире выделяются два крупных ареала месторождений нефти, приуроченных к горам: Андско-Кордильерский (Северная и Южная Америка), Переднеазиатско-Кавказский, а также относительно небольших – месторождения в горах Индонезии, на островах Малайского архипелага и Новой Гвинеи, на Сахалине, в Центральной и Средней Азии, отчасти в Карпатах, а также в горных регионах Африки и Австралии. Месторождения в этих горных и предгорных областях располагаются группами и связаны с крупными зонами нефтегазонакопления. Чаще всего такие группы месторождений приурочены к антиклинальным зонам.

Горы имеют свою специфику ландшафтной структуры, ее организованности, иерархичности, динамики. Основными факторами природной динамики гор являются:

1. Гравитационная энергия склонов, приводящая к возникновению лавин, селей, оползней, эрозии, осыпей, подвижкам ледников и каменных глетчеров и др.
2. Высокая напряженность гидротермических градиентов по высоте, экспозициям, в различных по величине и простираию горных долинах.
3. Сложная мозаика почвенно-растительного покрова, обусловленная различиями в условиях произрастания растительности и почвообразовании, а также в разновозрастности природных компонентов (Геннадиев, 1980).

Неравномерность хозяйственного освоения, вызванная различной доступностью и неоднородными ландшафтно-ресурсными условиями, приводит нередко к развитию крайних форм освоения природных ресурсов – очаговому интенсивному (нефтедобыча может быть ярким примером) и площадному экстенсивному, а также к возникновению очагов деградации ландшафта и



распространению ареалов с различной степенью антропогенной нарушенности. Это, в свою очередь, обуславливает резкую дифференциацию нетронутых и сильно нарушенных ландшафтов.

Хотя горные ландшафты считаются наименее затронутыми деятельностью человека (по сравнению с равнинными), часть из них, все же, находится в разной степени антропогенной модификации: от слабого изменения отдельных компонентов до изменения ландшафтных связей и появления новых природных комплексов на месте старых. Это объясняется тем, что в горных ландшафтах связи между отдельными компонентами не устоялись, они находятся в постоянном и динамичном развитии (Авессаломова и др., 2002; Беручашвили, 1986; Гуня, 2010 и др.).

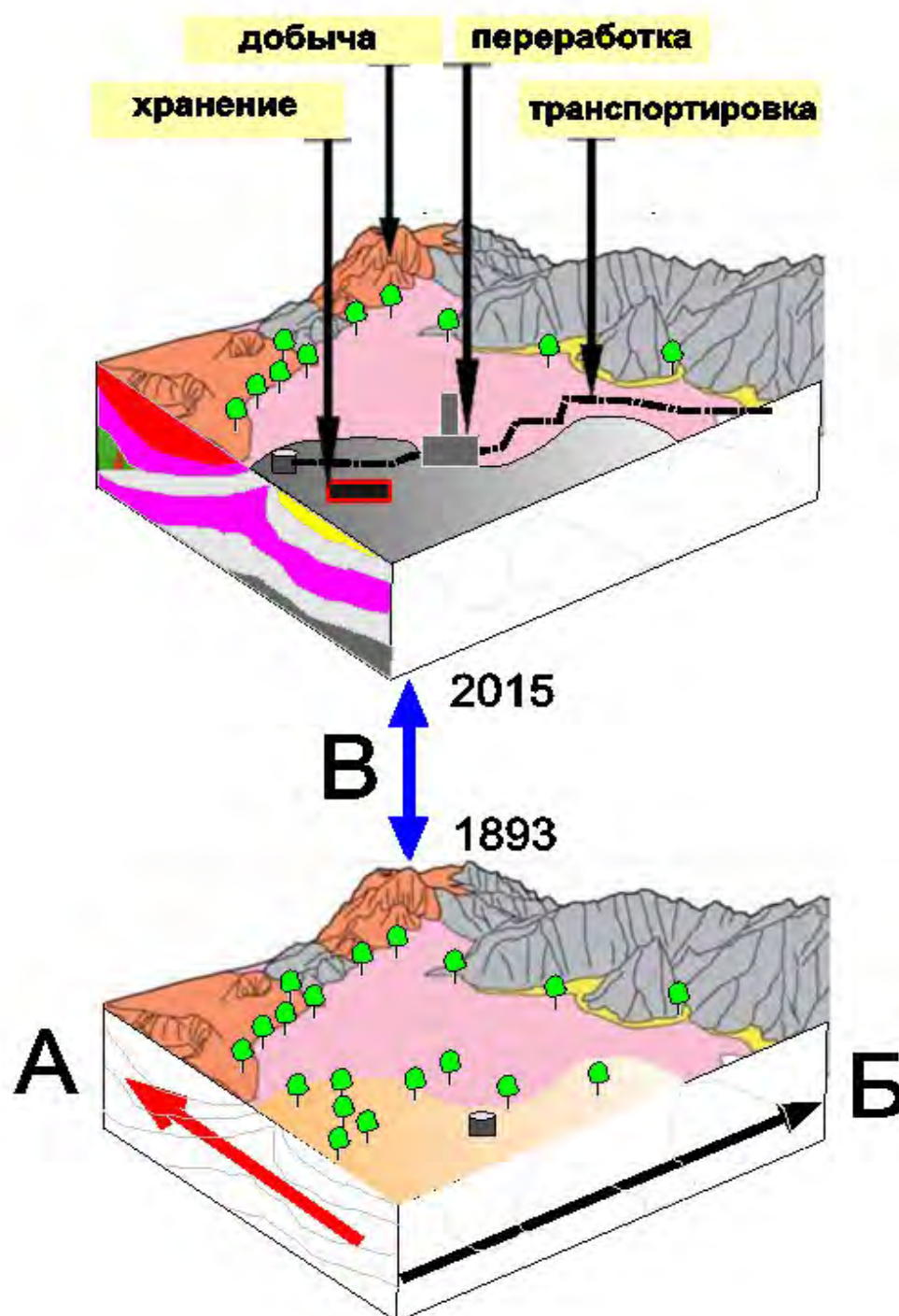
Ранимость и уязвимость горных экосистем очень ярко проявляется на примере воздействия нефтяного комплекса. Освоение горючих ископаемых в горных районах, как правило, полностью меняло традиционные формы природопользования и кардинально трансформировало экологическую структуру ландшафтов (Авессаломова и др., 2002). Разработка нефтяных месторождений, приуроченных к предгорным прогибам и межгорным впадинам, оказала существенное влияние на дифференциацию природно-антропогенных ландшафтов горных территорий (Керимов, Уздиева, 2008; Гайрабеков, 2012).

Уникальность нефтеносного комплекса на территории Чеченской Республики заключается в том, что крупные нефтяные залежи располагаются в непосредственной близости к активным зонам тектонических разломов, где морфоструктурные условия оказывают исключительно важную роль в устойчивости залегания и условий разработки нефти.

Специфика горного региона является важной для оценки любого антропогенного воздействия. Однако, без учета внутренней специфики конкретной хозяйственной отрасли или типа воздействия, оценка глубины и особенностей антропогенной трансформации вряд ли будет эффективной. Нефтяная промышленность по опасности воздействия на окружающую среду занимает третье место в числе 130 отраслей современного производства (Панов и др., 1986, Солнцева, 2004). Основными источниками воздействия на природную среду при добыче и переработке углеводородного сырья являются нефтепромыслы, внутри-, межпромысловые и магистральные трубопроводы, нефтеперекачивающие станции, нефтебазы, терминалы по наливу нефти и т. д.



(Нефть и окружающая..., 2008). Эти объекты накладываются на сложную структуру горного региона и трансформируют землепользование и расселение всего горного региона (рис. 1).



**Рис. 1. Концептуальная схема изучения взаимодействия объектов нефтяного комплекса с геосистемами горной территории: А – изучение компонентов и функционирования природных и антропогенных ландшафтов, испытывающих влияние нефтяного комплекса, Б – изучение ландшафтно-морфологической структуры, В – изучение динамики ландшафтов за 1893-2015 гг.**

**Заключение.** Таким образом, теоретико-методологические подходы к изучению техногенной трансформации природно-антропогенной среды под воздействием нефтяного комплекса основаны на специфике горных территорий, в первую очередь, гетерогенности природных условий, сложности природной организованности и разнообразия природной динамики и особенностей развития и эксплуатации нефтяного комплекса, его преимущественно очаговый и линейно-очаговый характер воздействия на природную среду. Это определяет необходимость сочетания двух подходов к моделированию техногенной трансформации: комплексного геоэкологического картографирования территории по степени подверженности влиянию нефтяного комплекса и выделения современной техногенной структуры нефтяного комплекса, приводящего к широкомасштабным экологическим последствиям.

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## Humanities & Social Sciences

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### ***Learning - the Israeli Way: Key Educational Experiences and Classroom Noise***

#### **ABSTRACT**

**Aims:** The present study exposes that meaningful learning experiences in Israeli schools take place in noisy and highly active classrooms. In contrast to common assumptions, we show that significant learning takes place in "active" classrooms, where "activity" reflects students' enthusiasm, curiosity and interest.

**Place and Duration of Study:** The study took place in Israel and collected evidence along three years.

**Study Design:** The study used a convenience sample of adults who reported about their strongest educational experiences in life. The sample proved representative of Israeli high school populations. The present article is based on the analysis of 483 retrospective key educational experiences that adults had during their school days.

**Methodology:** We used interpretive methods to analyze major themes and patterns but also coded experiences in order to assess the quantitative ecology of "noisy" experiences in school.

**Results:** A thematic qualitative analysis of the episodes shows that key educational experiences occurred when the content of instruction was authentic,

relevant and challenging. Key experiences also reflected teachers' use of competitions, instructional peaks, varied skills employed in research projects, free choice of activity, presentations in front of an audience, and the use of surprises in learning. The article shows that many experiences took place on field trips, while others transpired during what seemed like ordinary frontal, teacher-centered instruction. Overall, these key educational experiences reflect the "deviance" of individual teachers from patterned instructional programs, and students' "chaotic-like" behaviors during the pre-planned school schedule. During key educational experiences the teachers were deviating from formal instructional schedules and the students were neither sitting in silence, nor complying with formal directives. Rather, they were shouting with enthusiasm, rejoicing in their learning, at times ignorant of the fact that they were actually learning.

**Conclusion:** This article shows that in Israel learning is equated with noisy and rather informal modes of instruction, suggesting that "active" methods have long-term educational effects on students' lives.

**Keywords:** learning; classroom instruction; key experiences; Israel; culture.

## 1. INTRODUCTION

"In one of my social studies courses for high school seniors, I conducted a discussion on possible contradictions between democracy and national security. The pupils worked in teams, preparing arguments for or against each position. The discussion between the groups provoked excitement, with pupils fervently shouting at each other. Suddenly in walks the principal, asking if all was under control. I answered that it was. After class the principal approached me and asked whether I had discipline problems in class and whether I had managed to finish teaching the required material" (reported by a high school teacher).

This incident reflects a common wisdom among educators, pupils, and parents alike, namely that silent classrooms are conducive to learning [1]. According to this position, silent classrooms provide conditions for effective learning, where teachers can cover the required curriculum in predetermined timing and at a predetermined level [2-4]. It is further assumed that noisy classrooms provide fertile ground for pupil misbehaviour and disengagement. For example, critiques of open or progressive schools claim that unorganised debates, open discussions and individualised learning might provide pupils with an opportunity to use the noise and din during such

activities to disrupt classroom order. The common assumption is that learning in such settings undermines classroom order and exacerbates discipline problems. Learning and noise are regarded, then, as oxymoronic.

This assumption is indeed heralded by principals who pride themselves on the silent learning climate in their schools, regarding it as proof of effective learning. Teachers, too, consider silent classrooms as a key for learning and are inclined to identify a silent classroom with efficient learning. Even pupils and parents emphasize the importance of a solemn atmosphere for learning, claiming that pupils cannot study properly in "noisy" classrooms.

In contrast, a growing body of scholarship has begun to undermine the sweeping conclusions of this common wisdom. Such criticisms stem from recent theoretical developments that point out the inability of traditional bureaucratic school systems (which opt for silent classrooms) to cater for long-term meaningful learning amongst pupils. Theoretical trends such as "constructivism in education", "active learning", and "authentic instruction" look for instructional and curricular features that allow pupils to have meaningful long-term learning experiences [5-8]. Furthermore, an increasing volume of research showing that there is no simple correlation between classroom noise and pupils' achievements supports such trends. This literature further suggests that under certain conditions silent classrooms might even create alienation and pupil disengagement [9,10].

Moreover, critical scholars claim that silence primarily serves schools as a control device, thus curtailing significant learning [11]. They claim that many schools maintain silent atmospheres as a disciplinary means, thus compromising significant didactic goals [12]. They argue that administrators settle for class attendance, focusing on the accumulation of required credit points for graduation exams. Many pupils react to such school policies with opposition, expressing little involvement in class and a protest of roaring silence. Nevertheless, most of them are well aware of the importance of a graduation diploma for their future. Consequently, they go through the motions and pretend to be busy learning, knowing that a facade of involvement is the real scale by which they are evaluated in school [13]. But behind their expressed silence, they harbour disengagement, alienation, and hostility towards school and school learning [14,15].

The debate over the silent classroom has theoretical and practical implications, and has consequently received much attention. While the academic critics of

the silent classroom have gained momentum, educational policies in the past decades have pressed more firmly on schools to attain predetermined curricula and standards. For example, in the US the National Commission on Excellence in Education, and its repercussions in standards-based reforms two decades later has increased the emphasis on bureaucratic procedures and control mechanisms. In the UK, the National Curriculum has similarly pressed for standardisation and control of instruction and curricula. Such reforms have not passed unnoticed in the world, Israel including.

Notwithstanding the importance of this debate over silent, controlled classrooms, most of the extant literature on the topic is polemic in nature and ideologically driven. This state of affairs precludes any firm conclusion put forth by the protagonists in the debate. Furthermore, most of the studies on this issue were conducted in ordinary or traditional classrooms, where learning is focused on transferring "dead ideas" from teachers to pupils. As a result, they could not examine the extent to which significant learning takes place in silent classrooms.

To overcome these limitations, the present study assesses the extent to which silent classrooms enable students to experience meaningful instruction. It does so by analysing retrospective key educational experiences that have left a long-term mark on pupils' lives. The study uses the most significant learning experiences that adults recall from their school days in order to reconstruct the type of instructional practices that were evident in those classrooms. On this empirical basis it seeks to reassess the claims about the efficacy of silence in classrooms.

### **1.1 The Classroom as a Learning Society**

Willard Waller (1932) characterised the classroom as a learning society that imposes contradictory tasks on teachers: namely to teach and to motivate pupils. On the one hand, teachers are required to transmit the required curriculum in large heterogeneous classrooms. To that effect, they have to teach the pupils a pre-planned and pre-scheduled curriculum and prove to their superiors (as well as to parents) that their pupils achieve formal requirements. In order to meet this goal teachers are encouraged to discipline their pupils and safeguard the orderly environment of the classroom. Hence, they are keen on having a silent classroom, constantly supervising pupils and organising instruction using pre-prepared lesson plans [16,17].



On the other hand, the constant supervision and disciplinary control of pupils contradict the second task of teaching, namely motivating pupils, exciting them, and arousing their interest in learning. Different studies have shown that significant learning experiences occur when teachers supply pupils with a free choice of topics, challenging material, high level of skills, and relevant subject matter [5,9]. Therefore, in order to attain their second task, teachers have to ease their disciplinary supervision and minimise pupil control. Overall, the more teachers try to supervise and control pupil behaviour, the less they succeed in arousing motivation in their pupils, and vice versa.

There is evidence that in facing this dilemma most teachers choose to supervise classroom learning, thus compromising meaningful learning and inquiry. Studies have shown that the duality of the classroom as a learning society leads teachers to perceive silence levels as a central measure for assessing their professional capacity as teachers [18,19]. Many teachers also know that supervisors, head teachers, and parents all expect them to maintain a silent classroom in order to assure amicable learning conditions for the pupils [20]. These conclusions are supported by findings of leaders in school effectiveness studies, who concur that silent and focused classrooms are more conducive for learning [21].

The inevitable compromises that teachers make - preferring controlling rather than motivating their pupils - stem from the organisation of the school [7]. The bureaucratic principles of public schools reward teachers who discipline their pupils, while obstructing those who seek to motivate the pupils by using informal strategies [22]. The following analysis suggests that silence in classrooms is indeed driven by organisational considerations.

First, hierarchical teacher-pupil relationships encourage teachers to maintain distance from their pupils, avoiding improvisation and flexibility [17]. They prefer to follow pre-set course outlines while preventing pupils from developing an independent learning agenda. Second, the bureaucratic requirement to abide by impersonal rules and regulations leads most teachers to meticulously cover the material in the curriculum while blocking new initiatives and learning ideas that are not "test material". To meet these requirements, teachers strictly hush their classroom so that they can "cover the material" in time. Thus, dictation from the teacher's notebook and reading out aloud from pre-prepared worksheets create the feeling of serious and silent learning, especially to external spectators. Third, school



inspection rules also pressure teachers to maintain silence. Inspectors mainly assess external features of classroom instruction: They check national school timetables, assess the attainment of the National Curriculum, focus on decreasing dropout rates, and on controlling pupil misbehaviour. Studies have indeed shown that inspectors focus on symbolic and formal aspects of teaching, placing less emphasis on the inherent technology of teaching, namely the motivation to learn and the meaningfulness of instruction [23]. Thus the ministry of education, school inspectors, and head teachers are all busy maintaining the core rituals of schooling, preferring silent classrooms to productive and meaningful, but unorganised learning environments.

This analysis suggests that bureaucratic schools encourage most teachers to discipline their pupils and insist that their classroom study in silence. Moreover, such traditional schools promote the belief that silence in the classroom indicates that pupils are busy learning.

Consequently, silence is usually equated with learning while noise and disorganisation are regarded as disobedience.

## **2. RESEARCH BACKGROUND**

Although there is no direct evidence to prove that meaningful learning experiences can take place only in orderly, silent classrooms, there are different theoretical threads that indeed seem to support this general contention. First, Carroll's model of learning prompted many researchers to examine the effectiveness of teaching in terms of time [24]. The model assumed that all pupils can learn, and that pupils' talent variability required differential time allotments for achieving similar outcomes. Following these premises, different scholars measured the time allotted to learning in different classrooms, assuming that the time allotted for learning in a silent classroom equals to the time pupils are actually engaged with instruction [25-27]. These studies have shown that silent and controlled classrooms use up to 80 percent of the time allotted. Other studies have shown that noise level and pupil opposition in lower socioeconomic classrooms decrease the effectiveness of teaching by enlarging the gap between allotted time and engaged time [12].

A similar argument emanates from studies of school organisation. For example, a comparison between private and public schools suggests that orderly learning environments and achievement-directed school cultures provide more opportunities to learn and higher normative pressure toward school learning [28-30].

Thus, pupils in private and Catholic schools in the U.S. have higher achievements than their compatriots in public schools due to the fact that private schools have more orderly and silent classroom environments. In comparison, portraits of life in public schools show that many classrooms are noisy and disobedient, with teachers sacrificing instructional demands in order to attain the facade of a controlled classroom. With some generality, then, these studies support the claim that silent classrooms are indeed more effective for learning.

Third, school effectiveness studies - a conceptually independent body of literature - have a similar view. These studies have attempted to extract basic features of school organisation and culture, which set some schools ahead of the pack, and emphasised that silent and controlled school environments yield high achievements [31-35]. In contrast, in schools that lack leadership and control mechanisms over pupil achievement, pupils evade learning while settling for the lesser side of the educational opportunities that schools provide.

Although they differ conceptually and methodologically, these three lines of study concur that orderly and silent classrooms constitute the grounds for efficient learning. They also seem to agree that noisy, uncontrolled classrooms harbour disobedience and pupil disengagement. Notwithstanding this agreement, these theoretical schools share similar shortcomings, which should preclude a hasty acceptance of their conclusions about the effectiveness of silent classrooms for meaningful learning.

There is reason to suspect that what these studies call "learning" is not really meaningfully experienced as such by pupils. These cumulative models of learning assume that learning is a slow process that takes time to materialise, with pupils accumulating knowledge by sitting in classrooms day after day, year after year. There is reason to believe, however, that meaningful learning experiences cannot be equated with the outcomes measured by most studies in educational research. School achievements in mathematics, science, or reading cannot be equated with meaningful learning experiences. Consequently, these studies have not yet provided sufficient evidence to decide that silent classrooms are indeed necessary for producing meaningful learning experiences.

Overall, existing research does not provide us with a resolution to the question of whether a silent classroom is actually a learning classroom, or more accurately whether a learning classroom is necessarily a silent one. The aim of the present

study is to fill in the gap in this literature and test the claim that a meaningfully learning classroom requires silence. Unlike most studies in this field, the present study examines meaningful and significant learning experiences that were reported by adults many years after their school days. Thus, by analysing these significant learning experiences, the present study attempts to examine whether these experiences occurred in classrooms that were silent, and if not, to assess the "noisy" activities in those situations.

## **2.1 The Study**

In contrast to studies that use scholastic achievements as a criterion, the current endeavour uses meaningful, key learning experiences to assess the nature of effective instruction. Key learning experiences are those that have proved to have a decisive effect on pupils' lives [36-38]. They were episodes that allowed learners to evaluate their wishes, capacities and opportunities, and enabled them to break free from prior limitations and set themselves on a new path. These are the educational episodes that adults deemed to be the most influential in their lives, therefore serving as keys to their lifelong development.

### **2.1.1 Sample**

The present study is based on a snowball collection strategy that culminated in a sample of 505 respondents, aged 21 and above (with a range of 21 to 75, and a mean age of 37 years). The sample is representative of the Israeli population, with the exception of rural residents who were over-represented. Students from two universities interviewed two adults from their neighbourhood, and personally reported on their own key educational experiences. After narrating their experiences, respondents filled out a questionnaire, which focussed on their best key experience. The present study focuses solely on school-related experiences. It is based on reports of 379 of the 505 respondents who reported on key experiences that took place in school. Overall, these respondents reported on 483 learning experiences. We used several criteria to select experiences: (a) we only used experiences we could tie with socioeconomic and educational background variables; (b) we focused on experiences which incorporated all the necessary features of organization, phenomenology and outcomes (see below); (c) we selected only those experiences which matched the task.

The extracted experiences were divided by school level. Most key experiences were recorded in high school ( $n=229$ ), with a smaller share in middle schools ( $n=92$ ) and primary schools ( $n=162$ ). Statistical testing did not show any correlation between respondents' age and the type of institution that most prominently affected their life. This finding suggests that the results do not reflect memory-related recency effects. Moreover, it is possible that the design of the study triggered respondents to tell a story as a "turning point" narrative [39], though the phrasing of the questions asked respondents to report their best life experiences, or the most significant ones, without hinting at the fact that the study focuses on critical moments.

## 2.2 METHODOLOGIES

Data gathering was based on in-depth interviews in which the respondents were asked to report their three most significant learning experiences, whenever and wherever they occurred. After the interview, respondents were asked to choose the most significant experience of the three, and to answer a closed questionnaire related to it. Respondents were taped during the interview and the entire transcripts were taken from the tapes. Respondents were asked to address three main aspects of their key experiences:

Organisation - in this part the respondents were asked to describe the organisation of the activity, focusing on teaching practices and methods.

Phenomenology - in this part the respondents were asked to report their feelings during the activity, while discerning between intellectual, emotional, and identity-focused phenomenological experiences.

Outcomes - in this part the respondents were asked to report the long-term effects of their key experiences, while discerning between effects on their values, behaviours, pragmatic decisions, and personality.

## 2.3 Data Analysis

The study used a grounded-theory approach, combining deductive and inductive content analysis of the interviews. The analysis started with a deductive coding of the narratives using categories derived from the pilot study. Further categories were inductively gleaned from the data. Each experience was divided into segments (sentences and paragraphs), and each was assigned a main title. Similar

titles were grouped into theoretical categories, which were developed and refined as the coding continued.

Grouped categories relate to different teaching characteristics (i.e., authenticity, surprise), and to attitudes toward a "silent" and a "noisy" classroom. Other categories served to count episodes where noise indeed reflected disciplinary problems. After completing the coding, the frequency count of key experiences in each category was summed up. While we focus on the qualitative aspects of those key experiences, we thought that a quantitative estimation of the "ecology" of outstanding instructional practices is important in delineating the prevalence of various features of those events.

## **2.4 Rationale of the Present Study**

The present study examines instructional characteristics that were salient during key educational experiences. The main objective is to characterise the instructional methods and strategies that teachers used during these episodes. Conceptually, this approach seeks to assess whether these are "silent" strategies, and whether these methods indeed controlled and silenced pupils. This exercise is of utmost significance for the present study for two reasons.

First, if key educational experiences were not formed when teachers used "silent" methods, but rather when instruction was "noisy", then the claim that meaningful learning can take place in seemingly uncontrolled and noisy classrooms is borne out by the data. Second, to the extent that key educational experiences have indeed occurred in silent classrooms, we will be in a position to examine what actually happened during these silent episodes, namely whether pupils were passive (simply listening to a teacher), or rather were busy with disciplined learning activity. Finally, our approach enables us to assess the extent to which Israeli cultural codes drive "noisy classrooms" to prove effective in creating lifelong learning experiences [40].

## **3. FINDINGS**

The reporting of findings is divided into four sections. The first two sections test the assumption that meaningful learning experiences mainly occur in silent classrooms. They examine the instructional strategies and methods that teachers used during key educational experiences, focusing on informal activities on the one hand, and on the contents of the activities on the other. The third section shows that

a significant number of key experiences occurred outside the classroom, during field trips and "noisy activities". The fourth section suggests that even teacher-centered, lecture-type instruction can remain engraved for life, conditioned on their instructional characteristics.

### 3.1 Contents and Activities in Key Educational Experiences

Table 1 presents the frequency distribution of the categories, which were used to describe instruction during key, highly meaningful learning experiences. Based on the analysis of the narratives, we distinguish between content and activity characteristics. The reports suggested that many key experiences occur in silent classrooms, but that the content of instruction during these episodes was relevant, authentic and challenging. However, the results clearly suggest that many key experiences took place in noisy classrooms, where the activities did not allow teachers to maintain a silent, orderly environment.

**Table 1. Frequency distribution of content and activity feature  
in key educational experiences**

Teaching Strategy	Type	Frequency (N)
Authenticity	Content	121
Relevance	Content	63
Challenge	Content	58
Performance in Public	Activity	56
Experimentation	Activity	34
Use of Multiple Skills	Activity	32
Constructing Peaks	Activity	25
Allowing Choice	Activity	21
Using Competitions	Activity	20
Using Surprises	Activity	10

The following exegesis of the results uses original transcripts from respondents' reports in order to exemplify the contents and activities during key educational experiences, and to characterise the atmosphere during these episodes. We usually cite one quote for each category, although we could have provided many more. The numbers appearing at the bottom of the quotes refer to respondents' ID code and memory number.

### 3.2 Content Characteristics

The most salient content characteristic appearing during key educational experiences is authenticity. Authentic instruction is usually defined as teaching real-life topics, or as doing real-life activities [5]. Most respondents considered authentic instruction as "learning from life and about life" - learning that is neither scholastic nor disconnected from real-life and the adult world. Rather, the contents of instruction extend from real-life topics and connect pupil learning to their surrounding world. Authentic instruction brings pupils into direct contact with reality, without the mediation of a formal and emotionless school curriculum, which by its very nature relates to pupils' "ratio", or cold reason [41]. In contrast, direct contact with real-life situations allows pupils to feel and think at the same time, thus engraving the educational activity for a long time.

The analyses suggested that authentic instruction usually took place outside the ordinary classroom, immersing pupils in real-life situations. These settings were devised using learning expeditions and by visits to institutions, or by an active participation in an event [42]. These visits and active participation in authentic settings can turn routine topics into lifelong, key educational experiences. For example, a 24 year old respondent described an authentic lesson his teacher devised instead of a routine social studies lesson.

"In our social studies class in the 11th grade, we conducted discussions about motor vehicle accidents. At one time we went to visit the hospital where many accident casualties were hospitalised, some in critical condition, some even comatose. It is rather difficult to admit, but no teacher, no lecturer, nor traffic professional who came to the classroom to talk to us, no officer or doctor could ever be such a strong and real education figure as that critically wounded person in that ward. The learning method was the situation itself... healthy children standing face-to-face with an accident victim" (44/3).

The second most frequent category was relevance. Understanding, as John Dewey claimed, happens only through an experience, which is related to pupils' lives [43]. Learning must stem from past experiences and build up from the local to the universal. Similarly, many scholars claim that learning has to happen "close" to the individual (in his "proximal zone of experience", as Vigotsky says), and relies on pupils' original experimental discoveries. This perspective indeed promotes school reform in many places, which opt to adopt relevant instruction and curriculum that



connect with pupils' lives. As children differ from each other in their abilities, interests and past experiences, a relevant curriculum must allow each one to choose his or her personal topic of interest. Noteworthy in this respect is TheodoreSizer's dictum that "Kids Differ" [8,44], a basic principle later developed in his Coalition of Essential Schools.

Examples for relevance in teaching reappear in respondents' narratives of their key educational experiences. For example, a 30 year old educational counsellor told us about the research project she did during the seventh grade.

"Seventh grade was the Bar Mitzvah year in the kibbutz, part of which was dedicated to a project which examined a topic related to Israel. At that time I was reading a book by Dvora Omer, called "Love unto Death", which describes a love affair between a young girl from the army during 1947-8, and one of the boys there, who was later killed. As a seventh grader I was touched by the story and decided to write my project on that. It was a true story and I decided to write my paper on that topic... My father drove me to Dvora Omer's house and I talked to her... she let me read some of the diaries that the girl (Zohara) kept, which were the raw material for the plot... My father also drove me to see one of Zohara's childhood friends... reading Zohara's diaries and talking with her friends linked the reality and my imagination (the book)... the mere connection of something I read with its reality made that experience that much more unique and fascinating... my decision to study literature and education rose out of my feelings and interest in studies which could be applied to reality" (279/1).

The third most frequent content characteristic is challenge (n=58). Many respondents, some of whom had previously defined themselves as mediocre or poor pupils, noted that their "great moments of learning" were characterised by the difficult challenge they faced. Often, those were tough research assignments given to pupils in or out of school. In other cases, pupils were faced with topics and assignments that were intellectually and emotionally challenging, and promoted stormy and lengthy debates in class. All in all, challenging assignments demanded that pupils make the most of their personal resources (thinking, will-power, self-discipline and motivation), while requiring high performance levels, concentration and engagement. One of the most challenging instructional strategies was based on teamwork where pupils had to solve difficult problems and assignments in a group. A respondent who reported on his physics class provided an apt example for this category.



"The teacher presented us with a time-limited challenge, namely to build a device which produces its own energy... the pupils spent the whole weekend trying out different ideas and methods, using all the material and knowledge they possessed as well as their creative imagination... of course we did not make it, but... we did not feel we were busy learning, but rather that we were dealing with the challenge of proving to that teacher that we could do it" (200/1).

The challenge in those tasks is often accompanied by a time limit, which creates a sense of urgency among pupils. In this and other cases we learnt that pupils dropped all other activities and focused their energy on solving the problem, since it was important for them to prove to their teacher that they could meet the challenge.

### **3.3 Characteristics of Informal Activity**

Besides content characteristics, the analysis has pointed to seven other informal features of key educational experiences. The frequency count of these features appears in Table 1, and the following discussion elaborates on a number of them.

The most frequent instructional strategy we found (n=56) is performance in public. Respondents have a varied perception of an "audience", including peers, adult guests (e.g., parents), and external evaluators. Performing in front of an audience puts pupils in a stressful situation and encourages them to attain their best performance. We have found that public success and immediate feedback arouse intense feelings and self-fulfillment among respondents. For example, a 44 year old respondent recounted that at the age of 15 she enjoyed her geography classes particularly because the teacher appointed her as a "little teacher". At the beginning of every lesson the respondent conducted a 10-minute rehearsal with her class peers.

"I enjoyed the activity very much. It was lots of fun standing in front of the class, explaining the issues and discovering that pupils are interested and understand my explanations. I felt I was in command of the curriculum, that I was a good pupil, and that I was well able to explain the lesson to my classmates. The presence of the pupils prompted me to continue and explain and repeat it every time. This made me highly satisfied" (368/2).

The second most frequent instructional activity was research and experimentation. As many scholars already noted, significant learning occurs when pupils actively understand the material, through experimentation and research activity [5,43,45]. Respondents' recollections of key experiences suggest that they were asked to gather data, perform tests, systematically document incidents, analyse data, and prepare a research report. Experimental work in biology class, or writing a theoretical paper in a social science class, created an almost singular experience where pupils felt that they are finally responsible for creating, criticising, and validating knowledge. For example, a respondent reported that as part of his high school geography lessons he had to choose one elective course out of several options, and he chose navigation because it interested him. In this informal framework, the geography teacher taught the pupils to read maps and draw navigation routes.

"Learning was practical. We went out for two- or three-day field trips. At the beginning of each trip the teacher explained the maps, and then the pupils went out for a hands-on experience, alone or in pairs... The independent experimentation was very enjoyable. It gave us a feeling of independence and control, confidence, and a sense of orientation... In time, this preoccupation with navigation turned from a hobby into a semi-professional career. I took part in many navigation competitions in Israel and won first prize in quite a number of them" (384/3).

The third instructional strategy we deciphered was skills. Indeed, supporting a rich research tradition [46-48], the present study found that instructional activities that used a variety of pupils' skills tended to leave their mark for many years. Examples are numerous and varied: artistic skills (acting, dancing, singing, painting), technical skills (building and dismantling construction) or personal skills (handling time pressures, organisation management, teamwork). In all the narratives in which this strategy appeared, the activity demanded that pupils use more than one skill. A good example is the story of a respondent who today works as a guide in a science museum.

"In the ninth grade biology class, we were asked to write a paper on air pollution. Later, the teacher asked for volunteers to put up an exhibition on air pollution. I volunteered and together with a team of five other pupils we were busy for a whole month preparing the exhibition. It was important for us to put across the message to all pupils, in a clear and understandable way, so that even those who

were not interested in the subject would support the issue. Our cause was sublime: to arouse awareness of the risks of air pollution. Unlike our theoretical paper, here we had to use many skills, working under a pre-set timetable and using creative and original skills. For example, we drew the globe crying for help: "My hole in the ozone layer was growing and the icebergs were melting..." On another poster, we pasted all kinds of sprays ejecting preones, which attack the ozone layer. In order to illustrate acidic rain we drew black forests, deserts and wilderness, versus green and fresh grass with budding flowers. The teacher gave us a free hand in deciding which topics to focus on, and how to present them... The exhibition, which we built single-handedly, was positioned at the entrance of the school and was highly successful... we received praise from other pupils. During the activity I felt self-fulfilled and experienced a sense of vocation. Constructing the exhibition by ourselves gave me a sense of motivation to learn and apply myself; it taught me what teamwork and cooperation is all about, and I felt in control of the subject matter" (451/1).

This report illustrates the importance of using pupils' skills. Firstly, the use of skills can influence pupils' engagement in class, as they are given the opportunity to express their skills and capabilities - a very different feat to what is commonly demanded in silent, orderly classrooms. Secondly, exhibiting their prowess using different media (painting, writing, putting up exhibitions, theatrical shows) allows otherwise lesser involved pupils to take part in organising such activities [6]. Furthermore, the multi-media character of such activities promotes the use of many senses (touch, vision, hearing, smell, and even taste) and touches a variety of interests, thus allowing almost every pupil to take part in the activity and enjoy learning.

Another strategy that teachers used to challenge and motivate pupils was evident in their use of competitive situations. Respondents reported that their peak motivation occurred during the competitions that their teachers conducted in class. Competitiveness was not the main theme of the activity, but rather a catalyst that the teacher used to prompt pupils to take an active part in learning. Nevertheless, competitions can transform a dull lesson into a highly emotional endeavour. As a result of such arousal in class, pupils retain long-lasting memories of the content of instruction, or of its moral principle. For example, a young respondent described a covert though significant competition that her teacher initiated between her pupils.

"As part of my high school curriculum I chose to study Arabic. In my final year we had to pass an oral graduation test. But most pupils, myself included, had a very hard time with that. We felt stressed and tense, fearing the test... One day the teacher invited us over to her house. We watched a short videotape of her last visit to Egypt, listened to songs in Arabic, and she gave us some refreshments. We talked and laughed like friends... Then the teacher asked us to tell a story in Hebrew, and she helped us write it in Arabic. Then she prompted us to have a dialogue in Arabic about the meaning of the stories. Thus, we began a sort of invisible, but positive, competition, as each pupil wanted to express his own opinions and oppose the others... Finally, we learnt to love Arabic and succeeded nicely" (451/1).

Surprise - although the least prevalent strategy we extracted - represents another unique means by which teachers arouse intense feelings and motivation. Surprises in activities create highly emotional excitation and promote pupils' cognitive insight. Furthermore, such situations create high motivation among pupils, who seek to discover or solve the mystery that the teacher cast into the activity. Surprising activities could take form in a variety of ways. According to some reports, key educational experiences took place when pupils did not know what to make of the teacher's plotted lesson. For example, one respondent described a surprising activity that her science teacher created in primary school.

"The teacher, a colorful personality, called for a volunteer and asked him to lie on her desk (usually covered with test tubes). She blindfolded him and forbade us to react throughout the experiment. In addition, we were neither told what the subject matter was, nor about the purpose of the experiment, so we did not know what to expect. The teacher inserted pieces of paper between the volunteer's toes and lit them. The pupil began rotating his legs as if he was riding a bicycle and just in time the teacher removed the burning pieces of paper. This is how I learnt the fascinating topic of instincts. The surprise caused excitement in class" (51/1).

This story demonstrates that pupils had no clue as to what was about to happen in class. Then, in what seemed like a scene from a highly charged emotional gathering, e.g., where the preacher is inspiring his congregation, the respondent had an insight - the topic of the lesson, which earlier had seemed to be an unfocussed, chaotic educational activity, became clear to her.

In reviewing the results, it appears that key educational experiences did not take place in silent classrooms. The analyses have shown that pupils were all but

slumber: they were active, fervent, enthusiastic, and keenly interested in the topic; they were emotionally aroused, feeling excitement and fulfillment. The content and activity characteristics described here suggest that for instruction to have long-lasting effects on pupils' lives, it cannot be based on simple teacher-centered strategies. Likewise, teacher-centered, controlled and supervised classrooms left few traces in pupils' recollections. Rather, instruction that passed the test of years was based on "noisy" and seemingly disorderly strategies.

Performance in public was necessarily predated with uncontrolled, cheerful rehearsals; competitions generated shouts and enthusiastic engagement; relevance and authenticity made things dear to pupils' lives, thus implicating their selves in the activity, resulting in highly emotional and fervent involvement. Although we do not test this hypothesis here, we conjecture that instructional activities that combine several of the above mentioned content and activity features are more likely to have long-lasting effects on pupils' lives than those that use only one or none at all. All in all, the evidence suggests that although key educational experiences did not necessitate noise or disorder in class, they rarely occurred in silent, highly supervised classrooms. The next section elaborates on this claim.

### **3.4 Outward Bound: Learning Outside the Classroom**

Dewey and Whitehead, the American pragmatic philosophers, noted at the beginning of the twentieth century that instruction through the use of experimentation could translate disconnected scholastic knowledge into the child's own reality, and thus revive "dead ideas" [43,49]. According to their position, only experimental learning, which connects classroom learning with authentic and relevant topics outside the school, deserves the title of education. The findings of the present study support this philosophical view, by showing that key educational experiences occur "in the real world", i.e., outside schools' boundaries [42].

Indeed, many respondents ( $n = 65$  or 13.5% of the experiences) pointed to the fact that their key educational experiences took place outside the classroom. Learning through field trips, visits to an orchard, and excavating genuine archaeological sites combined theoretical content (previously studied in class) with its authentic, natural setting. Outward-bound activities are enriching, helping pupils gain insight about the topic and its natural context. For example, a 45 year old respondent spoke about her high school biology classes, which took place outside the

classroom. She described how enjoyable these field trips were, and why pupils were cooperative the whole time.

"My high school science teacher was an avowed science lover and an expert on reptiles and plants of all kinds... Few were the lessons we had indoors. Sometimes we were in the lab, and sometimes we strolled in the fields surrounding the school, or travelled far away on field trips... he used to talk about the topics while picking up stones and telling us: "look, under this stone I found the reptile which is called so and so..." We never dared interrupt his lessons, because the experience was so engaging that we did not want to make trouble in class and be punished and miss the next field trip" (304/1).

### **3.5 Silent Engagement in Teacher-Centred Classrooms**

Significant learning experiences rarely occurred in silent classrooms. Nevertheless, the evidence suggests that under certain conditions even teacher-centred instruction can produce key educational experiences. The analysis found that many respondents reported their significant learning experiences to have occurred in teacher-centred classes (n=75), where teachers combined authenticity, relevance, surprise, or peaks into the curriculum. Integrating these characteristics in teaching resulted in pupils' cognitive curiosity and emotional involvement with instruction. For example, one respondent described her high school history teacher as follows:

"The teacher entered the classroom and said she was going to talk about the Holocaust. This was not surprising, as it was part of the curriculum. We took out our notebooks and pens but the teacher said, 'there is no need'. I have to admit that I personally did not like history nor did I like the teacher. I used to disrupt and disobey from time to time. She started the lesson with a presentation from that period. She said she was going to speak as a Holocaust survivor. She talked about her parents, about their life in the community. She didn't ask questions - it was one continuous lecture... we sat there for two long hours mesmerised. We even gave up the break. At the end of the lesson she opened the box that stood on her table, and took out a bar of soap, displaying it as her family members. We were shocked. I can still remember that lesson in detail" (232/1).

There is reason to believe that the silence in this and in similar classrooms was due to the pupils' keen interest in what the teachers had to convey. To the extent that the contents were authentic, challenging and relevant to pupils' lives, they

willfully cooperated with their teacher's agenda. To the extent that such encounters required pupils to incorporate their personal resources into learning and forced them to think, to introspect or retrospect; to the extent that they learnt new things about their environment and about their own selves - to that extent pupils had immersed themselves in learning, entering a state of flow [50]. Unlike traditional teacher-centered instruction, learning in highly challenging and authentic classrooms does not allow pupils to remain passive. Silence in these cases resulted from attentive listening on the part of the pupils, rather than from an enforced discipline by the teacher. In conclusion, the testimonies that we analysed prove that it is possible to significantly affect pupils even in teacher-centred classrooms - without the need to use "firecrackers", charisma, or highly charged rhetoric.

#### **4. DISCUSSION**

The present study has provided an initial description of instructional practices that teachers used in what time proved to be adults' most meaningful educational encounters. It has demonstrated that certain content and activity characteristics generated cognitive and emotional involvement among pupils that affected their life henceforth. The following discussion of these results touches upon four main conclusions.

First, the study has shown that most key educational experiences occurred in a "noisy classroom" rather than in a "silent" one. While the literature assumes that teacher-controlled and silent classrooms constitute arenas conducive to learning, the present study shows that meaningful, key educational experiences mostly occur during an active and noisy interaction among class peers, during a public performance in front of an audience, while working in pairs, through interviewing and arguing, and by utilizing different skills and capabilities.

Teachers' use of competitions often led to pupils shouting at each other with excitement. The construction of peaks and surprises in the curriculum generated involvement and enthusiasm. The requirement to exhibit diverse skills and capabilities often created a carnival-like atmosphere in class.

Thus, in contrast to pupils' usual silent attendance in school, the instructional strategies described here necessitated pupils to attend to relevant and authentic issues, which demanded their utmost cognitive effort. During these key educational episodes, learning did not require silence. On the contrary, silence in class would



have annihilated learning and dulled the emotions that surfaced during the activity, replacing them with a cold, meticulous scholastic activity. One respondent summed up her experiences poignantly: "That was not a silent classroom, there was a lot of noise, but such a healthy noise, where everyone called out to the other: 'I found, I discovered, come see what I've got'. That was extremely interesting, the noise, the sounds, the voices. These are things I remember until today" (200104622).

Second, some of the experiences mentioned here did not involve stormy verbal interactions. Nevertheless, the pupils were far from being passive. Instruction in such contexts impelled pupils to use their capabilities in an active and motivated manner. For example, the paper that the respondent wrote on the protagonist in Dvora Omer's story (relevance), or the preparation of drawings and presentations for the air pollution exhibition (skills), did not require that the respondents work in a noisy setting. Indeed, pupils can perform such assignments without talking, some without need for interaction whatsoever. Nevertheless, these tasks definitely demanded respondents to use their cognitive ability, skills and capabilities, while exhibiting enthusiasm and learning derived from inner motivation. All in all, it seems that a passive engagement, which characterises silent classrooms (where teachers talk and pupils listen), is rarely mentioned in the context of significant, key learning experiences.

Third, admittedly, in about 10 percent of the experiences the activity took place in the context of a teacher-centred classroom, which could be externally described as a silent classroom. Nevertheless, the results have indicated that the key experiences that occurred in these settings were not like any other silent, teacher-centred lesson in school. In almost all cases we found the lesson to be authentic, relevant and challenging, and the topics were mostly connected to pupils' lives, or to burning issues that had to do with the community, the school, or their country. Thus, although the teacher controlled the classroom and instructed in a structured method, pupils in these settings participated enthusiastically, with overt excitement or covert emotional involvement. This implies that teachers can maintain conservative instructional activities, yet modify the contents of the curriculum in creative ways, connecting with and reaching to the life-world of their pupils. Such curricular modifications can promote exciting debates that would set them apart from the tradition of neutral, insignificant and routine school learning.



Fourth, the current study suggests that the alleged contradiction between noise and meaningful learning has little empirical support. It has shown that "positive noise" was evident during key educational experiences, yet it did not harm order in the classroom. In fact, quite the reverse: respondents remembered many teachers because they promoted noise in their classroom, without losing control over instruction or discipline. Actually, the reports have indicated that some teachers (n=25) considered noise as a positive factor that improves learning and discipline in the classroom. This contrasts with the common belief held by most teachers that such noise harms the pupils' ability to learn. Moreover, 40 respondents explicitly referred to active learning and noise as beneficial, because these features formed a positive learning atmosphere, aroused interest in the topic, and caused enjoyment and, paradoxically, even order and discipline in class. The following quotes attest to this statement: "The classes were conducted as a debate, the theoretical material which we were all familiar with was taught in the most interesting way possible, and this I believe is the reason there was no need for disciplinary measures. The pupils came to learn, because of the lesson" (178/1). "The experiment related to the topic... we worked in teams and the teacher passed between us and talked with us... The noise of talking did not bother us. It was almost like a "free hour" which nobody wanted to miss" (215/1).

Finally, this study supports the thesis by Waller (1932), Bidwell (1965), and Yair (1997), who claimed that instruction is undertaken in a sociologically ambivalent setting [51], with teachers torn between the need to motivate pupils and to discipline them at the same time. The results suggest that teachers who preferred to inspire their pupils and excite them through learning have been remembered in the long term. In contrast, the efforts to discipline pupils result in boring them. Thus, the bureaucratic emphasis that compels most teachers to emphasise discipline, social order and silence in class results in pupils remembering very few teachers and meaningful learning experiences. An emphasis on order, discipline and silence curtails the potential influence of teachers on pupils, and neutralises the basic goal of schooling: developing interest and love for learning, and influencing pupils' lives.

Nevertheless, the contradiction between discipline and motivation is not inherent in classroom instruction [9]. The present study suggests that by creating high motivation for learning, teachers can neutralise the need to discipline pupils since learning results from pupils' inner interest. The study has indeed shown that

when instruction was authentic, relevant and challenging, when it was built on suspense, surprise, peak moments and competitions - pupils participated energetically, without causing discipline problems. The noise - and there was much noise during these key experiences - was the noise of learning, of enthusiasm, of the enjoyment involved in acts of creation. There is evidence that the insistence on disciplining pupils results in boredom and - as a consequence of that - in noise, discipline problems, and alienation from instruction [52]. Upon reflection, it seems that teachers fear discipline problems in their classroom because they understand that what they do in their silent classroom actually bores their pupils.

## **5. CONCLUSION**

To conclude, it seems that the question is not whether noise is conducive to learning, but rather what type of noise. The current study has shown that high noise levels that derive from enthusiasm and interest in learning do not contradict school goals. Therefore, if schools wish to affect pupils, they need to find ways to allow more teachers to be authentic, relevant and challenging. They need to expand the use of surprises, peaks, competitions, and independent research. The present study has shown that silent classrooms conceal what time will prove to be meaningless instruction. In contrast, it has shown that what externally seems to be a disorderly, chaotic classroom may actually constitute an arena that is educative and will be meaningful for a lifetime. In concluding this paper we suggest that there might be some Israeli uniqueness to our results, as culture always plays a part in learning and instruction [40]. The Israeli national habitus fits the features we identified here [53], and it is possible that students in other countries might be shocked by some of the outstanding activities we described here. Comparative studies need to ascertain this conjecture.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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## ***Didactic Lectures and Interactive Sessions in Small Groups: A Comparative Study among Undergraduate Students in Hawler College of Medicine***

### **ABSTRACT**

**Aims:** To study and compare didactic lectures with interactive sessions in small groups among undergraduate medical students.

**Study Design:** A quasi-experimental research design.

**Place and Duration of Study:** Hawler College of Medicine, between October 2011 and May 2012.

**Methodology:** Two administrative groups of students were selected out of four groups of medical students in their final year at Hawler College of Medicine. A pretest and post test evaluation of both experimental and comparison groups was conducted using the same criteria. A questionnaire was used to address students' perception of the new teaching method. For comparing the results of both groups in the examination, we computed the mean mark achieved by each group (pre and post test). Student's t-test was used to compare means of both groups.

**Results:** Out of 72 students who were originally included in the study, 64 students (88.8%) of both groups performed both pre and post test examinations. The age range of the students was 21-26 (mean age+ S.D 23.25+ 1.01). There was no statistically significant difference between the two means (pre and post) of the lecture format ( $P = 0.15$ ), while the difference between the two means of problem-solving interactive class was statistically significant. Students in the study group showed higher marks than students in the lecture format ( $P = 0.059$ ). Twenty eight (90%) students found interactive sessions more active way of learning than lectures, 29 (93%) students agreed that interactive sessions provide more group interactive skills. There were some negative attitudes like heavy workload on students (55%), and uncertainty about the accuracy of information from colleagues (52%). Conclusion: Effectiveness of small group teaching may depend on the teaching style in small groups.

**Keywords:** didactic lecture; small group; interactive session; Hawler College of Medicine.

## 1. INTRODUCTION

The impact of teaching plays a major role in the learning outcomes in undergraduate medical education. This is more important in generating effective professionals. Its effectiveness depends on how much has been received by the students or the target audience. There are different methods of teaching; lectures, tutorials, seminars, by having a panel of experts, brainstorming, videotapes, class discussions, small group discussions, case studies, role playing etc [1].

The lecture is the most traditional method of imparting knowledge to students. It is the teaching method that is used frequently in the majority of medical schools despite the problems that are often attributed to it [2].

Student learning is one of the primary goals of universities. Suitable student-oriented teaching methods can help motivate students and help them realize their potential. One of these methods is small group teaching. It is student-centered and the tutor plays the role of facilitator [3].

Small group teaching has been the highlights of a revolution in medical education over the last 40 years [4]. Small group teaching is a rather broad term without a clear definition. It covers tutorials, seminars and small problem-solving classes. A small group is a number of people who interact in a face to face situation where the size of the group may vary from a handful of students to around 30 participants and about 8-12 is an optimal number [5, 6]. The concept of interactive sessions and small group teaching is not new. Socrates was a great exponent of this method of teaching [7].

The effectiveness of small group teaching against didactic lectures is well documented [8]. Small group teaching helps in generating free communication between the group leader and the members and among all the participants themselves. The faculty who acts as the group leader is a facilitator, allowing the participants to express themselves [6]. In fact, small group setting provides an ideal opportunity for teachers to facilitate active learner participation [5]. Reducing the size of the class will produce many benefits for teachers and students; for example. Students would receive more individual attention, teachers will be able to manage the students better, discipline problems are likely to be less and there is more interaction



between students and teachers. When the teacher spends less time in managing the students, more time can be utilized in teaching [8].

Small group teaching has become an increasingly important component of undergraduate medical education and many schools with more traditional curricula have incorporated a significant number of small group teaching sessions into undergraduate programmes for medical students [9].

The traditional lecture approach has been the core teaching method in the Iraqi medical colleges. Several activities and initiatives at both national and individual levels have been adopted for reviewing medical college curriculum and introducing new teaching methods in Iraq over the last two decades [10].

The first medical school in Iraq, Baghdad College of Medicine was established in 1927. The college adopted the Edinbrough curriculum, which reflected standard teaching curriculum of the time. Other medical colleges are subsequently established throughout Iraq and all adopted the teaching curriculum of Baghdad College of Medicine [11].

The traditional lecture approach or the content-oriented approach is still the core teaching method followed by Iraqi medical colleges. Several national activities have been adopted for reviewing medical colleges curricula in Iraq over the last three decades. The purpose was to develop a national curriculum for medical colleges relevant to community needs [10].

Quasi-experiments are studies that aim to evaluate interventions but that do not use randomization. Similar to randomized trials, quasi-experiments aim to demonstrate causality between an intervention and an outcome. Quasi-experimental studies can use pre-intervention and post-intervention measurements as well as nonrandom selected control groups [12].

The aim of this study was to study and compare two different teaching methods, didactic lecture and interactive sessions, in small group among undergraduate students in Hawler College of Medicine.

## **2. MATERIALS AND METHODS**

This study was a quasi-experimental, pre and post intervention with control, research done in Hawler College of Medicine. Hawler Medical University (HMU) is located in Erbil city in the Iraqi Kurdistan Region. It includes four colleges: Medicine, Dentistry, Pharmacy, and Nursing. Teaching in the four colleges is in English

language. The University is affiliated to the Ministry of Higher Education and Scientific Researches of the Kurdistan Regional Government. College of Medicine has been established in 1977 comprising 12 different basic and clinical departments. It awards Bachelor degree in Medicine and Surgery (M.B.Ch.B).

A sample of 6th year medical students was selected for participating in the study. Sixth year students in Hawler College of Medicine composed of around 140 students, divided into four subgroups, each subgroup comprised 35-37 students. Two groups of students were selected, by simple random sampling method, out of four groups.

The 35 students group (19 male and 16 female) was chosen to receive the experimental model (study group) taught through interactive session while the comparison (control) group composed of 37 students (20 male and 17 female) and taught through traditional lecture format. The study was carried out at Briaty and Malafandy primary health care centres in Erbil city.

Students in the experimental group received the topics through interactive sessions (problem oriented solving class) while students in the comparison group received topics through traditional lecture format.

A multiple choice pre and post-test consisting of 60 multiple choice questions (MCQs) was developed by the team in cooperation with a neurologist, rheumatologist and a gastroenterologist. Both experimental and comparison groups received a pre-test of knowledge administered at the beginning of the first interactive sessions session and prior to the lecture for those participating in the comparison group. Both groups were re-tested (post-test) following the completion of the education event.

The Research Ethics Committee of Hawler Medical University approved the study and an informed consent was obtained from each participant after giving them full information about the study.

## **2.1 Educational Intervention**

An educational intervention was designed to: (1) Provide students with the knowledge required for diagnosing three common medical problems in primary health care (Headache, Abdominal pain and Backache) effectively; (2) Introduce them to the tools and strategies for the management of these three conditions. The learning objectives of the educational intervention was focused mainly on developing clinical reasoning skills among the students.

Three teachers in Hawler College of Medicine trained in delivering student centred learning programmes were selected to deliver the interactive sessions and lectures. Both groups (The interactive session and lecture) were taught by the same teachers. The interactive sessions comprised 6 cases; all based on actual clinical cases. These cases were developed through consulting experts in the field and were given to the students before starting the session, students discuss with each other all aspects about the case during the session and tutor facilitated the session and clarified some difficult points about the cases when needed. The lectures were designed to cover all key content objectives identified for the study group and given as knowledge based information by the teacher. Oral instructions regarding the process of teaching were given to the students in both groups before starting the experiment.

## **2.2 Data Collection and Analysis**

A questionnaire was used to address perception of students participated in the sessions of the new teaching method. The questionnaire comprised 10 questions. Answers were to be provided on five point Likert scales ranging from one (strongly disagree) to five (strongly agree).

Statistical package for social sciences (SPSS) version 17.0 was used for data analysis. Student's t-test was used to compare means. Paired t test was used to compare between pre- and post-test scores of a single group, while t test of two independent samples was used to compare between the mean differences of the two study groups. A p value of  $\leq 0.05$  was considered statistically significant.

## **2.3 Validity of the Test**

Validity is a quantitative expression that indicates whether a test measure what it was originally intended to measure. Content validity is a form of validity refers to the assessment comprehensiveness or test appropriateness [13]. Content validity of the tests was evaluated by a committee, which consisted of teachers and experts in three topics under study. A test was developed in which the total pool of selected items was seventy-five. The test was divided into three parts of 25 items each. First part belonged to headache and second part related to backache and the last part related to abdominal pain. Firstly test was presented to the committee. Then pilot testing was conducted with ten students of same level for whom it going to be used.

Too easy and too difficult items were discarded in the light of the result of the test. At this stage 15 items were dropped. Thus the final form of the test comprised 60 items (20 items for each topic) was prepared.

### 3. RESULTS AND DISCUSSION

A quasi experimental design was used in this study as students were not randomly assigned to study groups. The newly implemented interactive session was integrated into the ongoing traditional study programme of the college taking into consideration practical difficulties of randomly assigning students into two groups.

The main difference between a quasi-experimental study and a true experimental study is that in an experimental study, the participants are assigned to a treatment group or a control group by random assignment. While doing so will allow you to get the best evidence of whether or not your intervention had the intended causal effect, random assignment is not always a practical step to take in the real world. It is usually impractical to ask a school or school system to divide up students in their school into two separate classes through random assignment. When random assignment is impractical, the pre-post test design, in this case, may give you the best results with minimal classroom disruptions [12].

Out of 72 students who were originally included in the study, 64 students (88.8%) of both groups sat both pre and post test examinations; 33 students were from the comparison (control) and 31 students were from the experimental (study) group. Study group participants filled out also the questionnaire on subjective perception of the interactive sessions. The age range of the students was 21-26 (mean age  $23.25 \pm 1.01$ ).

The sample size was small because each administrative group consisted of around 35 students and practically was not possible to add students to each administrative group. It is important that both the treatment group and the control group are of adequate size to be able to determine whether an effect took place or not. While the size of the sample ought to be determined by specific scientific methods, a general rule of thumb is that each group ought to have at least 30 participants. Many other studies done to compare traditional teaching methods with innovative curriculum in different countries used sample size close to our study [14-19].

This study showed that the difference between pre and post test in lecture format was not statistically significant, while there was statistically significant

difference between pre and post test in interactive session. Students in interactive session perform better than students in control group but the difference was not statistically significant.

The mean $\pm$ S.D pre test mark of the control was 50. $\pm$ 10.; mean  $\pm$  S.D post test mark was 54. $\pm$ 10. and the mean difference was 3.6 There was no statistically significant difference between the two means ( $P=0.15$ ). The mean  $\pm$ S.D pre test of the study group was 50 $\pm$ 10; the mean $\pm$ S.D mark of post test was 56 $\pm$ 9. The mean difference between the two tests was 6.7. There was statistically significant difference between the pre and post test results ( $P=0.009$ ). While the difference between the mean difference of the control group (3.6) and that of the study group (6.7) was not statistically significant ( $P= 0.059$ ) (Table 1).

**Table 1. Mean marks of both groups (study and control)**

Teaching method	Type of test	Mean $\pm$ SD	Mean difference	95% confidence interval	P value
Lecture (Control) group	Pre test	50 $\pm$ 10	3.6	(-8.6) - (-1.3)	0.15
	Post test	54 $\pm$ 10			
Interactive session (study) group	Pre test	50 $\pm$ 10	6.7	-11.7- (-1.7)	0.009
	Post test	56 $\pm$ 9			

The better performance of students in interactive session could be attributed to the fact that students read the case before coming to the session and did some private study in addition to the interaction during the session which may lead to better retention of information rather than memorization. Worldwide studies evaluating problem solving oriented class (interactive sessions) revealed variable findings. In a study done in Hong Kong, students showed statistically significant improvement in most of the aspects of the learning [16]. In other studies done in India (8) Iran [17] and UK [20] students scores in interactive sessions was more than lecture format. However, students in both formats showed similar knowledge in a study done in Pakistan [21] and in Netherlands [22] and students performed better in lecture format than problem based learning format in a study done in Hong Kong [23].

Out of 35 students in the experimental group (21 males and 14 females), a total of 31 students (88.5%) filled the questionnaire. The perception of the students was positive toward interactive session through their response to the questionnaire. Twenty eight (90%) students reported that interactive session was a more active way of learning, and twenty-five (81%) of them mentioned that they feel comfortable in

the discussion and twenty nine (93%) agreed that interactive session provides more group interaction skills and 26 (84%) mentioned that interactive session motivated them to use more resources (Table 2).

This is similar to the findings of studies in China [24], Hong Kong [23] and in Iran [17] in which students preferred small group interactive sessions in terms of participatory learning, team working, effectiveness, and developing self learning skills.

In China 89.4% of the respondents admitted that interactive sessions made them feel satisfied when their ideas were accepted by classmates; 80% reported that problem oriented class was more interactive than their own learning style; the majority of students reported that problem oriented class allowed them to learn on their own [25]. In Malaysia, 79.0% of respondents found problem oriented class sessions interesting; more than 65% of respondents were of the opinion that problem based sessions were beneficial in achieving their learning objectives and allowed in-depth understanding of the topic of study, and problem based class helped them in linking basic science knowledge to clinical appraisal skills and to develop group interaction skills [26]. In another study done in Hong Kong, many aspects of the small group student-centred activities were highly valued by students [27].

**Table 2. Positive attitude of students toward interactive sessions**

<b>%Statements</b>	<b>Strongly agree and agree No (%)</b>	<b>Undecided No (%)</b>	<b>Strongly disagree and disagree No (%)</b>
Interactive sessions is more active way of learning	28(90)	1(3.2)	2(6.4)
I am comfortable during the interactive session	25(81)	1(3.3)	5(16)
The interactive sessions motivated me to use additional learning resources	26(84)	4(12)	1(3.2)
Interactive session provide group interaction skills	29(93)	1(3.2)	1(3.2)
Enough learning resources available for interactive session	9(29)	11(35)	11(35)

There were some negative attitudes like heavy workload on students (55%), uncertainty about the accuracy of information from colleagues (52%) and stress in attending interactive sessions (22%) (Table 3).

**Table 3. Negative attitude of students toward interactive sessions**

%Statements	Strongly agree and agree No (%)	Undecided No (%)	Strongly disagree and disagree No (%)
Attending interactive session is stressful	7(22)	4(13)	20(64)
Time was wasted during interactive session	11(35)	6(19)	14(45)
Teaching was not focused	5(16)	9(29)	17(55)
Uncertainty about accuracy of information from colleagues	16(52)	8(26)	7(22)
Heavy workload on students	17(55)	7(22)	7(22)

Some other studies revealed also some negative attitudes of students toward problem oriented interactive sessions. In China, students reported: uncertainty on the accuracy of the knowledge acquired (80%), time wasted during the session (35.4), teaching was not focused (32.9%), and heavy workload on the students (28.2%) [25]. In a Malaysian study, 27.0% of students found problem oriented class to be very stressful [26]. In Iranian study, students believed that they need longer discussion of the topics [17]. In study done in Hong Kong; students expressed a preference for learning and interacting with teachers than colleagues [27]. In another study done in India, majority of students favored a judicious mixture of didactic lectures and case – oriented problem solving in tutorial classes to be an efficient modality in understanding a system under study [28].

### 3.1 Limitation of the Study

Small sample size used in this study because each administrative group of students in the target population 6th year students in Hawler College of Medicine comprised 35-37 students and it was not possible to add students to groups. This small sample size may affect the finding of our study.

This study as a quasi-experimental study has a problem with internal validity because the authors have little or no control over many potential extraneous variables any changes observed might just be due to some factor other than the manipulation of the independent variable.

This study is limited to one college; the finding cannot be generalized to other colleges of medicine in Iraq.



#### 4. CONCLUSION

This study shows that effectiveness of small group teaching may depend on the teaching style in small groups and also showed that majority of students have positive attitude toward problem oriented interactive sessions with few negative opinions. Further research is needed on a larger sample of students from different years of study in different subjects for better evaluation of this relatively new teaching method.

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#### COMPETING INTERESTS

The authors declare that they have no competing interests.

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## ***Investigating the Effect of Social Variables on Speech Variation: Social Class, Solidarity and Power***

### **ABSTRACT**

The study presented here was conducted first, to classify speech based on functional effects by using the theory of speech act [1] as well as Brown and Levinson's politeness theory [2], and to see the effects of social class, power, and solidarity on variations observed within Persian speech. The data for the study constituted the entire conversations among the main characters of the movie called "A Separation". They included Nader, Simin, Termeh, Hojat, Raziye, and the Judge. The procedures involved first, transcribing the conversations between the characters of the movie, next, Brown and Levinson's politeness theory as well as Austin's speech act theory were applied in order to categorize the data and to examine how successfully our data could be classified based on their model. Then, the effects of social class, power, and solidarity on speech variations were examined for discovering how social variables create variation in Persian Language. The findings revealed that first, utterances could be classified based on both Brown and Levinson's politeness theory and Austin's speech act theory. Second, social class, solidarity and power create variations in Persian. Social class raises the politeness degree of speech, while solidarity and power decrease the degree of politeness.

**Keywords:** speech variation; brown and levinson`s politeness theory; social class; social power; social solidarity; politeness.

### **1. INTRODUCTION**

Mastery of formal characteristics of language can lead one to the skill of knowing the language in a static sense. In order to accomplish the communicative functions of language, one needs more knowledge than what we know as linguistic: mastery of vocabulary and grammatical rules results in developing skills required to

use the language without the rich and abundant variations which are the results of several sociolinguistic factors [3].

How we speak is more revealing of us than any other non-verbal activity we may do. What we say and how we say it can reveal how polite, relevant, and mature we are; in addition, it informs the hearer more about our intelligence, personality, educational and social status compared with the way we walk, eat, dress, or make our living. Certain linguistic choices speakers make designate their social identity; it further reveals the kind of relationship which exists between them and their addressees [4]. The point is that there are always alternative ways one can articulate their point, and it is true to claim that the linguistic choices in one language may not be appropriate in another language, and this may result breakdowns in cross-cultural communication [5]. There are numerous aspects of the study of communicative competence, among which this study chooses to examine the effects of social class, power, and solidarity on speech variations.

Many researchers focus on the need for the rules of producing "communicatively appropriate performance" [6,7]. As a matter of fact, many learners may not be aware of socially and culturally appropriate forms which may lead to communication break-down or communication conflict. Therefore, according to Schmidt and Richards [6], we should try to appreciate a theory which account for language use among which speech act theory plays a crucial role.

Speech act theory is concerned with uses of language. According to Schmidt and Richards [6] speech act theory explains how speech achieves actions and how the speech acts result in both verbal and non-verbal reactions, in the realization of which face is an essential aspect. The main contribution of speech act theory is to explanation of communicative competence. Pragmatic speech acts such as invitations, refusals, suggestions, and apologies are significant components of communicative competence. Thus, the study of speech acts appears to be necessary to the understanding of intercultural studies. Many researchers [2,8,9,] have worked on speech acts to demonstrate speech act realization patterns and their characteristics in different languages [10]. There have been also research attempts focusing on the pragmatic aspects of Persian speech acts, such as: request [11,12], apology [13,14], compliment [15], refusals [16,17], complaints [18,19], griping [20], invitations [21], and requests [22].

Functions of speech are unlimited; but, researches have introduced classification of types of functions, dividing them into categories. For example, speech act theory [1] considers the illocution of the speech, the one intended by the speaker and detected by the addressee. Austin [1] defines speech acts as acts performed by utterances such as giving order, making promises, complaining, requesting, among others. When we utter a sentence or a phrase, we are performing an act to which we expect our listeners to react with verbal or nonverbal behavior.

Politeness of speech is the primary condition of a successful communication event. The pragmatic claim is that speech needs to be polite and politeness involves taking account of addressees' feeling of self-respect and freedom of imposition as much as possible. Holmes [23] proposed that the manner in which speakers apologize or make a request enables the analyst to get to an estimation of what social category or social groups they are identified with. According to Janney & Ardnt [24], "politeness is viewed as a rational, rule-governed, pragmatic aspect of speech that is rooted in the human need to maintain relationships and avoid conflicts". Speech acts are, therefore, common manifestations of politeness behavior in human interactions: the motivation which is provided for the speakers to save face.

Politeness is an integral part of every body's verbal life in any human society. How polite we choose to be not only reflects how close we feel to a person, how powerful socially we estimate the addressee to be, how much solidarity, closeness or distance exist between the interlocutors, and how power determines who should be more polite. Goff-man's [25] symbolic interactionism theory describes the many ways people use to communicate, create, and maintain social roles. In this theory, social distance is a prime characteristic of social roles, and politeness serves to regulate social distance. Different speech communities emphasize norms of politeness for different functions, and as a consequence, express particular functions differently as per their social norms imposed on them. The way people decide which form to use in a particular context depends on a few social factors such as: their social class, the social distance between participants, their relative status, and the role of social power which could all affect speech; and these and a few other factors are referred to as constituents of a speech context which is to be of a specific style representing the degree of formality of the setting.

Discussing face encompasses both face-saving and face-threatening acts. Speakers often get involved in achieving speech functions in their given contexts of

use [26]. The claim is that politeness is context dependent. Brown and Levinson [2] base their theory on the concept of face which is defined as the public self image that all rational adult members have, when engaged in spoken interaction, and it must be constantly adhered to. Face consists of two related aspects: positive face and negative. Positive face is the wish all speakers have that they be respected; their face 'wants' be desirable to fellow interactants. Negative face is the 'want' all speakers have that their actions will not be impeded by others. However, it is not possible for conversation to flow without a demand or intrusion being made on another person's autonomy; the fact is that we refer to certain functions of speech potentially face threatening. A simple act such as asking someone to sit down is a potential threat to their face; and it could be a threat to both positive and negative face. Brown and Levinson define the performance of such utterances as potential face-threatening acts (FTAs).

Koutlaki [27] contends that there exist two aspects of face in Persian culture. One, *shakhsiat* refers to prestige, the other, *ehteraam*, refers to the respect of the community for a person with a good moral standard (similar to English social status). The main difference between the two is that basically, *shakhsiat* deals with an individual's prestige gained by achievements, influence, connections, etc, while *ehteraam* has to do with the community recognition for an individual's social influence (the concept could be similar to English social class), moral behavior or judgment. Nevertheless, both components involve respectable images that one can claim for oneself from the community in which one interacts or to which one belongs. Thus, to be polite in Persian discourse is to know how to attend to each other's *shakhsiat* and *ehteraam* [27].

Some speech acts are categorized as containing threat towards the negative face of the hearer: orders, requests, suggestions, advice, reminding, threatening, warnings, offers, promises, expressions of envy, admiration, expression of hatred, and lust are examples. While those which are threatening to the positive face of the hearer include expressions of disapproval, criticism, contempt, complaint, accusation, insult, disagreement, expressions of violent emotions, the mention of taboo topics, interruption, bringing bad news about the hearer or good news about the speaker as well as other non-cooperative acts which can be listed. The positive face is in sum every person's wish not to be disrespected verbally. An order in Persian to a person of an older age could be threat not only to negative face, but also to the positive face [2].

It has been believed that every utterance or series of utterances producing a speech functional unit produced by individual speakers could be a display of, among other factors, the degree of social solidarity and social power existing between the interlocutors. In this case, linguistic politeness is a social construct which indicates the power relation between the interlocutors. The solidarity is by nature about the quality of the relations between the interlocutors involving in a conversation event. It can be divided into differing levels based on who is conversing with whom: how related and close they are. However, as will be demonstrated, solidarity is a relational variable which increases or decreases not just by change of the characters; rather it is a highly context related quality. Measuring solidarity is obviously different from measuring other social qualities such as class, status, or power.

Fairclough [28] puts forward that power is a hidden construct in face-to-face discourse. From the list of threatening acts, we can strongly argue that the issue of power is inherent in our communication activity and is a major variable which depends on the context of the speech; it is a basic force in social relationships, the press of situations, and the dynamics and structure of personality. It is also defined as an individual's relative capacity to modify others' states by providing or withholding resources or administering punishments. Resources can be both material (food, money, economic opportunity) and social (knowledge, affection, friendship, decision-making opportunities), and punishments can be material (job termination, physical harm) or social (verbal abuse, ostracism).

Another social factor that is reflected and maintained through everyday social interactions with teachers, bosses, neighbors, and friends in homes, schools, workplaces, and religious spaces is social class which is connected to relative social power in general. Social class is a multi-faceted construct that is rooted in both objective features of material wealth and access to resources (income, educational facilities); on the one hand, and education, political influence, area of residence, and parenthood on the other hand [29]. These facets all reflect real, material conditions that shape the lives and identities of upper and lower-class individuals. Relative to their upper-class counterparts, lower-class individuals have fewer economic resources and fewer educational opportunities [29]. Moreover, people with lower-class backgrounds often face increased stress in their close relationships [30] and violence in their homes [31]; and they are the inferior conversation partner in most speech encounters [32].



Research findings in Western societies indicate that there is a distinction between social class and power [33, 34]. Generally there is a broad conceptual difference in social class and social power. Social class is based on material resources, rather than any valued resource and differs conceptually from power, which focuses more broadly on any valued resource.

For example, two managers may have the same educational background and salary, but one who has longer tenure with the company may have more power, because that manager has more intimate knowledge of company procedures and more established ties with other members of the organization. Power may predict differences in the behaviors of these managers, but social class may not. By contrast, social class should have stronger effects than power when individuals have different access to material resources, but those with less material resources have access to compensating non-material resources, so that they have as much power as those with more material resources. For example, one employee may have more material resources than another, but the latter may have access to an extensive social network. The two employees have similar levels of power, but the former has higher social class. Social class may predict differences in the behaviors of the managers, but power may not. Countries such as England and India are known to form societies of social classes, unlike countries such as Iran where social class is perceived differently.

Below, we will mention the issues of research we are interested in which are the functional analysis of the speech and investigating of the effects of social power, solidarity, and social class on the way speech is shaped by different individuals belonging to different social classes and enjoying different degrees of power in several different contextual settings created in the Oscar winning movie "A Separation" which is world-wide popular and has enjoyed praise. The movie is a representation of how conversations manifest the role of power and social class and the solidarity in the characters' speech.

The work presented here will be of significance when it comes to investigate the differences in the relationship between speech members with different social relationships in a movie with rich conversational contexts that represents how the effect of social variables on speech can be investigated in details. Moreover Movies with plenty of conversational context between characters with different ages, genders, social power level and class are a good medium for analyzing the effects of



social variables on speech in contexts involving various power degrees and across different social classes. Besides, movies are proper mediums to study speech behaviors both within and across cultures. And in our case, the movie selected is known not only to the native Persian speakers but also to English native speakers who have interest in internationally praised pieces of work.

## 2. BACKGROUND

The proper task of semantics is to study relation that exists between expressions in virtue of their linguistic meaning. But of course in ordinary conversations the speaker's meaning is in general different from the sentence meaning. Often, the speaker means to perform non-literal illocutionary act, as in the case of metaphor, irony, and indirect speech acts.

A speaker who means to perform a primary non-literal speech act or to implicate conversationally something in a context of utterance intends to get the hearer to understand him by relying (1) on the hearer's knowledge of the meaning of the sentence to understand the literal speech act; (2) on their mutual knowledge of certain facts of the conversational background; and (3) on the learner's capacity to make inferences on the basis of the hypothesis that the speaker respects certain rules of conversation in performing the primary speech act in the context of utterance. According to this view, it is not possible to understand the primary non-literal speech act without having understood that this literal act cannot be the primary speech act in the rules of conversation in that context. Pragmatic is conceived as the theory of speaker meaning and it incorporates semantics as the theory of sentence meaning.

Austin [1] uses the term illocutionary act to refer to the ways in which language functions express speaker's intent, e.g. to express emotions, establish contacts, make proclamations, ask for things, etc. The speech act is also abounded unit whereby a particular social action is accomplished through speech. Hymes considers speech act to be a minimal unit, which "represents a level distinct from the sentence and not identifiable with any single portion of other levels of grammar or with segments of any particular size defined in terms of other levels of grammar" [35]. Thus speech act theory deals with the functions and uses of language, all acts we perform through speaking, and all the things we do when we speak.

Performing a speech act involves performing: (a) a locutionary act, the act of producing a recognizable grammatical utterance in the languages, (b) perlocutionary act, the act of producing certain intended effects upon the feelings, thoughts or actions of the other person, and (c) illocutionary act, the attempt to accomplish some communicative purposes such as promising, warning, greeting, reminding, informing, and commanding all being distinct illocutionary acts [36].

Pragmatics is defined as the study of communicative action in its sociocultural context. In order to be successful speakers in actual communication events, the functional approach to the study of speech, research suggests that it is essential for speakers to know not only grammar and text organization skills but also pragmatic aspects of the target language (Bachman, 1990). Communicative action includes not only speech acts such as requesting, greeting, inviting, suggesting and so on but also the pragma-linguistic ability to use language forms in a wide range of situations characterizing the context of the speech events the speakers get involved in. According to Schmidt and Richards [37] speech act theory explains how speech achieves actions and how the speech acts result in both verbal and non-verbal reactions. The function of a given utterance or a set of utterances is its illocution and speech act theory considers the illocution of the speech, the one intended by the speaker and detected by the addressee [1].

In pragmatics, our interest lies in the fact that a sentence, pragmatically called utterance, carries a message which is intended by the speaker and understood by the addressee. The issue of speech acts has been one of the most vital issues dealing with the functions of speech. The pioneers of this line of research [1] claim that the speech acts are operated by universal pragmatic principles, and some [38, 39] claim that their realizations are language specific. The fact is that although there are universal pragmatic principles which exist in all languages, their realization becomes culture specific. In fact, universal functions become culture specific when they are to be realized in a language: for instance, being polite is universal, but how to be polite depends on the cultural norms governing the speech of a specific language.

In case of the Persian language some studies have looked at the pragmatics of Persian politeness [40,41,42,27]. According to Sahragard [43], Beemen [40] is the only authoritative and comprehensive published work done on the Persian language from a sociolinguistic point of view. Nevertheless there are many researchers who

attempted in realization of politeness in Persian. Among them Zahra Akbari [44] in her article has extracted and categorized the range of politeness strategies used by Persian mono-lingual speakers in certain situations and to compare and contrast them with those employed in English, based on the model proposed by [2].

Social factors, which are either relational and context-sensitive such as solidarity and power, or non-relational such as social class, status, gender, or age, can be regarded as the factors which influence variations in speech, a thorough understanding of which is vital in order to follow norms of politeness in contexts of interactions. Different cultures find expressions in different systems of speech acts. Since decades ago, researchers [2,8,9] have worked on speech acts to demonstrate the realization patterns and their characteristics in different languages [10]. However, the works done on socio-pragmatics in Persian seem to be insufficient. There have been research attempts focusing on the pragmatic aspects of Persian speech acts; however, most of them have focused on one specific function with the aim of showing how pragmatic norms are realized differently across English and Persian. None, to our knowledge, has chosen the role of social class, solidarity, and social power in the sense we have chosen to research using pseudo natural data of a movie which could be claimed to be a familiar context for most of the analysts.

Discussing face encompasses both face-saving and face-threatening acts. Speakers often get involved in achieving speech functions in their given contexts of use [26]. The claim is that politeness is context dependent. Brown and Levinson [2] base their theory on the concept of face which is defined as the public self-image that all rational adult members have, when engaged in spoken interaction, and it must be constantly adhered to. Positive face is the wish to be respected; the face 'wants' are to be desirable to fellow interactants. Negative face is the 'want' all speakers have for being free from imposition and that their actions will not be impeded by others. However, it is not possible for a conversation to flow without a demand or intrusion being made on another person's autonomy; the fact is that we refer to certain functions of speech potentially face threatening. A simple act such as asking someone to sit down is a potential threat to their face; and it could be a threat to both positive and negative face. Brown and Levinson define the performance of such utterances as potential face-threatening acts (FTAs).

Some speech acts are categorized as containing threat towards the negative face of the hearer: orders, requests, suggestions, advice, reminding, threatening,

warnings, offers, promises, expressions of envy, admiration, expression of hatred, and lust are examples. While those which are threatening to the positive face of the hearer include expressions of disapproval, criticism, contempt, complaint, accusation, insult, disagreement, expressions of violent emotions, the mention of taboo topics, interruption, bringing bad news about the hearer or good news about the speaker as well as other non-cooperative acts which can be listed. The positive face is in sum every person's wish not to be disrespected verbally. An order in Persian to a person of an older age could be threat not only to negative face, but also to the positive face. The basis of arguments about speech variation lies on the concept of face. The two significant social variables, power and solidarity which affect face are mentioned below.

Every utterance or series of utterances producing a speech functional unit produced by individual speakers could be a display of, among other factors, the degree of social solidarity and social power existing between the interlocutors. In this case, linguistic politeness is a social construct which indicates the power relation between the interlocutors. The solidarity is by nature about the quality of the relations between the interlocutors involving in a conversation event. It can be divided into differing levels based on who is conversing with whom: how related and close they are. However, as will be demonstrated, solidarity is a relational variable which increases or decreases not just by change of the characters; rather it is a highly context related quality. Measuring solidarity is obviously different from measuring other social qualities such as class, status, or power.

In fact Language does more than helps people understand the speaker's thoughts and feelings. By using language in a subtle way, people define their relationship to each other and identify themselves as part of a social group. "In no area of sociolinguistics is this second function of language more clearly highlighted than in address forms". So there is an increasing emphasis on the study of the second person pronouns and address systems in different languages. One of the most influential study was conducted by Brown and Gilman in 1968, which, for the first time, brought the concept of "power and solidarity" into the field of sociolinguistics and identified their correlation and the pronominal usage.

Brown and Gilman [45] found that the use of the familiar pronoun T and the deferential pronoun V in European languages were governed by two forces: power and solidarity. If one person has power over another in the degree that he is able to

control the behavior of the other, he may give T and receive V. The bases of power can be physical strength, wealth, age, sex, institutionalized role in the church, the state, the army or within the family. On the other hand, solidarity implies intimacy and "shared fate" and is reciprocal. If the interlocutors are close or intimate to each other, they will mutually exchange T or V.

Fairclough [28] puts forward that power is a hidden construct in face-to-face discourse. From the list of threatening acts, we can strongly argue that the issue of power is inherent in our communication activity and is a major variable which depends on the context of the speech; it is a basic force in social relationships, the press of situations, and the dynamics and structure of personality. It is also defined as an individual's relative capacity to modify others' states by providing or withholding resources or administering punishments. Resources can be both material (food, money, economic opportunity) and social (knowledge, affection, friendship, decision-making opportunities), and punishments can be material (job termination, physical harm) or social (verbal abuse, ostracism).

Power is positively associated with speaking time and speaking out of turn [2,46]. Similarly, those with greater power are more likely to express their private opinions and true attitudes [47,48,49,50]. For example, high-power individuals are more likely than those without power to openly express their opinions during a group discussion [47,48], and they are unfazed by the expressed attitudes or persuasion attempts of others [49,50]. In contrast, low-power individuals' own attitudes and opinions are shaped by their high-power counterparts. Even when subordinates try to engage in overt acts of upward influence to improve their own situation and thus reduce the gap in power, they are likely to feel that their voice has fallen on deaf ears.

In fact high-power individuals tend to be more optimistic, more confident about their choices, and more action-oriented [51,49,52]. When there are inhibiting forces in the environment, power-holders act as if those forces were invisible [50] and take more goal-directed action [52]. For example in bargaining contexts, those higher in power are also more likely to initiate a negotiation and to make the first offer [53]. Negotiating and making first offers have both been shown to lead reliably to the accumulation of more resources and thus more power [54].

High-power individuals are also more optimistic and confident than low-power individuals [51,49]. For example, the powerful feel more optimistic about possibilities

for career advancement than do individuals without power [51]. These effects of power are important mechanisms of hierarchy maintenance because confidence and optimism are predictive of achievement and success across a range of tasks [55,56]. This increase in optimism also affects attraction to risk, with high-power individuals showing greater risk preferences and making riskier choices than low-power individuals [51,57].

The third social variable which is of interest in this study is social class, which is unlike the other two variables, an attribute which does not supposedly ever change as an attribute of a person. The effect of social class is reflected and maintained through everyday social interactions with teachers, bosses, neighbors, and friends in homes, schools, workplaces, and religious spaces social class is connected to relative social power in general; however, it is not always in correspondence with social power. Social class is a multi-faceted construct that is rooted in both objective features of material wealth and access to resources (income, educational facilities); [29] on the one hand, and education, political influence, area of residence, and parenthood on the other. These facets all reflect real, material conditions that shape the lives and identities of upper and lower-class individuals. Relative to their upper-class counterparts, lower-class individuals have fewer economic resources and fewer educational opportunities [29]. Moreover, people with lower-class backgrounds often face increased stress in their close relationships [30] and violence in their homes [31]; and they are the inferior conversation partner in most speech encounters.

For the purpose of this study, we classified social class into six levels, starting from very low (an unemployed, uneducated, poor, from an unknown parental background in slums of a city is the very low class individual). The quality of relations in Iran is much more demonstrated in the impoliteness of speech to the extent that lots of rude words and slang expressions might be exchanged between friends; and this is true mostly about the male young generation of the current social structure of Iran. Culpeper [32] defines impoliteness as "communicative strategies designed to attack face, and thereby cause social conflict and disharmony". He also claims that "impoliteness comes about when: (1) the speaker communicates a face-attack intentionally, or (2) the hearer perceives and/or constructs behavior as intentionally face attacking, or a combination of (1) and (2)". Power in this study is measured on a six level scale from least to most (a person in the court accused of murder without any connection represented in speech in relation to the judge who is to sentence the

accused). The most powerless talks to the most powerful who enjoys the highest social power).

### **3. METHODOLOGY**

#### **3.1 Participant**

The participants were actually fictional characters of the movie and the data presented in this work is a display of the world created by the characters of the movie *A Separation*. Six main characters that interact constantly throughout the movie give us a sufficient corpus of speech displaying differing effects of the social variables of the study. 3 male, 4 female characters were selected and their conversations in various contexts were recorded and transcribed. The characters include one Iranian middle-class couple ( Nader & Simin) and their 11 year old daughter (Terme), and one low-class couple (Hojat & Raziye) with terme's female teacher (Miss Ghahrayi) and the court judge.

#### **3.2 Instruments**

The Iranian movie called "*A separation*" was used as the instrument to be employed for collecting data. *A Separation* won the Academy Award for Best Foreign Language Film in 2012. It received the Golden Bear for Best Film and the Silver Bears for Best Actress and Best Actor at the 61st Berlin International Film Festival. The film was nominated for the Best Original Screenplay Academy Award, making it the first non-English film in five years to achieve this (Wikipedia). The world created by the movie was the context of situations with six main characters acting in various contextual situations. The materials of the study included the entire utterances produced in various situations by six movie characters of "*A Separation*". Each utterance was subject to a number of examinations; hence, the functional category, directness, and the use of mitigation devices in them were among the characteristics which we dealt with in order to reach findings about the effects of social variables on speech variation.

The rich corpus which contained 329 functions for classification could be a reliable source of data for verifying the validity of the claims made by the speech act theories which were chosen to be employed and tested.



### 3.3 Design

The design of the study is a simple one, as the nature of it is a descriptive attempt to show the role of social variables while applying the functional classifications.

### 3.4 Procedures

The data for analysis constituted the conversations of the movie characters in various contextual settings. The theme of the movie has been known to a large group of individuals who pursue Oscar winning films and have some interest how cross-culturally different speakers interact. The assumption is that social class, power, and solidarity among the interlocutors vary to a considerable sense, as the story of the movie is about socially different characters who represent a different social class; and the contexts are full of the interactions of interlocutors with differing power and solidarity.

In order to examine the functional classification of speeches made by the movie characters through employing the speech act theory of Austin as well as Brown and Levinson's politeness theory, the procedures were first, transcribing the entire conversations, and classifying them into functional categories they belong to. Second, getting to an estimation of how frequent was each speech act category in the speeches of the six characters of the story. To compare the differences between the characters in various contextual settings, the speeches of every character were transcribed with information available regarding where, when, in which circumstance (agreeing, conflicting, arguing, quarrelling, requesting etc) the speech is made; and the knowledge of who made the utterances to whom could give us as analysts the ability to examine closely how the effects of social variables create speech variation. Concerning the effect of social class, solidarity and power on speech variation, the methodology which was used makes the work different from previous research and hence contributes to its originality.

### 3.5 Data Analysis

This study needed 2 kinds of analysis: qualitative and quantitative analysis: The data constituting speech was categorized based on different speech acts, the comparisons of which were shown by examples, different tables, and using Figures. The qualitative data will be turned into quantitative by measuring frequency and



percentage of each and every speech acts that was produced by characters in contextually different situations. The use of excel was a sufficient statistical tool for us to get to what is of interest to our research.

#### 4. RESULTS

In what follows, the quantitative data will be presented and discussed limited to the characters of the movie *A Separation*. The application of Brown and Levinson politeness theory as well as Austin's speech act theory will provide results which will be introduced for analysis. The first to present is Table 1, which gives a classification of the utterances into functional units based on their illocutionary force. As is clear, one functional unit could be identical to an utterance, while some functional units have an organization which requires several utterances with one being the head act. As is clear from the table, the utterances have been turned into 408 functional units; an example will be clarifying here: Nader first gives a warning request as well as a threat to Hojat in one unit of function. The first utterance is an imperative with a message which is intended to be a warning request and the second utterance is functionally considered to be a threat.

**English 1:** N to Hoj: Be respectful! I'm not saying anything in front of your family.

**Persian 1:** N to H: Moaddab bash, man jelay-e zan o bach-at hicch-i behet ne-mig-am.

**Persian (hereafter P) 1:** N. to H: polite be-imp, (2nd sing). I front wife and child-2nd sing nothing to you-2nd sing ne-(neg marker)-mi (present simple) say-1st sing.

Treating collections of utterances, we came up with turning 252 collections of utterances with a given function into 408 functional units with a head as well as with strategies of either politeness or such issues as compliance, etc. Table 1 is a comprehensive illustration of how syntactic units turned into functional units. The first column demonstrates the speech act kind including both face saving and face threatening ones; the subsequent columns show who interacted with whom and what was the speech act type.

Noticeable is the fact that for an English speaker, it is strange how some things are not to be mentioned in front of one's family. The differences of this type, however, are not the issue of analysis here; the mere purpose is to examine how

The functional units were divided in the following categories, regardless of who says what to whom: Those functional units called the FTAs to positive face included: criticism (54), complaint (47) direct disagreement (19), insult (17), and accusation (7). The total number of tokens in five categories constituted 144 instances. In addition to the categories above; ironical expressions used for showing intimidation and resentment which were used in speech acts potentially face threatening, usually employed specifically in the expression of disagreements, complaints, criticisms, (11); obligation(4) and refusal (4). The total number of tokens in eight categories constituted 163 instances.

[illegible]

The functional units chosen for examination which were viewed to be FTAs toward negative face included 113 tokens in seven categories of speech act: order (27), direct Request (42), indirect Request (11), threatening (22), advice (2), suggestion (8), and promise (1). As listed below, a number of characteristics were observed worthy of mentioning. The means of conveying the functions were either strategies or devices employed in conveying emphasis, increasing the face saving degree or decreasing the threat of a speech act by showing respect through using a class raising device (19 tokens); using high tone of voice for either showing emphasis, defensiveness, or threat (18 tokens); hesitation, showing lack of confidence (4 tokens), swearing which indicated either distress, emphasis, or defensiveness apparently unique to Persian unequal power in the contexts of conflict compared with English (15 tokens).

The use of face saving politeness strategies was mostly observed in the categories of speech acts below. Here is the tokens of speech act which were classified into types which often were used in building a more complex hierarchical functional structure: apology (8), expression of distress (7), permission (7), making an excuse (4), reasoning (4), agreement (1), and inquiry (1). The total number of tokens in seven categories constituted 34 instances. In addition to the categories mentioned, their frequency of occurrence was measured based on an estimation of which characters uttered them to which addressees (*Nader, Simin, Raziye, Hojat, Termeh, the Judge, Ghahrayii, the Police officer, the sister in law, mother in law, Ms. Kalani*).

Use of address forms (46 tokens) was an additional interesting issue for examination. The situations in which characters interacted could be divided into different ones. Who is addressing whom under what contextual circumstances function as variables which could predict which type of an address term will be chosen. In many languages, including Persian, the second-person plural pronoun used to address is an honorific form being a sign of respect. In addition, the use of non-honorific address pronouns (*tou* 2<sup>nd</sup> sing) may be used as a sign of either solidarity between the interlocutors or high power of the speaker, compared with *shoma* (2<sup>nd</sup> pl) which is used for the more powerful addressee. In English there is no difference in the form of second person address pronoun: *.you*. There is only one used for an addressee without showing either solidarity or inequality of powers. The *tou* (2<sup>nd</sup> sing) pronoun is usually used by those who do not have much social distance from each other (Fazold 1990). In example 2 the honorific pronoun, in 3, the non-

honorific pronoun, and in four a substitution (*darling dadi*) which indicates the greatest degree of solidarity are used displaying varying degrees of either power or solidarity.

**A: Address forms:**

**English 2:** J. to Ms. Ghahrayi: You can go. Thank you.

**Persian 2:** J to Ms. Gh: shoma tashrif be-barid, kheili mamnoon.

**P 2:** J. to Mrs Gh: you (2nd pl) honor be- (subj marker)-take (2nd pl), very thankful.

**English 3:** T to S: If you hadn't left, Dad wouldn't have been in jail now.

**Persian 3:** T to S: to age alan vel na-kard-e bood-i, baba alan too زندان na-bood.

**P3:** T. to S: you (sing) if now leave na(neg. marker) do(past participle) be-(past, 2nd sing)-I (condition marker) be- (subjunctive marker) go (imperative 2nd sing) dad now in prison na- (neg marker) was-0 (3rd sing).

Other address forms are used to convey such in-group membership, like generic terms and terms of address, such as:

**English 4:** N to T: Honey (Dad 'darling')! Go to your room.

**Persian 4:** N to T: Boro too otaghet baba joon.

**P 4:** N to T: be-(imperative marker) go (imp. Verb) in-of room-at (possessive adj, 2nd, sing) dadi life (informal, extreme intimacy).

Examples are chosen from the data to show each one of the speech acts mentioned above. It is interesting to note how the two languages English and Persian compare in conveying the functional effects. The details of how the two languages are different are not the topic of discussion here; however, the translations into English could automatically reveal to the readers how relativistic the nature of speech can be.

Example 5 is representative of an instance of complaint. The style of speech could reveal to the Persian speaker how the relevant social class of the speaker may be misjudged due to the context of speech between two persons forming a couple: the indicators of inequality in the social power of one of the interlocutors could be identical to the linguistic devices which function as indicators of the degree of solidarity. And, as an additional fact revealed through the qualitative examination of the conversational data, the degree of solidarity may vary according, not only to change of addressing character, but also to the contextual circumstances; the

context of conflict changes the effect of solidarity to a negotiation of power between two speakers. Examples below are revealing:

**B: Complaint:**

As 5. a shows, the fairly literal version of the Persian translation into English reads differently to the extent that some functional effect will change and the illocutionary force cannot be indicated:

**English 5:** N to S: This is what happens when you just find random people.

**5. a.** N to S: When you find any stranger from the corner of the street and pick her up and bring into the house, this is what it becomes!

**Persian 5:** N to S: Vaghti har kasi ro az sare khiyaboon peyda mi-koni var mi-dar-i mi-yar-i tooy-e khoone mi-she hamin.

**P 5:** N to S: when everyone ro- (informal direct object marker) from head-e (of) street find mi- (simple present) do(imp, 2nd, sing) pick (informal spoken) have (present form of v)-i (2nd sing) mi (present tense marker) take (present tense)-I (2nd sing) in-ye (of) home mi-(present tense) become (3rd sing) same this).

Reaction to complaint is represented in 6 in which we see the reaction is not an apology; it is rather rejecting the complaint.

**English 6:** S to N: Don't blame me. I told you even then that I only know the sister in law. The literal translation could be:

**6. a.** S to N: Don't place it on my neck without any reason, etc.

**Persian 6:** S to N: Bi-khod garden-e man na-ndaz, az hamoon moghe ham behet goft-am man faghat khahar shoharesh o mi-shnas-am. Khod-esh o ne-mishnas-am.

**P 6:** S to N: bi (without) self neck-e (of) I na (neg marker) throw (imp, 2nd sing), from same time also be-(to) you (sing) say (past tense)-am (1st sing) I only sister-e (of) husband-esh (3rd possessive adj)-ou (OM) mi-(present prefix) know-am (1st sing). Self-esh (3rd sing)-ou (OM) ne-(neg marker)-mi (present tense prefix) know (present tense verb form)-am (1st sing).

**C: Criticism:**

Example 7 is what Hojat mentions to Nader as Criticism. The interesting point is that extracts such as these could reveal, in addition to the functional effect, the social class of the speaker. As one judges according to Hojat's objection of why Nader has touched his wife, who is referred to by a euphemistic term which indicates that in Persian culture one's wife is a sacred property for no one to touch but the

husband. The address term *Namous* is used to refer to one's wife; there are not any such expressions in English. The English audience will never comprehend the difference between the two. There is numerous address terms for female individuals in Persian most of which indicate how significantly the society is male oriented. In addition to the two address terms, a husband may call his wife by the term, *zan* (woman) which again signifies that the wife is a possession of the husband especially among members of lower social classes:

**English 7:** Hoj to N: Quiet! Who even let you touch my wife (*Namous*)?

**Persian 7:** H to N: to *aslanbe che ejaze-yi be namoos-e man dast zad-i*.

**P 7:** H. to N: you (sing) never with what permission-yi (indefinite marker) to wife (a substitution with especial connotations)-e (of) I hand hit (past form)-i (2nd sing).

It is interesting to know that what S tells the Judge cannot be translated at all in the same functional sense. The address term *Haj Agha* (Mr *Haji*) refers to one who has already had a pilgrimage to Mecca to do *Hajj* ceremonies, then after that the person will be Mr *Haji*. It has become a popular address term after the Islamic revolution for people to refer to the clergy, to respectful, and to the judges who are dressed like a clergy. The use of *Haji* signifies the less powerful *Hojat's* acknowledgement of his weakness and his involvement in a conflict; using the term addressed to the Judge who is of higher power as well as class shows a good instance of the effect of social power:

**English 8:** Hoj to J: Sir, if they don't care about honors, I care.

**Persian 8:** H to J: *Haj agha age namoos vase in ha mohem nist vase man moheme*.

**P 8:** H to J: *hajj* (title) sir if wife for these important *ni*-(neg marker) *be* (3rd present sing), for I important-*eh* (3rd sing, pres).

Example 9 is revealing of a difference between the two characters in conflict. One tries to show that his wife is a sacred property not to be touched by anyone; the other reveals several indications of being polite which could functionally be ambiguous. Being polite in a situation of guilt is one of the reasons speakers become polite. However, analysts and native Persian speakers can draw conclusions regarding the social class of the speakers in this conversation. Example 9 shows polite speech by Nader who is involved in a situation of lack of power due to his guiltiness.

**English 9:** N to Hoj: Sir, please don't insult.

**Persian 9:** N to H: Agha lotfan tohin na-kon.

**P 9:** N to H: sir, please insult na (neg marker) do (imp, 2nd sing).

Example 10 represents S to N the husband; a distinct feature of how Persian middle class couples interact in situations of conflict. If they had belongs to lower working classes living in small towns, one would expect much less power of expression than the husband. Here, a direct suggestion is made in a fairly direct way without any mitigation to make it polite. The speech act of suggestion is made by the head act being pay the blood money, the rest is considered to be expressions of dissatisfaction and complaint in the form of asking questions challenging the husband's refusal to pay. The head act of direct disagreement is giving money by force. The Persian native speakers can judge that a wife must be of high or middle class to be as direct as the speaker, Simin, is.

Knowledge of the larger context enables the Persian speaker judge that such a conflict uncovered in this conversation shows how the upper middle class in Iran is undergoing changes; Simin takes it her responsibility to force her husband to act through unpleasant speech that forms a unit of suggestion. In 10 Nader directly disagrees with Simin who is showing her resentment why the husband shows reluctance and does not act upon her request. This example shows that change has happened in Persian culture when one sees the style of Simin's speech could be offensive to Nader, because she uses non-honorific address pronouns, direct complaints, and finally a suggestion. Using such terms as stubborn by a wife to a husband clearly indicates the change of power across the two genders.

**English 10.** S to N: Then why are you being so stubborn? Pay the blood money, so it gets over with.

**Persian 10:** S to N: pas chi migi, chera hey lajbazi mikoni, biya in diya ro bede tamoom she.

**P 10:** S. to N: good then what mi(present prefix) say-i (2nd sing)? Why hey (continuously) stubbornness mi-(present prefix) do (present tense)-i (2nd sing)? bi-(imp. Marker) come (present, imp 2nd) this blood money ro (OM) be- (imp marker) give (imp mood) finish-she (become, present, 3rd).

Most Iranian workers belonging to the traditional social class would be outraged by such a term. Additionally, the social class of the speakers is judged to be not high, especially the English performants find the social class always to be fairly



lower than the Persian native speakers' judgments. In 11, Nader disagrees with the suggestion made by Simin in an indirect way, which signifies how he is concerned about his wife's judgment of him and his character. And this kind of concern is mostly true about the middle educated class of Persian speakers. Being indirect implies his tendency to be also acceptable in terms of saving his face in the sight of Simin, his wife.

**English 11:** N to S: I won't be forced to pay.

**Persian 11:** N to S: man pool-e zoor be kas-i ne-midam.

**P 11:** N. to S: I money-e (of) force to anyone ne-(neg marker)-mi- (present marker) give-am (1st sing).

Example 12 is a suitable representative of how social classes compare in Persian culture. The extract is an indirect request made by the house maid. The strategies employed by the speaker are all indicators of social class and level of social power of the character. The female speaker, Razieh, displays a much lower class as well as power lever compared with Simin whose speech was in 10. In 12, the speaker is asking for permission, or in other words, a request for permission to act. She is asking Nader to permit her to give his phone number to her husband. She feels insecure about her giving the number to her husband; and only an Iranian native speaker of Persian would understand the reason for the concern about any possible suspicion for Hojat's thinking why his wife has communicated with a stranger man. The issue is socially sensitive for the simple working class citizens; therefore, it is obvious that she is very concerned about how she had got acquainted with Nader.

The Persian version is made into an unconventionally indirect speech act of request, while the translation version is a conventionally indirect request. Use of mitigation, confessing to her deliberate lying to her husband and asking for cooperation (letting her husband falsely believe that there had been no personal contact between them) all indicate the social class to which she belongs and how her power compares with Simin, the other wife's. As 12 a shows, the speaker displays a much lower social power and consequently social class. She is used to talking in hesitation, hedging, and the fact is that she uses honorific terms plus mitigation. The tone of voice and the gestures are added to show how her situation is of considerable powerlessness.



**D: Indirect request:**

**English 12:** R to N: Sorry, I was wondering if I can give your number to my husband, telling him I found your job announcement in the newspaper. Tell him for these household chores and for your father.

**12. a.** R to N: Forgive me, I wanted to tell, if it were permissible, I give your (honorific 2nd PI) number to my husband, tell him I found it in the newspaper. I tell him for the housework and nursing, etc.

**Persian 12:** R to N: be-bakhsh-id man mi-khastam be-gam mishe shomare-ye shoma ro be-dam be shohar-am be-gam az too ye roozname peyda kard-am baraye hamin karhaye khoone-tan va parastar-i ina be-gam.

**P 12:** R to N: sorry I mi-(declarative marker) want (past tense) -am (1st singular) be- (subj. marker) say (present tense)-am (1st singular) mi-(present prefix) become (present 3rd singular) number-e (of) you (plu) ra (obj marker) be-(subjunctive marker) give (imperative mood)- am (1st sing) to husband- am (possessive 1st), be-(subjunctive) say (present)- am (1st sing) from in-ye (of) newspaper find (adj) do-am (1st sing) for same work- s (plu)- ye (of) home- tan (poss 2nd plural) and nursing these (discourse extender) be-(subjunctive marker) say (present tense)- am (1st singular).

Extract 13 is compliance to the request by Nader. He uses a direct speech act; and to make it more polite (gentlemanly), he confirms and says that no problem with what is asked by her. His class is revealed by the style of his speech: use of honorifics (subjunctive-be-order-2ndpluralequals English tell him), use of honorific ending in make-3rdpl a call, make an appointment with him 3rdpl. This style is a display of a gentlemanly way of speech representing the social class of the speaking character Nader in a context of cooperation. The politeness degree, as we compare the two versions, has not been properly transferred into English, due to use of honorifics, and plural address pronouns which show respect which could not have been transferred to English. The existence of honorific address terms and pronouns, honorific verbs substitutes for normal verbs, and third person plural pronouns and endings referring to singular referents, all indicate that Persian is comparatively more a complimentary type of language compared with English.

**English 13:** N to R: Don't worry about that. Have him call me and I will setup to meet him.

**Persian 13:** N to R: Na oon masaale-i nist, pas be-farmayid ba man tamas be-gir-and. Man bahash-oon tamas mi-gir-am.

**P 13:** N to R: no that problem-yi (indefin marker) ni- (neg marker) be (present, 3rd sing), then be-(subj marker) order (honorific verb) that with I contact be- (subj marker) take (present tense)-and (3rd pl). I with they (3rd pl) appointment mi-(future marker) put-am (first sing).

**E: High tone of voice:**

The high tone of voice in 14 is an interesting part of Persian speech. The character, Nader in the context of the Judge and the court, speaks with a high tone to show either his distress or his emphasis. In response to an accusation that he left Simin, Nader raises the tone of voice. In general, in several contexts, Persian speakers raise their tone to indicate such points as emphasis, anger, and distress.

**English 14:** N to S: WHEN DID I EVER LEAVE YOU? YOU BROUGHT ME HERE (Capital indicates loudness).

**Persian 14:** N to S: man key to ro vel kard-am to mano keshoond-i dadgah.

**P 14:** N to S: I when you (sing) ro (OM) leave (adj form) did-am (first sing). you (sing) I- o (OM) pull (past tense)-I (2nd sing) court.

The tone of voice is raised by Simin too in the context of argument. The translation to the English version is non-literal, as what Simin says starts with: then what did you do? Twice repeating the same interrogation is a means of showing anger and disagreement with resent.

The expression is intended to convey: if you did not, then who did.

**English 15:** S to N: WHAT DID YOU DO? WHAT DID YOU DO?

**Persian 15:** S to N: pas che kar kard-i, Pas che kar kard-i.

**P 15:** S to N: then what work did-I (2nd sing), then what work did-I (2nd sing)?

In example 16, the hot issue of accusing the one who was the responsible party for what had happened, Nader raises the tone of voice not to show his power; rather he tries to show his high degree of stress and resent. The functional message of 16 is an indirect act of placing the guilt on the addressee:

**English 16:** N to S: YOU WERE THE ONE WHO APPLIED FOR THE DIVORCE.

**Persian 16:** N to S: To baram darkhast talagh dad-i.

**P 16:** N to S: you (sing) for-I appeal-e (of) divorce give (past tense)-I (2nd sing).

**F: Obligation:**

In example 17, obligation is pointed out by the judge who represents the absolute power compared with other characters. His speech is empty of signs of mitigation. The Judge mentions the solution to the conflict: does not grant permission. So the permission to divorce, the permission to have custody all is in the power of the judge. These circumstances make him the most powerful figure among others as manifested in the tone of his speech and the functions of his speech units. The issue is: could it be that his social class enhances when his power increases over the other characters, or vice versa: will his power increase when his social class increases? The permission to the custody as well as divorce is given to Nader as his right, however, the real right of granting permission not only for custody but also for divorce is in the judge's hands; and this makes him most powerful of all in the contexts he is present. And in consequence, his speech is mostly directive.

**English 17:** J to S: Ma'am, he (3rdpl) also has to approve (3rd sing) of this divorce. It has to be mutual.

**Persian 17:** J to S: Khanoom ishoon bayad baraye talagh razi bashe, tavafoogh do tarafe bayad bashe.

**P 17:** J to S: Madam, he (honorific, 3rd pl) must for divorce satisfied be-(subj) be-e (3rd sing).

In example 17, it becomes clear that the judge is empathetic to the husband; this is clear by using terms signaling solidarity while politeness has also been observed. Using third person singular pronoun is an indication of respect for the addressee, and using non-honorific ending in the verb shows his display of empathy. The use of utterances in the form of rules, laws and principles could reveal that the judge is to relegate the issue to the civil laws of divorce and custody. The interesting issue is that although it is the law dictating whose right is divorce and custody, the parties involved see the permission in the judge rather than the laws which are to practice the rights.

**English 18:** J to S: If her father doesn't give permission, she can't come with you, Ma'am.

**Persian 18:** J to S: pedar-esh age ejaze nade ne-mitoone ba shoma biyad khanoom.

**P 18:** J to S: father-e (of)-sh (3rd sing) if permission na- (neg) give-e (3rd sing) ne- (neg marker)-mi (declarative) can-e (3rd sing) with you (pl) be-(subju) come-0 (3rd sing) madam.

**English 19:** S to J: Her father doesn't allow.

**Persian 19:** S to J: pedare-sh ejaze ne-mide.

**P 19:** S to J: father-ash (3rd sing) permission ne-(neg)-mi- (present marker) give-eh (3rd sing).

### **G: Direct Request:**

Examples 20 and 21 form a pair of utterances, one is a direct request supported with expression of compensation (I for sake everything mine to you instead) which could potentially guarantee compliance. To refuse indirectly, in 21, Nader makes comments accusing the mother by saying to her that the daughter is emotionally attached to him, the father. He brings another reason why he doesn't comply: that the daughter does not like to join the mother Simin. In support of the request, the mother offers another challenge/reason: that the daughter doesn't understand. So, in the conversation below, 20 was a directly made request with the head act, give me my daughter, and supportive strategy: I'll give everything to you. It is refused indirectly by Nader, (the husband) that the daughter herself prefers the father, and the daughter is emotionally attached to her father as mentioned in 21. In 22, the mother tries to use a supportive act for her request: she doesn't understand. The response in 23 is made to refuse and intended to be derogatory and is used to show the wife that she is mistaken, can be viewed as criticism using irony. The same is true with 24 in which Simin responds to the derogatory comment by her husband in still the same ironic way. The utterances 20 to 24 all form a complex functional structure in which a request is refused through employing varying strategies.

**English 20:** I'll give up everything. Just give me my daughter.

**Persian 20:** S to N: man hame chiz-a-mo mi-bakhsh-am faghat dokhtar-am o bede be man.

**P 20:** S to N: I all thing-am (possessive 1st)-o (OM) mi- (present)-ba (subju) forgive-am (1st sing) only daughter-am (poss, 1st sing)-o (OM) be- (subju) give (imper mood, 2nd sing) to I.

### **H: The Use of Irony:**

**English 21:** N to S: Your daughter is emotionally attached to me. She doesn't even want to come with you.

**Persian 21:** N to S: Dokhtar-et be lahz-e atefi be man vabastast asan khodsh ne-mikhad ba to biyad.

**P 21:** N to S: daughter-et (poss, 2nd sing) with regard sentiment-I (adj marker) with I dependent is (3rd sing), at all, self-esh (3rd sing) ne (neg)-mi- (present)- want (3rd sing) with you (sing) bi- (subju) come-0 (3rd sing).

**English 22:** S to N. She doesn't understand.

**Persian 22:** S to N: Khodsh ne-mifahme.

**P 22:** S to N: self-ash (posse 3rd sing) ne- (neg) mi- (present) understand-0 (3rd sing).

**English 23:** N to S: No one understands but you.

**Persian 23:** N to S: Hich kas ne-mifahme faghat to mi-fahmi.

**P 23:** N to S: no one ne- (neg)-mi- (present) understand-0 (3rd sing), only you (sing) mi- (present) understand-i (2nd sing).

**English 24:** S to N: No, it's just you that understands everything.

**Persian 24:** S to N: Na toy-i ke hame chiz ro mi-fahmi.

**P 24:** S to N: no, you (sing)-yi (be 2nd sing) that all thing-o (OM) mi-(present) understand-i (2nd sing).

In another conflictive context, Nader argues with the maid criticizing her for leaving the father unattended. In his criticism, there is insult and the speech is quite threatening. Power unequal context is displayed and the one who is more powerful mentions insulting comments while firing the maid. The maid responds to the more powerful employer Nader by showing how she is helpless in such a situation. 25 does not show how insulting the firing of the maid is; the utterance in the English version cannot convey the same functional effect. In response, the maid responds by just following the order of going out while complaining. The use of God's name is indicative of powerlessness on the part of the maid, Razieh. In 27, Nader shows his rude and direct insulting speech which has a much stronger effect compared with the same expressions in English. The English culture is one in which under no circumstance one is permitted to be this much insulting. The use of insult is one which can never be conveyed into English in a corresponding way.

**I: Insult:**

**English 25:** N to R: You deserve to be kicked/ thrown out of here.

**Persian 25:** N to R: hagh-e in e ke ba lagad az in ja bendazam-et biroon.

**P 25:** N to R: right-at (2nd sing) this-is that with kicking from here be- (subjunctive) throw (present, imperative)-et (2nd sing) out.

**English 26:** R to N: Ok I'll get out. But this is not right (God doesn't like this).

**Persian 26:** Man mi-ram biroon vali khoda ro khosh ne-miyad.

**P 26:** R to N: I mi- (present) go-am (1st sing) out but God ra (OM) happy ne- (negative)-mi- (present) come (3rd sing).

**English 27:** N to R: I'm being nice to you to not just throw you out.

**Persian 27:** Daram be to lotf mi-konam ne-mindazam-et az in khoone biroon.

**P 27:** N to R: have-am (possessive 1st) to you (sing) favor mi (present) do-am (1st sing) ne- (negative)-mi (present) throw-et (2nd sing) from this home out.

### **J: Swearing:**

Another important speech feature in Persian is swearing to get approval or to get addressee's trust. In response to the accusation in 28, the maid rejects the accusation by mentioning the name of the infallible imams. She represents the traditional social class who believe swearing by using the Imam's name could gain trust. The reaction to the swearing by Nader is to ask the maid to go out as she was fired by him. The use of honorifics in this context by Nader indicates the distance between them; solidarity decreases when conflict starts and increases. This conversation is not only the demonstration of class, power inequality of the context, but also how speech acts could be face threatening as a result of power of one over another.

The swearing is one of the signs that the maid speaker belongs to a class which is certainly different from the middle class Nader belongs to and is supposed to be modern. It seems that swearing, or at least religious swearing, decreases as education increases. It may be because educated people are sure about themselves and their reasoning power so that they do not employ linguistic devices to prove the truth of their speech. In the English version, a lot of cultural effects cannot be present, as the audience does not know anything about the nature of swearing in Persian.

**English 28:** N to R: What'd you need in that room over there? The room you took money from its drawer.

**Persian 28:** N to R: Too oon Otagh poshti che kar dashti, hamoon otaghi ke az too kesho-sh pool var dasht-in.

**P 28:** N to R: inside-e (of) that room back-i (adj marker) what work had-i (2nd sing)? same room that from inside drawer-osh (3rd sing) money up-take (past)-i (1st sing).

**English 29:** R to N: I swear I did not! I swear I would never do such thing!

**Persian 29:** R to N: Be emam-e zaman agar man rafte bash-am az too kesho-ye shoma pool var dashte basham.

**P 29:** R. to N: (I swear) to Imam Hossein if I gone become-am (1st sing) from in drawer-e (of) you (plural) money up-taken be (subju)-am (1st sing).

**English 30:** N to R: Get out.

**Persian 30:** N to R: Khanoom biya boro biroon.

**P 30:** N to R: madam bi- (subju) come (imper mood, 2nd sing) be- (subju prefix) go (impe 2nd sing) out.

Among the speech acts frequent in the movie, request was one which was found in abundance. Hojat responds to a job announcement in 31 by expressing his readiness to start the employment. His speech is full of honorifics and is fairly polite. It acknowledges the social class difference as well as lack of solidarity. In 32, the worker's offer to start is refused indirectly by mentioning there is one who is helping today. Then, as an invitation to come for work, he uses mitigation. In Persian, one's job is very much related to one's respect and reputation. Being a house maid could be utterly intimidating to the man, so Nader tries to use the softest tone possible not to let the man think intimidated. The English version has omitted the mitigation as it has been intended for the English audience. The English relatively literal version is rewritten to show how the employer attends to the condition.

#### **K: Direct Request with Mitigation:**

**English 31:** Hoj to N: If you want I could start today.

**Persian 31:** H to N: Az emrooz ham agar be-khayn mi-toonam biyam.

**P 31:** H to N: from today also if be- (subju pref) want (present imp mod)- ain (2nd plu) mi- (present marker) can (present)-am (1st sing) bi- (subjunc) come-m (1st sing).

**English 32:** N to Hoj: No, I have someone today. Bring an identification card and start tomorrow.

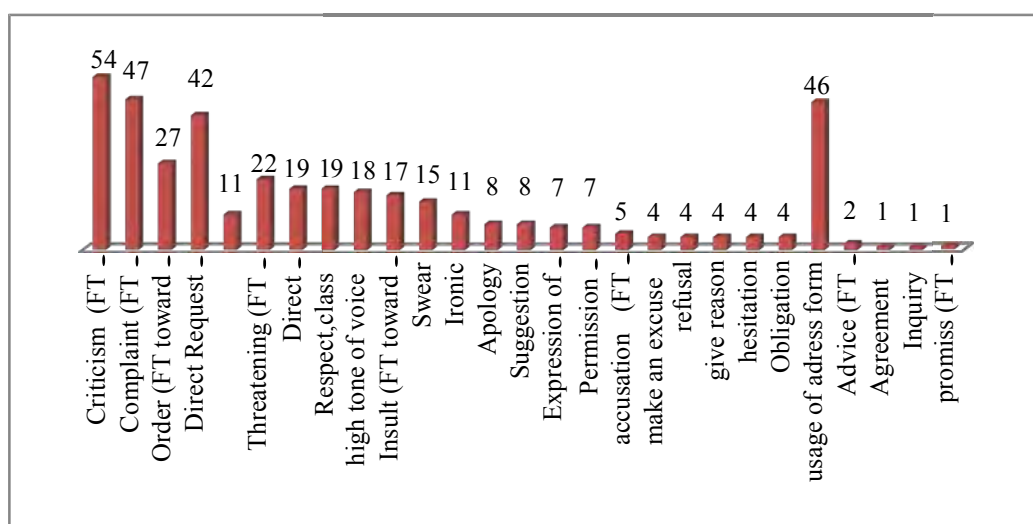
**32. a.** N to Hoj: No, today there is someone there; you (2ndpl) do favor start from tomorrow.



**Persian 32:** N to H: Na emrooz kasi hast shoma faghat mohabat kon az farad biya. Ye karte shenasayi ham ba khodet biyar.

**P 32:** N to H: No, today someone is you (plural) favor do (imperative) only from tomorrow bi-(subju) com (imperative). A card-e (of) identity also with self-at (2nd sing) bi- (subju) bring (imperative mood).

Fig. 1 is a comparison display of types of speech acts and the characteristics which could vary under the effect of social variables; and the bars show the frequency of each one of the speech acts in general, regardless of who said what to whom. Criticisms, complaints, direct request, direct order and threat were the highest frequently used speech acts. Direct disagreement, insult, swear, indirect request were second frequently used speech acts. The rest of speech acts were the least frequently used speech acts by all Characters of the movie. It is interesting to know that complaints, criticisms, order, direct request and threat were of highest frequency as the situations the characters were involved in are mostly arguments, conflicts and disagreements. Usage of address forms, frequent class raising devices, high tone of voice, and choice of an ironic speech tone were among the strategies employed to increase the functional effect of the speech acts.



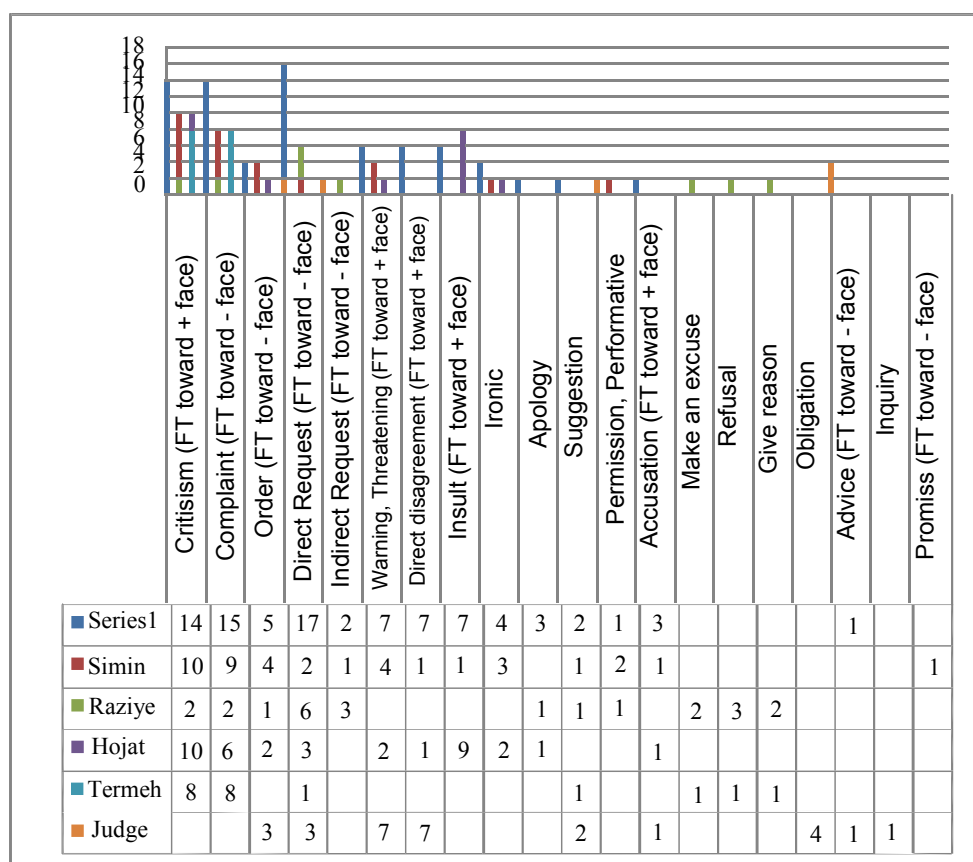
**Fig. 1. Functional classification of the utterances of the movie**

Fig. 2 is a comparison between the main characters regarding to the frequency of each speech acts they employed in their utterances. The bars show the frequency of each speech acts for each one of the main characters separately. Nader has the highest bar in complaints (15 out of 40), criticisms (14 out of 44), direct



requests (17 out of 32), accusation (3 out of 6), apology (3 out of 5) and ironical expressions (4 out of 9). Bars also show the same frequency of criticism for Simin and Hojat (10), the same frequency of accusation for Simin, Hojat and judge (1), and almost the same frequency of complaint for Simin (9) and Termeh (8), who had the highest frequency of the usage of Complaint in their speech after Nader.

In threatening (7/7), suggestion (2/2), advice (1/1) and direct disagreement (7/7), the bars for both Nader and Judge show the same frequency, and the only bar for obligation (4) and inquiry (1) belongs to the Judge. But the Judge has no bar on criticism, complaint, indirect request, insult, ironic, apology, making an excuse, giving reason and refusal; the indication is that the judge has a position whose role requires certain speech acts to occur more frequently than others. Raziye and Termeh are the only characters that have bars for making an excuse (2/1), giving reason (2/1), and refusal (3/1) showing the likelihood of their social standing in terms of power and influence. Hojat (9) and Nader (7) also have the highest bar for insult; the indication of it is they are involved in conflictive contexts of situation.



**Fig. 2. The comparison between the main characters based on the frequency of different speech acts uttered by each character**

In Table 2, the frequency of occurrence of each speech act and strategies for using those speech acts were measured based on an estimation of which characters uttered them to which addressees (Nader, Simin, Raziye, Hojat, Termeh, and the Judge). The total number of functional units that were produced by main characters (Nader, Simin, Raziye, Hojat, Termeh, Judge) are 329 criticisms (44 tokens) and complaint (40) in Nader's utterances were mostly addressed to Simin and Raziye, reflecting his male superiority of social standing power in relation to such female addressees as Simin and Raziye. In the case of Simin and Hojat, complaints and criticisms were addressed to Nader; clearly showing their greater power in the given contexts of conflict. This kind of power is mostly context related. Termeh's solidarity with her family Nader and Simin gave her the permission to place direct complaints. Raziye's complaints to Nader and Simin were mostly responses to the accusations revealing the great degree of her powerlessness. Her complaints were made in a considerably different style of politeness. As the last instance of complaining speech, it is interesting to mention that the judge's utterances were not categorized in any of the face threatening speech acts of complaint and criticism.

Insults (17), which had the highest frequency in Nader and Hojat's utterances, were exchanged between N and H showing how social class and face could be violated under the influence of conflict in the Iranian society. Insults were also addressed by N to Raziye in a highly direct style showing that being a maid decreases one's class; in addition, being a female addressee could make one more susceptible to direct threatening speech such as insult.

Direct disagreements (16) which were dramatically observed in Nader and Judge's speech were in sight of and in response to Simin's requests. Accusations (7) by Simin, Hojat and Judge were made toward Nader for telling the lie and his inconsiderateness. On the other hand, Nader accused Simin, Raziye, and Termeh for their carelessness and their irresponsibility in given situations showing how the world of the "A separation" is full of conflicts; in response to accusations directed to Raziye, what we see is her insisting by using swearing, tone of voice, gestures made, used as different strategies. In addition, Raziye persists on making excuses and giving reasons in her effort to relieve herself from the guilt she was accused with.

In addition to the categories above; Nader, Hojat, and Simin uttered ironical expressions for showing anger and intimidation while addressing each other showing disagreements, complaints and criticisms. Obligations (4) as one of the threatening

speech acts were uttered toward Nader and Simin by the Judge at court; signifying that it is not the judge who disagrees; rather, it is the laws governing legal relations that are practiced. The total number of tokens in these eight categories constituted 141 instances.

The functional units which were viewed to be FT toward negative face included 76 tokens in six categories of speech act: order (15), direct Request (32), (15 out of 32 were direct request with using mitigation devices), indirect Request (6), threatening (20), advice (2), and promise (1). Nader mostly used mitigation devices (like, Mohabbat konid (compassion do- imp, 2ndpl), Lotf Konid, Tashrif Biyavarid) in his direct requests from Hojat and Raziye except the time while they were in conflicts. Also, in the presence of the Judge most of the direct requests by characters were with mitigation devices used to acknowledge the higher power of the judge. But, Nader requested directly from his daughter Termeh without using mitigation devices which indicated solidarity of relations between them.

It is often the case that context decides if the use of direct mitigation less speech is as a result of solidarity or in equal power between the two parties speaking. Between N and T, direct speech without mitigation could be related to the high solidarity between them. Also, Indirect requests which are often indicators of a low degree of solidarity and a low level of speaker's which was observed mostly in Raziye's speech in conversations with Nader. However, direct order as a face threatening act, was employed in a conflict situation by Nader, Raziye and Hojat indicating how norms of politeness are violated under the effect of contextual factors. The same is true about the conversations between Simin and Termeh; however, in the latter, the solidarity is more manifested than the role of power.

Moreover class raising devices (14 tokens) were often used to decrease the threat of a speech act by Nader in making requests and asking questions from Raziye and Hojat. Also, it was employed by Hojat in one situation while he was talking to Nader; which signaled the formality in relations and the social distance which called for being as polite as possible. Except the Judge and Termeh, the characters used a high tone of voice for showing emphasis, defense, or threat in their speech by each other (17 tokens).

It is worth mentioning that hesitations (4 tokens) in Raziye and Termeh's utterances while talking to Nader, Simin, and Judge show their lack of confidence in what they said to their more powerful addressees. They both made an excuse and

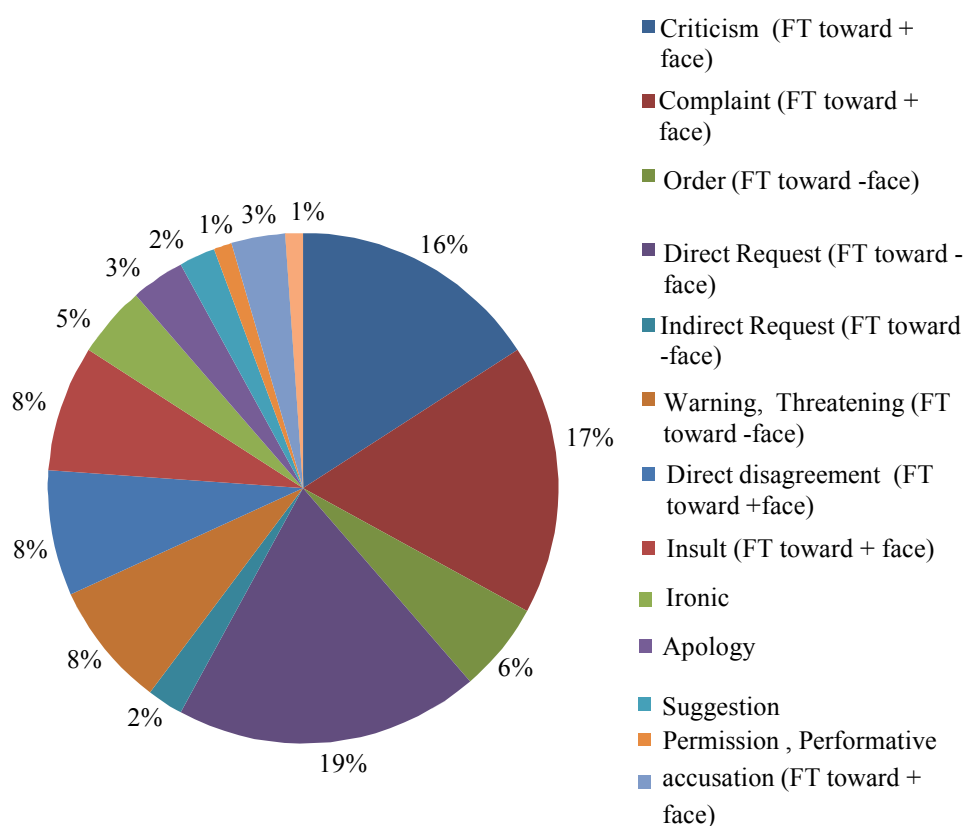
gave reasons to defend themselves. In addition, swearing (12 tokens) was observed in High frequency in Raziye's utterances which indicated either her distress, emphasis, or a defensiveness in a conversation she had with Nader, Judge, Hojat and Simin. The majority of speeches made by R showed how her situation in various contexts was one of absolute powerlessness.

The use of face saving strategies as well as mitigation was mostly observed in the categories of speech acts below. The tokens of speech act were classified into types which often were used in building a more complex hierarchical functional structure: apology (5), suggestion(?), and expression of distress (4), permission (4), making an excuse(3), reasoning (3), agreement (1), and inquiry (1). The total number of tokens in eight categories constituted 28 instances. In addition to the categories mentioned, their frequency of occurrence was measured based on an estimation of which characters uttered them to which addressees (Nader, Simin, Raziye, Hojat, Termeh, and the Judge).

**Table 2. Classification of the utterances of six main characters into different speech acts and strategies regarding who is addressing whom**

[illegible]

Usage of address forms which is related to who is addressing who under what contextual circumstances was mostly employed by Nader more than other characters. He used Intimate address terms in his speech with her daughter Termeh such as (Baba joon, Dokhtaram, Azizam) and honorific second person pronoun in front of Raziye, Hojat, Judge like (Khanoom, Agha, Haj Agha, Ishoon) and Non honorific address terms directed to Simin as his wife (To). The Judge also had a high frequency of the usage of address terms most of which were honorific second Person Pronouns in reference to all characters, like (Shoma, Ishoon, Khanoom, Aghaye Mohtaram, and Agha). Terme was also addressing her parents with a Non honorific second person pronoun (TO).

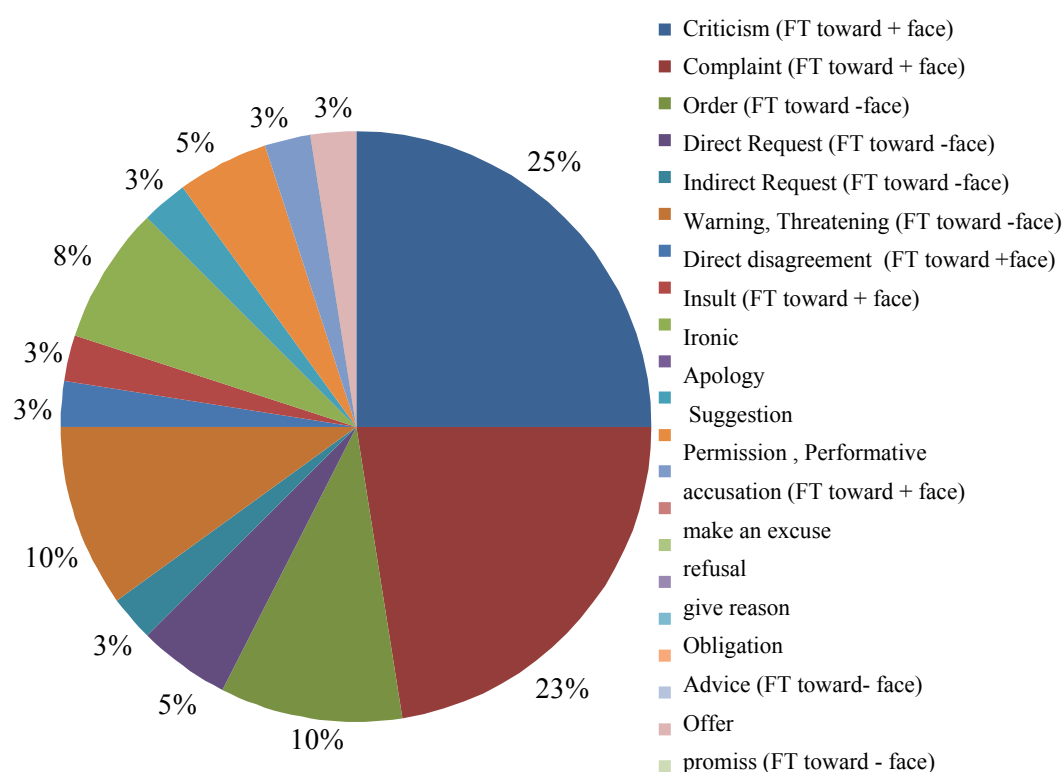


**Fig. 3. The percentage of the all speech acts in nader's utterances**

Fig. 3 shows the percentage of the all speech acts which were uttered by Nader in his utterances generally, regardless in what situation he was involved and to whom he conversed. Direct Request with the percentage of 19% was the most frequently used speech acts and complaint with the percentage of 17% and criticism

with the percentage of 16% were the second frequently used speech acts in Nader's utterances. Threatening, insult and direct disagreement with the percentage of 8%, also were in the third category in terms of ranking. Order with the percentage of 6% and ironic speech with 5% was in the next categories in rank. Other speech acts like apology, accusation, with the percentage of 3%, indirect request, suggestion with 2%, and permission and advice with 1% were the least frequently used speech acts in Nader's speech.

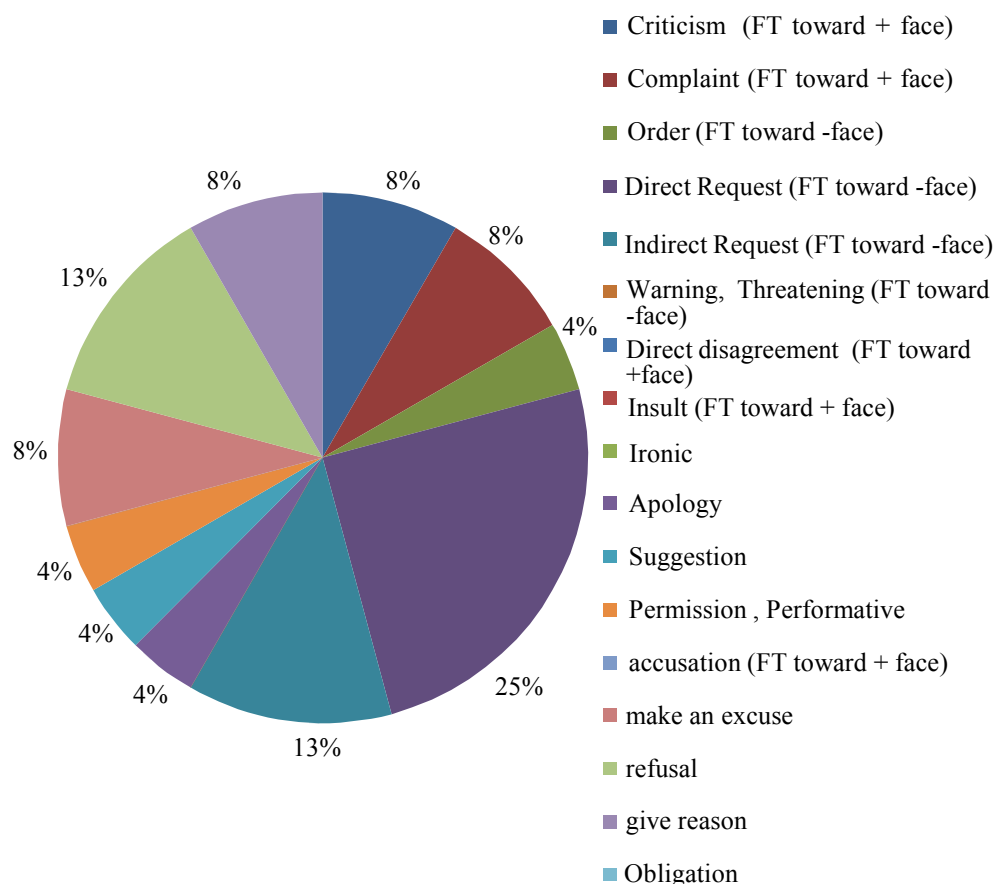
Fig. 4 shows the percentage of all speech acts which were uttered by Simin in her utterances generally, regardless in what situation and to whom she talked. Criticism with the percentage of 25% and complaint with the percentage of 23% were the most frequently used speech acts. The speech act of order and threatening with the percentage of 10% as well as ironical expressions with the percentage of 8% were the second frequently used speech acts in Simin's utterances. Permission and direct request with the percentage of 5% also were in the third categories in rank. Other speech acts like direct disagreement; insult, indirect request, accusation, and suggestion with the percentage of 3% were the least frequently used speech acts in Simin's utterances.



**Fig. 4. The percentage of the total speech acts in simin's utterances**

Fig. 5 is a character-based comparison which shows the percentage of the all speech acts which were uttered by Raziye in her utterances, regardless of the situations of speech and the addressee she interacted with. Direct request with using mitigation devices with the percentage of 25% was the most frequently used speech acts. What makes her requests different is the semantic formula her speech acts had. The use of mitigation, swearing, and voice tone could imply that the requester represents a powerless class of society. Indirect request and Refusal with the percentage of 13% were the second frequently used speech acts in Raziye's utterances. It is mainly with qualitative analysis that we as analysts could distinguish the effects of power and class on the speech act realization patterns.

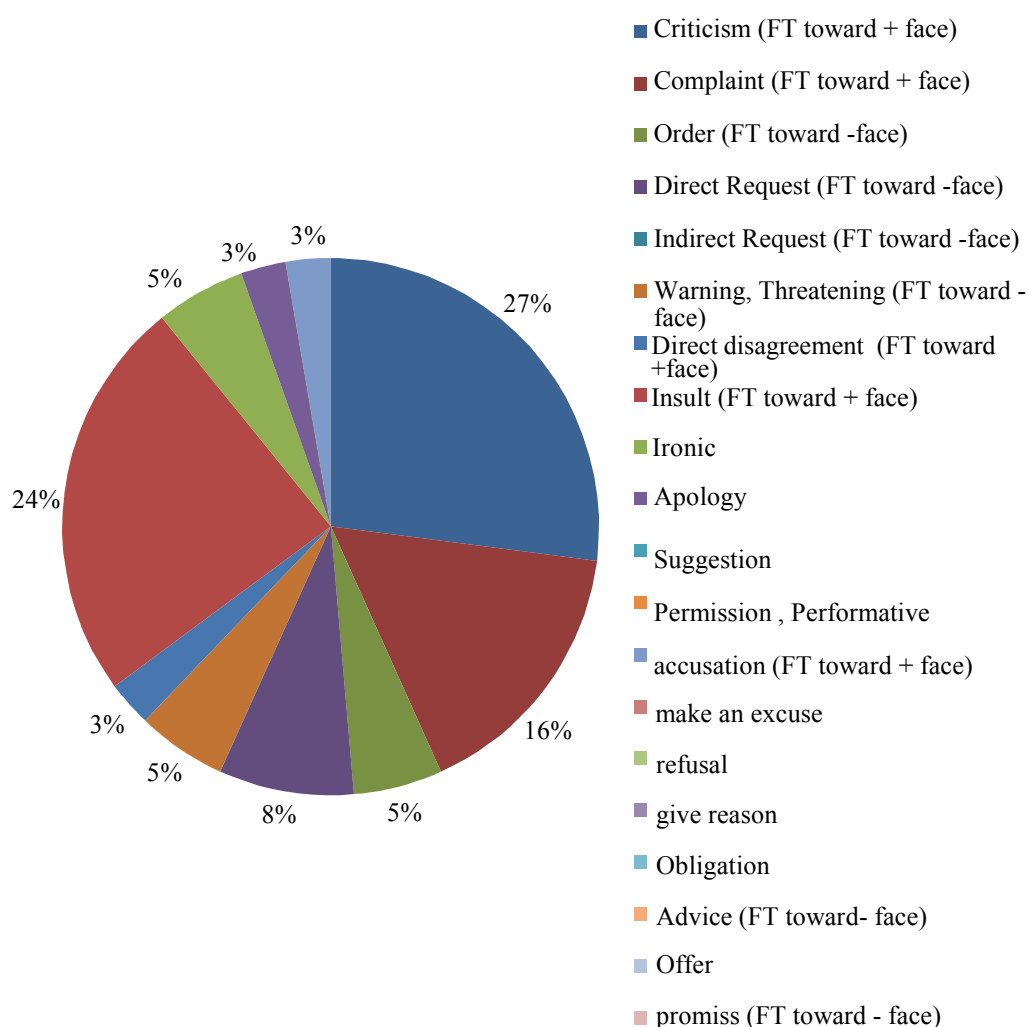
In the structure of the requestive speech act, the effect of power makes a considerable degree of difference; this is what we should take into consideration. Reasoning, criticism, complaint, making an excuse constituted 8% of the data. They were indirect responses to seriously formulated direct face threatening speech acts such as complaint, criticism, or accusation by a speaker much more powerful than her.



**Fig. 5. The percentage of the total speech acts in raziye's utterances**

The percentages of each speech act being 8% of the entire speech data indicate another fact: that the most frequent speech behavior by Raziye includes those speech acts which are more expressive rather than directive which is associated with power. The speech acts by Raziye included four types and these four types were the third in terms of frequency. Other speech acts like Direct Order, Apology, and Suggestion with the percentage of 4% were the least frequently used speech acts in Raziye's utterances.

Fig. 6 shows the percentage of speech acts by Hojat regardless of the contextual circumstances within which the SPAs were uttered. Criticism with the percentage of 27% and Insult with the percentage of 24% were the most frequently used speech acts. These two SPAs are clear indications that H belongs to a low working class of society. This is because most of his utterances include insults and criticism showing his class as manifested in his speech.

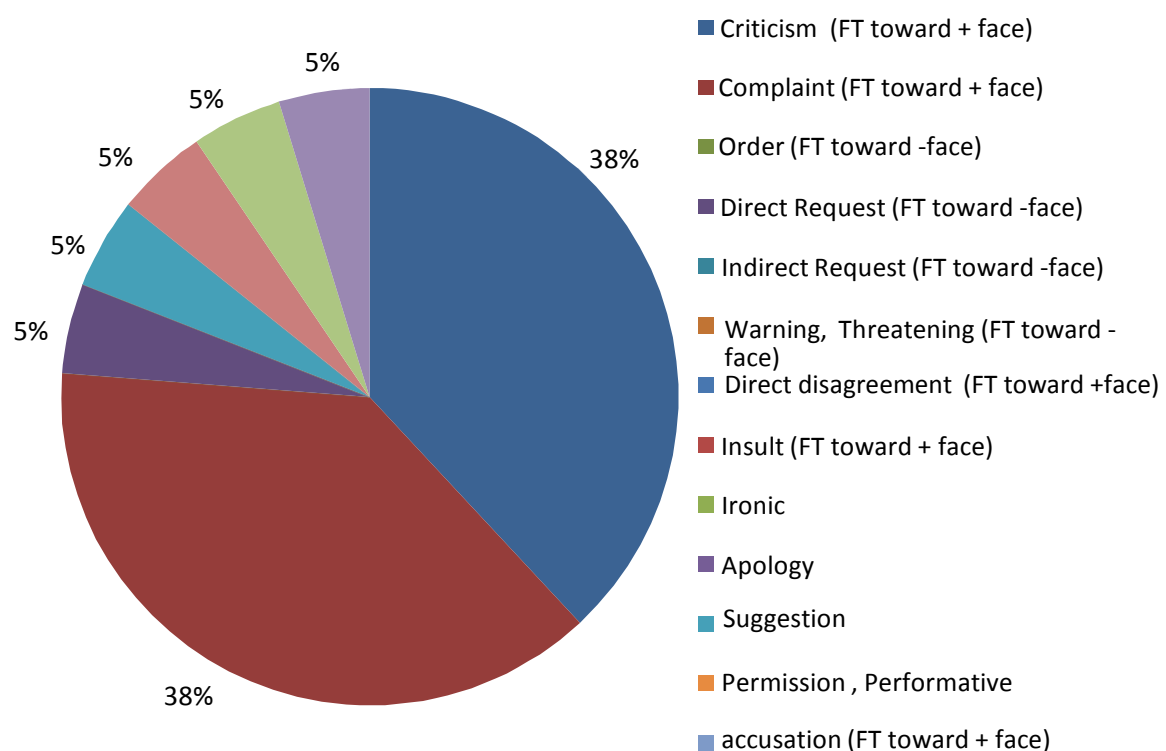


**Fig. 6. The percentage of the total speech acts in Hojat's utterances**



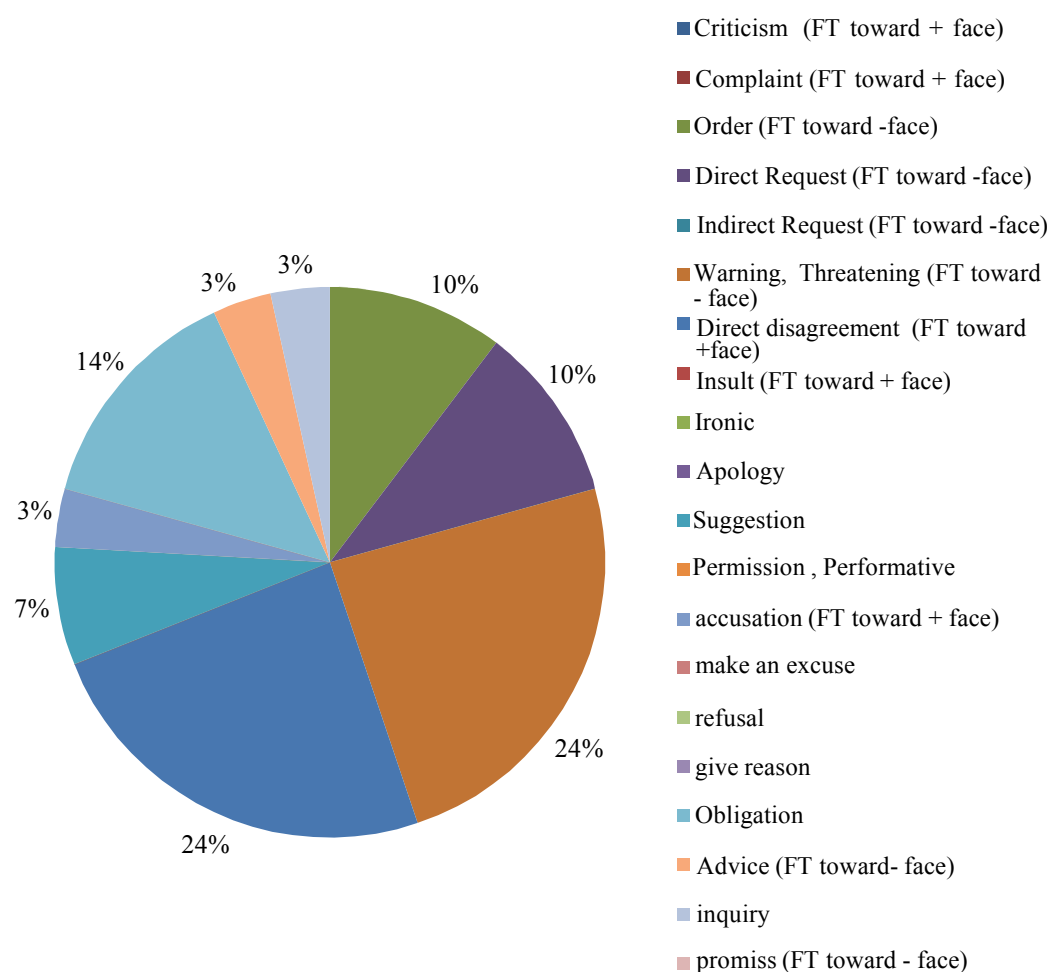
Complaint with the percentage of 16% were the second frequently used speech act in Hojat's utterances. Direct request with the percentage of 8%, threatening and ironically made comments functioning as SPAs with the percentage of 5%, also were in the third categories in rank. Other speech acts like accusation, apology, and direct disagreement each with a percentage of three were the least frequently used speech acts in Hojat 's speech. Again this finding shows how social class belonging can be predictive of how the speech acts are more, most, or less and least frequent. The central condition for belonging to a high-middle class is to utter messages and to sort out conflicts without resort to a violation of the norms of speech.

Fig. 7 shows the percentage of all speech acts which were uttered by Termeh in her utterances generally, regardless of speech situation and the addressee to whom she talked. Criticism and complaint with the percentage of 38% were the most frequently used speech acts. Direct request, suggestion, making an excuse, refusal, and giving reason with the percentage of 5% were the second frequently used speech acts in Termeh's utterances. Reasoning was used as reaction to a complaint by the judge viewed to be indirect apology for what she had not done.



**Fig. 7. The percentage of the total speech acts in termeh's utterances**

Fig. 8 shows the percentage of the speech acts which were uttered by the Judge in his utterances generally, regardless of what situation and to whom they were said. Threatening and direct disagreements with the percentage of 24% were the most frequently used speech acts and obligation with the percentage of 14% was the second frequently used speech acts in the Judge's utterances. Order and direct request with the percentage of 10% also were in third categories in rank. Suggestion with the percentage of 7% was in the next category in rank. Other speech acts like accusation, advice and inquiry each with the percentage of 3% were the least frequently used speech acts in the Judge's speech.



**Fig. 8. The percentage of the total speech acts in judge's utterances**

## 5. SUMMARY AND CONCLUSION

The issue of social variables and their effect on creating variation has been a recent and important aspect of speech. In speaking, one cannot assume to learn the language unless they learn how functional variations are marked in linguistic

communication. The Article started by introducing the effects of such social variables of power, class, and solidarity in relations between the speaker and the addressee within Brown and Levinson's politeness theory and Austin's speech acts theory. The relative nature of communication and the functional effect were elaborated on and definitions were presented for what power, class, and solidarity are and how they can cause variation in speech.

Recently in our time, the most advanced understanding of translation and TEFL places the significance of language learning on the skill of communicating appropriately rather than being good grammarians; and this work is an attempt in shedding light on the communicative aspect of speech. The question is, rather than being what language is, how language is used in various contexts and situations. The communicative language teaching places all the emphasis on the fact that if the EFL learner is competent linguistically but incompetent communicatively, the learner could not be considered to be an appropriate user of English in real various contexts. Functional theories as mentioned above were employed as the framework of study to uncover the causes behind the functional variation. The characters with various social backgrounds actually produced the data required for the purpose of our comparisons resulting in verifying the feasibility of the speech act theory as well as politeness theory as our functional approach.

The thrust was to examine how comparable are characters with regards to the contexts of situation they were involved in and how their speech acts were made: social power, solidarity in relations, and social class were the three variables each of which could bring about variation in speech. It was shown that certain speech acts are more frequent than others and this is the result of the contextual setting of conversations. The findings of such a project indicate how context decides which functional categories have to be prioritized and which speech acts are most frequently used. We also discovered that class variation, and variations as a result of power make Persian speech considerably variable. The effect of social class was demonstrated mostly in the qualitative analysis in two ways: a) the deliberate neglect of the social norms governing speech and b) the quality of speech through using mitigation, swearing, honorific devices for class raising strategies, and choice of strategy for saving face in speech acts which are potentially face threatening. As for social solidarity, we discovered that social solidarity is variable as a result of any change in contextual factors other than change of interlocutors. It was also

discovered that increase of power and solidarity lead to decrease of politeness. However, increase of class leads to increase the level of politeness in Persian.

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### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## ***The Importance of Global Citizenship to Higher Education: The Role of Short-Term Study Abroad***

### **ABSTRACT**

An increasing number of institutions actively promote internationalisation as a key strategy, implying that the development of a "global citizenry" is an integral part of their educational mission. To fulfil this strategy, four constructs must be addressed: (1) what is global citizenship? (2) why is global citizenship important? (3) how do we measure global citizenship? and (4) how do we foster global citizenship? (1) Although global citizenship is a highly contested and multifaceted term, three key dimensions are commonly accepted: social responsibility, global awareness, and civic engagement. (2) Today's graduates are critically dependent on an interconnected world, and universities have a responsibility to promote global mindedness, to provide greater employment opportunities for their graduates, and to respond to political calls for enhanced national security. (3) There is a consensus that the natural and built environment is the context in which global citizenship can be best understood. Utilizing the three previously consented upon tenets of global citizenship, Tarrant (2010) developed a Value-Belief-Norm model to assess global citizenship. (4) A number of nations are utilizing international education as an en masse mechanism for nurturing global citizenship. However, the "just do it" model may be ineffective. Conversely, short-term courses, coupled with action-oriented experiences that encourage reflection, critical analysis, and synthesis may be effective catalysts. Since short-term programs are likely to remain the only realistic option for many



undergraduate students, there is a growing need to document whether short-term courses can promote higher-order outcomes and, if so under what conditions.

**Keywords:** critical reflection; transformative learning; experiential education; internationalization; globalization.

## 1. INTRODUCTION

Institutions of higher education arguably have a responsibility to develop curricula that foster "global citizens", either as a consequence of their educational mission, in response to political calls for enhanced national security and global awareness, or in strengthening the employability of their graduates within an ever-globalizing context. To fulfil this strategy, four constructs must be addressed: (1) what is global citizenship? (2) why is global citizenship important? (3) how do we measure global citizenship? and (4) how is global citizenship fostered? In addition to discussing these questions, commentary will focus on the pivotal role short-term study abroad programs can play in fostering global citizenship.

## 2. WHAT IS GLOBAL CITIZENSHIP?

Although global citizenship is a highly contested and multifaceted term [1,2], three key dimensions, at least within the study abroad literature, are now commonly accepted [3,4]: (1) social responsibility (concern for others, for society at large, and for the environment), (2) global awareness (understanding and appreciation of one's self in the world and of world issues), and (3) civic engagement (active engagement with local, regional, national and global community issues). In one of the most thorough reviews of the global citizenship concept in the study abroad scholarly field, Schattle [4] proposes that it "entails being aware of responsibilities beyond one's immediate communities and making decisions to change habits and behavior patterns accordingly" (p. 12).

Outside the study abroad literature, there is consensus that the natural and built environment is the context in which global citizenship can be best understood [5-8], since environmental concern not only benefits others beyond the individual, but also invokes a sense of obligation toward others. According to Dobson [7], the environment constitutes a community of obligation in which social responsibilities and behaviors extend, in the form of an ecological footprint. In distinguishing between a Good Samaritan (i.e., based on charity) and a Good (Earth) Citizen (i.e., based on

obligations), Dobson argues "the idea of the ecological footprint converts relationships we had thought to be Samaritan into relationships of citizenship" (p. 105). Citizens, then, are not merely global by reason of their international travel, but as a result of their pro-environmental behaviors that make a sustainable impact. Similarly, Attfield [5] suggests, "environmental responsibilities form the most obvious focus of concern for global citizens, as well as the territory where global obligations most clearly arise" (p. 191). In a similar vein, Winn [8] considers the concept of global citizenship to include "behaviors associated with the global issues of environmentalism, social justice, and civic participation" (p. 124). With the ever increasing role of higher education institutions in the development of global citizens, a specific emphasis on internationally located educative experiences, coupled with critical reflection methods, and ultimately framed by relevant disciplines, the behaviors and actions of globally educated citizens can and should be developed. Moreover, it is the students' exploration and application of pro-environmental behaviors within the natural environment, the built environment, and the communities they engage.

### **3. WHY IS GLOBAL CITIZENSHIP IMPORTANT?**

Universities and colleges arguably have a responsibility to develop international curricula that foster a student citizenry with stronger global awareness, either as a consequence of their educational mission [1,4,9-11], in response to political calls for enhanced national security [12-14], in providing greater employment opportunities for their graduates [15], or simply in heeding the public's growing interest in the importance of promoting global mindedness among future generations [16]. Responding to these realities requires a massive increase in the global literacy of the typical college graduate.

The intensification of and access to technology has forged links between institutions, societies, cultures and individuals, and today's university graduates live and work in a world that is more accessible than ever before [17]. While the availability of modern travel and technology is not accessible to all of earth's 7 billion 'citizens', those who have access and acceptance into higher education institutions also have greater opportunities for globalized experiences. The opportunity for a student to frame their existence within a global context can promote deeper understanding of cultural differences and provide a counterpoint for juxtaposing their personal beliefs with those of others. Internationalization and globalization are

fundamental components of the learning process; to live and reflect upon the experiences a student has with these phenomena can increase action and bring about transformation of perspective.

#### **4. HOW IS GLOBAL CITIZENSHIP FOSTERED?**

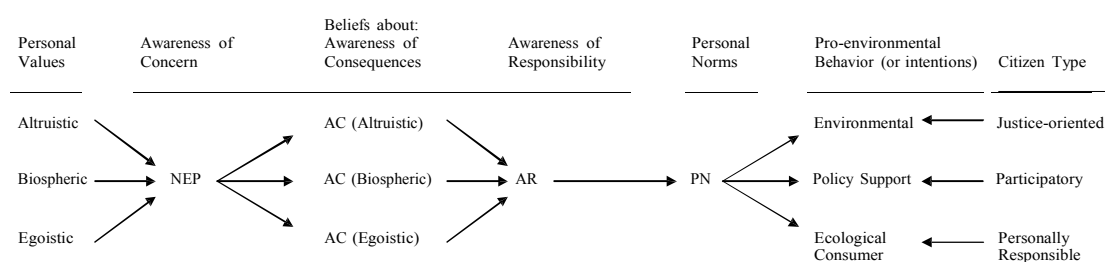
There is growing political interest in international education and increasing reference to globalization (and the need to prepare students as global citizens) in the missions of academic institutions [10]. Lutterman-Aguilar and Gingerich [18] argue that education abroad can effectively prepare students as responsible global citizens if programs incorporate the principles of experiential education, notably action-oriented experiences that encourage reflection, critical analysis, and synthesis. Similar conclusions are drawn by McLaughlin and Johnson [19], who propose a field-based experiential learning model for short-term study abroad programs. This model enables students to move beyond knowledge learning to application and integration, toward a real, "unbuffered" world. Indeed, there is strong evidence throughout the study abroad literature supporting the integration of experiential learning as a key medium for promoting higher-order learning [20-28].

The outcomes of study abroad experiences, students' previous experiences with the course material, the destination, and travel in general can have an influence on the potential shift in a student's worldview. McKeown [29] recognized the profound change in students' values when experiencing a new social environment that called into question their internal beliefs [30] and referred to this as the first-time effect. This phenomenon has also been recognized in other learning environments where experientially based pedagogy (service-learning, problem-based learning) has been utilized and experienced for the first-time [31,32]. Valuable to the student experience, their engagement, and the likelihood of a shift in worldview are the following: faculty-student engagement, experiential learning opportunities, dialogue and group discussions focused on students' experiences, and reflection assignments connected to experiences and readings [33]. Within study abroad experiences, exposure to new places, cultures, and learning environments where a student's preconceived and established notions and beliefs are tested, may act as the catalyst or impetus to bring forth a transformative experience. Of particular importance is the creation of moments of critical reflection and discussion. In these types of environments, exposed to realities that are outside their previous understanding or comfort zones,

the learner may discover a need to acquire new perspectives in order to gain a more complete and complex understanding. A deeper, more sincere understanding of reality and how their perception of reality is framed by their worldview, is the value in combining experiences with critical analysis, reflection, and abstract conceptualization [34].

## 5. HOW IS GLOBAL CITIZENSHIP MEASURED?

There is a consensus that the natural and built environment is the context in which global citizenship can be best understood. Utilizing this context, Tarrant [30] developed a Value-Belief-Norm model to assess global citizenship and the "added value" of study abroad (Fig. 1). In Tarrant's [30] conceptualization of a framework for exploring the role of studies abroad education and global citizenship development, he posited a frame based on Stern's [35] Values-Beliefs-Norm theory (VBN). In this, Tarrant identifies two components based on (1) an awareness/belief that specific environmental conditions threaten or have adverse consequences for the things the learner values and (2) an awareness/belief that the individual/learner can act to reduce the specific threat(s) [30,35]. These components and the extent to which an individual learner aligns with these two beliefs are critical to the conceptual framework Tarrant puts forth.



**Fig. 1. Adapted value-beliefs-norms theory of global citizenship [30]**

The recognition of critical reflection as an integral component of the conceptual framework offered by Tarrant [30] is evident in Westheimer and Kahne's [36] "citizen-type" and Dobson's [7] "Earth Citizen". For example, Westheimer and Kahne [36] argue that a justice-oriented citizen is one who is concerned with asking questions about issues she or he sees in their community (local and global) and then acting upon the answers they find. This is in sharp contrast to a personally responsible

citizen who is typically concerned with acting responsibly or volunteering in times of crisis. Interestingly, it seems that a clear difference between these two citizen types is found in the citizen's concern with or interest in critical reflection upon their observations and experiences. Justice-oriented citizens seem to be more concerned with asking the more complex questions versus accepting the simpler answers. By asking more complex questions, it is assumed that justice-oriented citizens are analyzing, considering, and reconsidering their perspectives and beliefs in light of new information and experiences. This is primarily a function of critical thinking and reflection. That is, being prepared to ask and answer the complex questions that emerge from our continually evolving and complex society [28]. Doing this may promote and nurture "change in environmentally oriented values, norms, and behaviors" [30]. This observation is demonstrated further by Dobson's view of an Earth Citizen. With an Earth Citizen there tends to be less emphasis on volunteerism as ends unto itself, and a greater emphasis placed on questioning what is observed or has come to be known and then this is acted upon in order to ameliorate the causes of observed injustices. Overall, the conceptual framework "proposes that values and worldviews act as filters for new information in the development and formation of congruent beliefs and attitudes which in turn predispose behavioral intentions and ultimately pro-environmental behaviors" [30].

The two components Tarrant identified (the connection between environmental conditions and the threats on a learner's values and the belief that the learner can reduce the threats), which underpin Fig. 1, have a common denominator. That denominator is a learner's values and what they are willing to do about those values. The measurement of value identification or awareness is a complex, but important endeavor. One particular theory that has been operationalized and empirically tested to measure a person's values is the Schwartz norm-activation theory. Norm-activation theory states that "pro-environmental actions occur in response to personal moral norms about such actions and that these are activated in individuals who believe that environmental conditions pose threats to other people, other species, or the biosphere and that actions they initiate could avert those consequences" [37]. One salient, empirical study measured the values associated with social movements particularly in context of pro-environmental actions. In the Stern et al. [37] study, which was designed to measure two variables from Schwartz's norm-activation theory (personal norms and awareness of consequences), resulted in findings that were

strongly consistent with the VBN theory. Essentially, it was determined that personal norms were strongly associated with the behaviors of all three types of nonactivist environmentalism, provided the strongest predictor of consumer behavior and willingness to sacrifice, and was the only variable in their study to have a direct effect on all three types of movement support.

A limitation of Tarrant's model is that it directly focuses on environmental awareness and does not directly address the concepts of social justice or civic engagement, i.e., the key dimensions of global citizenship [3,4]. Although, it should be noted that in Tarrant's conceptual framework, there is indirect or ancillary inclusion of personal values and awareness of responsibility (civic engagement) and the citizen type (social justice orientation) an individual could align. Even though Tarrant clearly is addressing the conceptualization of "pro-environmental behavior" from an environmental perspective, it is inextricably connected to other important elements to be considered when attempting to understanding global citizenship. In addition, the use of Schwartz's norm-activation theory to operationalize and measure global citizenship is an important avenue to consider.

## **6. WHAT ROLE CAN SHORT-TERM STUDY ABROAD PROGRAMS PLAY?**

The past 25 years have witnessed growing numbers of students, particularly in the United States (U.S.), participating in study abroad programs of varying durations, locations, and academic foci. These growing numbers, contextualized and sourced from the U.S. higher education student body, have led to the literature being skewed in context of the U.S. This particular growth and respective body of literature ultimately reflects a U.S. centric perspective on research into the influence of short-term study abroad. This is due to the limited number of empirical studies investigating non-U.S. students studying abroad Curthoys [38]. With this, Europe and Australasia could be considered emerging markets for future generations of students beginning to study abroad. Further investigation into these emerging markets and the influence of study abroad on participants is necessary.

In the U.S., most recent estimates indicate that of the approximately 270,000 U.S. students who studied abroad for academic credit in 2009/10 (compared to 75,000 students in 1990), the majority (57%) were short-term (summer or 8 weeks or less) [39]. While short-term programs have been criticized for being academically light [29], they appeal to large numbers of undergraduates without prior international

travel experience and/or who lack the funds or time for extensive education abroad opportunities [40-43]. Short-term programs thereby may provide a springboard for future, more in-depth travel [44], a pathway for those studying abroad for the first-time [29], and perhaps "the only realistic alternative in terms of the demands of your degree studies and economic resources" [39]. As such, short-term programs may be viewed as crucial for achieving broad and more egalitarian access to study abroad for U.S. undergraduates.

Skepticism has been voiced about whether the short-term study abroad format can offer students a sufficiently profound experience to transform the fundamental values and beliefs that underlie global citizenship. Recent evidence suggests that the duration of the international experience may be only weakly related to student learning outcomes. The large scale Georgia Learning Outcomes of Students Studying Abroad Initiative (GLOSSARI) [45] found a general advantage for study abroad at any duration over no study abroad in terms of graduation rates, although moderate duration (4-8 weeks) exceeded both shorter and longer programs on this variable. In their study of over 6,000 alumni from 20 institutions, Paige et al. [3] suggests no difference in global engagement between students who had studied abroad for shorter versus longer durations. Their findings from the University of Minnesota's Study Abroad for Global Engagement project revealed that students in short-term programs (of 4 weeks or less) were just as likely to be globally engaged as those who studied abroad for several months or longer. Similarly, McKeown [29] posited that, "students who had been abroad for as little as two weeks showed patterns of intellectual development more similar to peers who had been abroad for months or years than to those who had not been abroad at all" (p. 6). The conclusion is that spending at least some time abroad is probably better than no time at all, though the extent to which the "just do it" analogy [46] holds true for study abroad (i.e., relative to home campus) remains relatively unsubstantiated [29,47]. Meaning, whether studying abroad for a short, moderate, or long-term period, there needs to be some level of consideration for appropriate measures to be implemented that will help students make connections from and sense of their new experiences.

Short-term study abroad, when coupled with an adequate pedagogical framework, could serve as an educative opportunity for fostering transformative learning environments where new experiences and perspective may be developed. It is that critical moment where learners have engaged with something novel, whether



it is physical or psychological, that is when reflection and critical reflection become imperative to the learning process. The shift from physical experience to meaning making can be different, but it is imperative for perspective transformation and ultimately behavior adaptation to occur. Though it should be noted that prior to the exposure to something novel, abstract conceptualization can have occurred. Meaning, preparation and study for future experiences related to a student's involvement in a course is also valuable to their learning. These connections between experience and reflection, content and experience, and reflection and content are ones that have long been theoretically [14,34,48] and practically [31] established.

## **7. DISCUSSION AND DIRECTION**

Over the past decade there have been increasing calls to develop the capacity of higher education students, particularly in the U.S., to think and act globally [11]. One method of encouraging the civic of global citizenship is through study abroad [30]. To date, the academic response to calls for greater global learning has focused primarily on increasing quantity (i.e., "just do it"). The number of students participating in education abroad is often the primary indicator of an institution's success in achieving globalization aims [44, 49]. Clearly, a major driver of such efforts should also address quality - the added value and outcomes of studying abroad as indexed by measures more informative than traditional course evaluation responses. As resources become available for study abroad development, funds should be targeted toward programs that promote demonstrable and specific learning outcomes.

Short-term, faculty-led, field-based programs can have an important role in fostering some of the outcomes considered critical to national security, globalization and global competitiveness, and social norms [11,50]. Though not all education programs should be similarly structured, we concur with Lutterman-Aguilar and Gingerich [18] that, "study abroad and experiential education are natural partners because they share the common goal of empowering students and preparing them to become responsible global citizens" (p. 46). Accordingly, we encourage faculty to incorporate field-based learning experiences into study abroad curricula and to consider their role as facilitators of citizen activism [1], promoting opportunities for civic engagement, responsibility, and global awareness. The challenge, clearly, is to develop programs in a measured and effective way. Such programs must be attractive to students (especially for those traveling abroad for the first-time), yet must



not turn the travel experience into a token service program of consumerism with little value beyond the tourism dollars it generates [2,51]. Since short-term programs are likely to remain the only realistic option for many undergraduate students and potentially the least expensive medium for democratizing study abroad, achieving such strategies will be critical. In moving toward more robust evidence of the value of education abroad, particularly with respect to globalization, we need to design research that can clearly demonstrate whether studying abroad (relative to home campus) can promote higher-order outcomes (such as global citizenship) and, if so, under what conditions.

Essentially, the literature to date is primarily focused on U.S. students studying abroad [38]. Comparative groups of students are needed to determine the influence study abroad experiences might have on non-U.S. counterparts who are from different geographical and cultural backgrounds. Moreover, this lack of research can be attributed to the emerging market and associated pedagogy of study abroad and international education in countries like New Zealand, Australia, and the United Kingdom.

## **8. CONCLUSIONS**

There is a consensus that the natural and built environment is the context in which global citizenship can be best understood. Utilizing this context, Tarrant [30] developed a Value-Belief-Norm model to assess global citizenship and the "added value" of study abroad. A number of nations, including the U.S., have witnessed growing political pressure to utilize international education as an en masse mechanism for nurturing global citizenship. However, the extent to which the "just do it" analogy holds true for study abroad remains relatively unsubstantiated. Education abroad can effectively prepare students as responsible global citizens, but only if coupled with action-oriented experiences that encourage reflection, critical analysis, and synthesis. Since short-term programs are likely to remain the only realistic option for many undergraduate students, there is a growing requisite to document whether short duration programs can promote higher-order outcomes (such as global citizenship) and, if so, under what conditions. In particular, there is a lack of demonstrable evidence of the transformational change attributable to participation in field-based/experiential study abroad programs, relative to (a) other study abroad programs lacking a structured experiential component and/or (b) home campus (i.e.,

traditional classroom) courses and/or (c) comparisons of the experiences and learning outcomes of students from different countries and cultures.

Although global citizenship is a highly contested and multifaceted term, three key dimensions are commonly accepted: social responsibility, global awareness, and civic engagement. This particular observation lends itself well to the perspective that global citizenship, at its core, is focused on connections - a person's connections with the products they choose to use, the environment they believe they influence, and the groups of people who they directly and indirectly associate with. Whether or not those connections (with products, environments, and people) are recognized and reflected upon is what fundamentally separates those who consciously assume their role as a global citizen from those who do not.

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### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## ***A Framework of Multimedia Integration Based on Teacher's Perspectives***

### **ABSTRACT**

**Aims:** Teacher's role in multimedia integration is not only a user but also a designer and producer, by which teachers can manipulate more appropriate multimedia aids and fulfill teacher's essential needs. In order for a teacher to promote the efficiency and effectiveness of the technology integration in classroom, this study explores the entire process of teacher designer to integrate multimedia materials and induce a framework based on teacher's position so as to help designers in their integration of multimedia materials.

**Study Design:** This study is based on the criterion of a qualitative approach.

**Place and Duration of Study:** Kindergartens in Taichung City, between May 2012 and February 2013.

**Methodology:** In total, ten kindergartens, twenty-five classrooms, and thirty-two qualified preschool teachers were involved in this study. The selection of the interviewees and the observation classrooms were based on recommendations by the school principals who were more familiar with their own situation in technology integration.

**Results:** In the end of this paper, we construct a framework of multimedia integration consisting of five main procedures to illustrate how teacher designers are to proceed their journey of integration. This framework provides a proper guide to teachers who want to integrate multimedia teaching aids in their classroom teaching.

**Conclusion:** Through the application of this model we expect that teachers can easily design the digital teaching aids which are fit for their real needs and allow teachers' teaching to be more efficient and effective.

**Keywords:** computer integration; teacher's perspective; multimedia; multimedia integration.

## **1. INTRODUCTION**

The highly developing of computer technology allows multimedia information to be presented variously and vividly, and the speedy connection of internet allows people to gain information easily and swiftly. Thus, the application of multimedia technology in classroom is very pervasive and is integrated into different levels of education in classroom teaching. The definition of multimedia is a function of computer system which transmits visual and aural information to user interactively [1]. The idea of integration of multimedia in teaching is to connect different multimedia elements, such as text, image, audio, animation, and video, to create digital teaching materials and to apply it in classroom teaching, which intends to improve the quality of teachers' teaching and students' learning [2]. Many researchers claimed that applying multimedia materials can create many positive effects in classroom teaching. For example, there are researchers indicating that the integration of computer technology helps teachers to build a more visualized and more interactive learning environment in their classroom teaching [3]. Researchers also alerted that various products of computer technology are very powerful teaching tool adopted to achieve powerful interactive teaching, which increases learner's interest and help them to engage intensely in their learning objects [2,4]. Many researches also indicated that the application of computer technology has great potential to increase students' motivation, help learners to connect various information sources, provide opportunities to work collaboratively, and allow teachers to have more time for facilitation in classroom [5,6,7]. As [8] declared, one of the advantages of integrating multimedia is that it allows students to assess the teaching content easily and helps them learn to be more effective.

However, some researchers declared that digital media materials have no direct effect on students' learning achievement [9,10]. According to [11] theory of cognitive load, he declared that human's learning in brain is just like a data processing machine, and the learning achievement is based on how people process and arrange the information. Based on this theory, [12] developed multimedia cognitive learning theory and advocated theories of how multimedia elements influence student's learning effect. They declared that too many multimedia materials or inappropriate arrangement in teaching may cause negative influence on student's learning achievement [13].



Therefore, the integration of multimedia in teaching does not simply focus on how many digital materials are involved in the curriculum but how proper the materials are used. The volume of using multimedia is not the main concern. What we really need to focus on is how to utilize this strong tool to create positive effect in teaching and learning [14,15].

In order to promote the efficiency and effectiveness of the technology integration in classroom, numerous frameworks are constructed to help teachers to involve computer technology in curriculum ably and efficiently [16,17,15]. However, researchers and educators indicated that integrating computer technology into curriculums has not been accomplished well yet. Researchers indicated that teachers have not really integrated digital technology into their classroom teaching but only into their personal documentary work. These developed frameworks or models are too theoretical and idealistic in reality [15] and do not consider the angle of teacher user and teacher designer normally [18]. Even if teachers can understand some principles, design concepts, and standards, they often forgo these principles and frameworks in actual teaching implementation. Therefore, researchers suggest that digital technology integration must take into account of teachers' specific habits of applying technology [19,20,21].

Furthermore, due to the heavy load of teachers' daily routine work, teachers used to adopt the published multimedia materials for assisting their teaching, such as instructional CD-ROM, DVD, or internet platform. However, these published digital materials do not fit teachers' essential needs normally. Teachers only can adopt only limited useful parts of the published materials and strive to reorganize the content. Therefore, the current packages of digital teaching aid do exist with a great gap between teacher's actual need in teaching. On the other hand, it is quite time-consuming for teachers to find appropriate multimedia teaching aids. These have brought tremendous obstacles for teachers in multimedia integration.

To solve these problems, teacher's role should be transformed from user to both designer and creator. Due to the pervasive use of computer technology, teacher's competency of using computer technology has been improved tremendously, and increasing numbers of teachers can operate and design multimedia materials. If teachers can arrange and produce multimedia teaching aids by themselves, the integration of multimedia in classroom teaching will be more effective and efficient and close to teachers' actual needs. However, from being a user of digital

material to being a designer does exist a gap and prove long way to go. For this reason, this study tends to explore the entire process of how teacher designer integrates multimedia materials in classroom teaching and to induce a framework based on teacher's position to help his/her integrating multimedia in their teaching. Therefore, the research question of this study is to investigate what a teacher may experience in the entire process of integration and to clarify various kinds of consideration, difficulty, possible problems, and solution which a teacher designer may meet in his/her integration.

## **2. MATERIALS AND METHODS**

The research method in this study was based on the criterion of a qualitative approach. Teachers' views of how they integrate computer technology and the entire process of how they integrate multimedia material were investigated. Both approaches of in-depth interviews with teachers and observations of the real classroom teaching were adopted. A semi-structured interview technique was adopted as our research interview method was due to the main topics being fixed, although the sequence of our interview question was not necessarily the same for all interviewees, as shown in appendix. All interviews were audio-recorded and the transcriptions were completed on the same day. The classroom observation was implemented with note taking and video recording concurrently by the researcher.

Instead of random sampling, purposive sampling was adopted in this investigation [22, 23]. Through contacting and visiting numerous kindergartens which are well known for integrating multimedia materials in their curriculum in Taichung City in the middle of Taiwan, researchers selected the research participants who were more willing and appropriate for this study. In total, ten kindergartens, twenty-five classrooms, and thirty-two qualified preschool teachers were involved in this study. The selection of the interviewees and the observation classrooms were based on recommendations by the school principals who were more familiar with their own situation in technology integration. The period of each classroom observation was at least five days and was supplemented by referring to the teacher's lesson plans. The number of participants was decided by saturation of the researched data, that is, when the informants could raise no more new issues and start to repeat the same issues as compared with previous interviewees or classroom observation, it may be valueless to collect more data.

Through a series of qualitative analysis steps, the researcher analyzed the collected data systematically from the raw data corpora, generated codes, and built some initial low level concepts; thus gradually we developed some more abstract themes, and then substantive theories were constructed in the final stage [24]. The qualitative analysis of the data helped us to refine and deduce how kindergarten teachers integrate computer technology into classroom teaching, and how they apply multimedia materials to designing digital teaching aids for classroom teaching. These results provided the researcher with various themes and codes to help constructing a substantial model for teachers in their integration of multimedia.

### **3. RESULT AND DISCUSSION**

This study is based on the empirical investigation of teacher's actual use of multimedia in their classroom teaching. This research deeply looks into teacher's considerations, challenges, and struggles when they integrate multimedia into their classroom teaching. The process of designing and making digital multimedia materials was also explored. Through the inductive analysis of the qualitative data, the researcher concludes a framework with 5 procedures for teachers in their integration of multimedia, as shown in Table 1. The sequent procedures are: preparation and analysis, plan and design, detail manufacture, test and modification, implementation and reflection. Every procedure has consideration in detail. The sequence of the identified procedures has a logic connection with the former and latter procedures. These identified stages start from the macroscopic self-analysis to the intermediate arrangement, to the microcosmic practical manufacture, and back to the amendment, and finally to the macroscopic amendment and reflection from user and learner.

#### **3.1 Preparation and Analysis**

In the first stage of the procedure, the researcher concludes that teachers have to do self-evaluation including teacher's internal factors and external factors from teacher's environmental reason. This stage strongly influences whether teachers will actively or passively integrate multimedia into their classroom teaching. If teachers' perspectives of using multimedia in this stage are pessimistic, they tend to decide not to use multimedia as their teaching materials. This stage is much closer to teachers' self-analysis of their motivation of adopting or using multimedia. The

influenced factors can be divided into two parts: the internal self-analysis and the evaluation of external environments. The former includes teachers' perspective and attitude of adopting multimedia in teaching, teachers' confidence and competency of using multimedia, teachers' will or motivation to spend time and effort on it. One teacher with a positive perspective declared that:

*In fact, I am very interested in multimedia stuffs. When we turn on the computer, it is full of multimedia information. These are very useful materials, and I believe it can bring very positive effect in classroom teaching. According to my observations, students seem to have very good responses to multimedia teaching aids. Personally I am very willing to use or make multimedia teaching materials (T16).*

The other teacher with a negative opinion declared that:

*I think young children should reduce the stimulations from digital multimedia. They are surrounded by different kinds of digital materials and overused them. I feel it is too early for them to contact digital materials and so on. Habitually I don't use digital multimedia in my classroom teaching because I don't think it can bring any help in my teaching and students' learning (T6).*

Furthermore, many teachers believed that their computer competencies were not sufficient and lacked of knowledge and experiences of using digital multimedia so that they might feel anxious for using multimedia. The other consideration was the time consuming. Many teachers claimed that to adopt multimedia materials needs to spend more time in organizing and editing digital materials. To sum up, the above considerations, many teachers do tend to give up using multimedia in their classroom. One of the teachers commented that:

*At the time when we were students, multimedia technologies did not exist yet. These new stuffs are what only the young generation can use. To be honest, we cannot use them at all except the easy one, for example, Power Point. Our working load in everyday's routine work is already very heavy. To spend more time learning and making multimedia materials for classroom use is not practical and realistic (T14).*

Thus, teachers have to experience this internal self-evaluation procedure in the initial stage. They have to overcome their negative perspectives to multimedia and increase their willingness to use it in their curriculum. As researchers have

reported, a teacher's computer attitude or computer self-efficacy will decide whether the teacher will adopt computer technology in the teaching [25,26,27,28].

Except teacher's internal factor, there are still many essential external factors which may affect teacher's use of multimedia and which need to be analyzed and examined in the initial stage. Through the analysis of teachers' perspectives in this point, the researcher concluded five external factors which might influence teachers' decision of applying multimedia materials. Those are support from school ideology and policy, school equipment of computer software and hardware, support from school manager (principal or director), technique aid and consultation, and peer review and support. Teachers advocated that once these external factors are supported, they may willingly integrate multimedia into their classroom teaching.

*In my school, the policy is to encourage teachers to use and make multimedia materials. The principal has proposed this idea a lot. She thinks it is a future tendency to be digitalized for teaching. Every Wednesday's routine meeting she arranged some teachers who often used multimedia for teaching to teach and share how they have worked in integrating multimedia. I think the equipment for using digital multimedia in my classroom is quite sufficient. Each classroom has a computer and a projector... Actually I will not use multimedia materials in my teaching if our school doesn't support these essential facilitators. Due to the request and advocacy from the school supervisor, we have no option but just follow this order without hesitation to integrate multimedia in teaching (T21).*

*I think the implementation of adopting multimedia for teachers' classroom teaching was mainly influenced by the school adviser or principal's recognition and advocacy. Teachers normally will not do this work actively. In fact, they are required by their supervisor to use it; for example, teachers are asked to make student's digital portfolio. Every student will have one CD or DVD disk with multimedia elements on it. They have no choice but just have to complete this job (T18).*

Researchers claimed that school leader has great influence on teacher's use of computer technology [29]. Researchers also alerted that school-related policies, equipment support, and teacher professional training of multimedia technology have played an essential role for teachers to integrate multimedia in their classroom teaching [30]. Their research also reveals that school policies are often underdeveloped and underutilized in developing teacher's use of technology in classroom.

Therefore, to be a multimedia user and designer, teachers have to implement self-analysis of their perspective and confidence of applying multimedia in teaching and extinguish whether their external environment has sufficient support. If these considerations were not to reach certain level, teachers might not go forward to the next procedure of integration. If teachers are lack of confidence in involving new technology for teaching after the above considerations, most of the teachers may decide to neglect or abandon this new tool [14].

### 3.2 Plan and Design

When a teacher's internal and external motivation are satisfied, the teacher designer may have the motive force to move on further. Once teachers have entered the process of planning and designing, there are several points which the researcher has concluded need to be considered carefully. This stage focuses on the design of the whole integrative picture or plan which includes decision of learning objective, arrangement of curriculum and pedagogy, selection of multimedia resource, and methods of integrating into teaching activities. Teachers in this stage need, firstly, to decide their teaching objective, do lesson plan, and design teaching activities which can reach their teaching goals. Secondly, they have to think about what or which multimedia resources are available, what teacher's ability of editing multimedia is, which activities need to involve multimedia, what place in the activity should involve multimedia, and how to deposit. One of the respondents claimed:

*The most difficult part of integration of multimedia for me is how to design and involve multimedia in curriculum and teaching activities. It means I have to decide which place, what kind of, and how to use multimedia in teaching... On the other hand, we have to consider its essentiality. We use it because we do need it, and we expect it to create good influence on our teaching and students' learning (T2).*

As researchers have advocated, the role of using technology is to be an effective and efficient tool but not to be a purpose [31]. [15] coincided that designer has to justify why the use of multimedia is essential, what value or advantage it will create, and how it can support classroom teaching. Thus how to plan and arrange multimedia to be a useful and effective teaching tool is the main task for teacher designers to consider and think carefully in this procedure.

### 3.3 Detail Manufacture

After teachers have planned the method and strategy to integrate multimedia in curriculum, the next step is to make the idea materialized. In this procedure there are three dimensions which need to be concerned by designers: teacher user, student learner, and expression of the multimedia content. Firstly, we have to consider whether it can be easily operated by user and whether the interface of operation should be too complicated. The inconvenient and complex interface used may cause problems for teachers to their operating. This discontinues teachers' teaching flow and disturbs students' concentration of learning. As what [22] have emphasized in the usability of the technology, the designed digital material has to be operated easily. Even though the content is plentiful and attractive to learner without convenience and ease for user to use, the tool still cannot reach its expected achievement. One of the participants claimed that:

*What we hate most in teaching with multimedia is the complicated operation procedure, unfriendly operational interface, or unsolvable technical problems for teachers. For example, when we have to play a video file, we may need to try different driver or need to install new software. To deal with these operative problems causes interruption of my teaching and break student's concentration on learning. Sometimes the problems may not be solved instantly, teachers are forced to quit the lesson and substitute with other activities (T11).*

Thus, a teacher who wants to be a designer has to consider several essential elements in the views of user when they are making digital teaching materials, such as whether it can be operated easily by user, is it too complicated, have we selected the proper computer software, and so on.

Furthermore, a designer also has to conceive the angle of learner including their age, studying grade, learning style, and cognition level, and so forth. For example, the ability of preschool students to recognize abstract script is not sufficient. They need to use more graphic, image, or animation to facilitate their comprehension of the information. In this case, teacher designers can reduce the part of script illustration and aid some more digital materials with cartoon characters, which can activate learners' learning motivation and interest. However, some teachers indicated that using too many multimedia materials may cause opposite influence to student's learning effect and efficiency. Designers also have to consider learner's limit in the



volume of learning content and time of concentration. One of the teachers has commented that:

*As we can usually observe when we play video program or cartoon for students to watch. In the first minutes they are so attracted by the program. Once it is longer than 10 minutes, some students start to lose their concentration, talk to their neighbor, turn their head and look around, or leave their site... Although these digital materials are very attractive to them, we can see that it doesn't always work and needs to be arranged properly (T28).*

This point coincides with [13] explanation in the theory of cognitive load. Based on the idea of cognitive load, human being's learning is limited, and too much information and stimulation in the teaching may cause increase of student's cognitive load, which may reduce learner's learning effect and efficiency. Due to the consideration of learner's nature of learning, teachers can avoid the mistake of inappropriate use of multimedia and bring more positive effect to students' learning [32].

Beside, in this stage whether the multimedia has presented the teaching content properly need to be thought carefully. When designers have transformed or manipulated the teaching content into the multimedia materials, they have to check the completed work to see whether it has missed or deviated from the main teaching stream. As one of the participants' comment has said:

*We may choose many digital teaching aids or materials to help our teaching. However, on many occasions, the chosen materials have limited components related to our teaching objectives which can be adopted for actual teaching. Teachers used to put all the materials into their teaching even though these are very slightly related to their teaching objective. Sometimes the published digital materials may contain various subjects. When teachers use it in the unrelated topic, students may lose their focuses easily. Therefore, it is a very essential issue for teachers to spend more time to filter the right materials for their teaching use (T1).*

Furthermore, in this stage designers have to consider whether their designed multimedia aids have involved the function of interactivity. The interactivity in multimedia teaching has been emphasized by many researchers [33,29,34]. The interaction of multimedia can be classified into four types: learner-instructor, learner-content, learner-interface, and learner-learner [35]. In this stage the researcher emphasizes the interactivity between instructor-content. Except teacher's teaching pedagogy has to be interactive, the interactivity between teacher and multimedia



plays an essential role in facilitating teacher to teach interactively. One teacher commented that:

*Traditionally, the idea of multimedia integration is alone to play video or animation with CD-ROM driver and have very little interactivity between the teacher and the students. Nowadays, the technology of multimedia has been developed swiftly and can allow designer to develop the interactive function for user to operate. For example, on the operational interface, it increases the controlling function, such as pre-page, next-page, pause, back to the main menu, hyperlink click, etc. These interactive controlling functions allow teachers to operate more fluently and create more opportunities for them to teach interactively (T22).*

Moreover, the expression of multimedia teaching aids usually consists of several multimedia elements [2], such as the electric picture book involves still images and words, and the animation of picture book involves the element of words, images, animations, and auditory effects. Thus, in this stage teacher designers have to decide what multimedia elements are appropriate to be applied in their work, and they also need to choose what multimedia software is more convenient to be operating and can create the best effect.

### **3.4 Test and Modification**

When the first edition of the multimedia is completed, we will go to the next stage of check and modification. Before we start to use the completed work of multimedia teaching aids, it is very essential for us to confirm whether it has defect or gap and to amend those inaccuracies to be proper. As one teacher has mentioned:

*According to my personal experience, when we check the first edition of the completed digital work, we usually find some gaps or defects in the original design and this may be far from our initial expectation. This is because the problems or difficulties appear only when we are dealing with the details. Therefore, it is very necessary to go back to the original idea, check the present work, and then do the proper modification (T26).*

In this stage, teacher designers usually need to go back to the second and third procedure of the entire process to investigate all the details about whether the designed multimedia has fulfilled our teaching needs. These may include whether the content of the multimedia can reach the teaching objectives, the digital materials are convenient and easy to be used, the expression of multimedia materials are artistic

and can create student's learning interests, and the arrangement of the sequence and time are suitable and allows learner to obtain the best learning effect. This process can be completed through peer review, by which teachers or school supervisors estimate and conceive what possible results may be caused, what aim the multimedia may reach, and then what modification may be done. Once they discover the fault, the designer may need to go back to the second procedure to reorganize or the third procedure to remake until the final check has been completed in this procedure, and then we can apply it practically in actual teaching in the next step.

### 3.5 Implementation and Reflection

When the former process of modification has been completed, the next step is to implement. The completed multimedia aid was used to the classroom teaching practically, and the feedbacks from teachers and students will be collected in this stage as well. The feedbacks from teacher's teaching, student's learning, and peer review have to come back to the designer. Through clarifying the feedbacks and suggestions, teacher designers can inspect their work and accumulate more experiences of multimedia integration. This process of reflection not only can help designers to correct the defect at this time but also help to avoid making the same mistake in the future integration. It also offers an example for other teacher designers to refer. One teacher commented that:

*When I was using multimedia to help my teaching, I could always uncover what was missing, what was lacking, and what was not proper. Through few times of experience of integration, I improved a lot and have less confusion and obstacle now... Our colleagues do learn from each other. In Wednesday afternoon we have a routine meeting. We used to share our work with using multimedia to other teachers and check others' work, too. We got the experiences and suggestions from colleagues' checking and reflection (T9).*

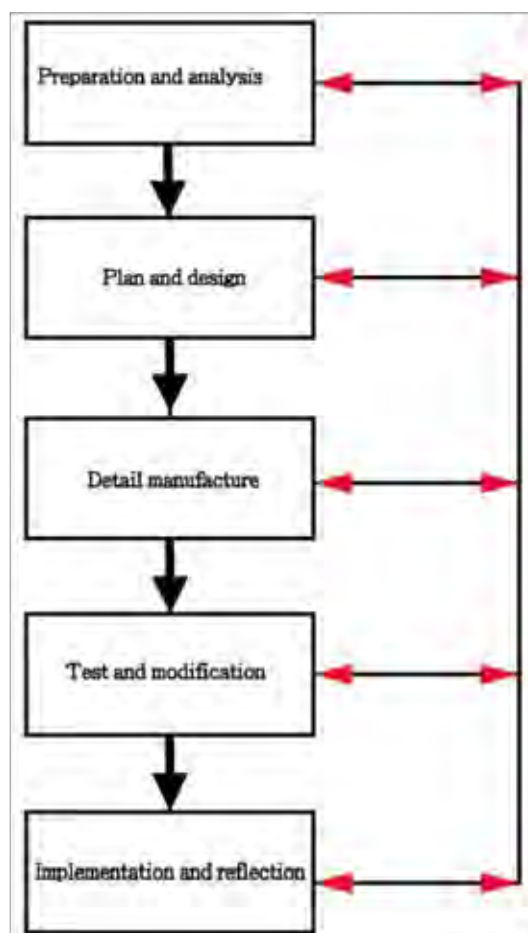
The reflection may consist of various aspects: school policy, teacher's individual motivation to the practical design, detail manufacture, and the implementation in the classroom teaching. The following list concludes the significant points in the procedure of reflection, which contains the aspects of multimedia factors, pedagogies, teaching objectives, and facilitation from school.

- Whether the software and hardware equipment or facilitation are sufficient?
- Have the school policy or school supervisor supported adequately?
- Whether the teaching activities with multimedia aids can help to achieve the teaching objectives?
- Whether the multimedia technology can effectively assist the process of activity teaching?
- Whether we have better substitution to replace the present way of using multimedia in teaching activity?
- Whether the application of multimedia material has been arranged properly so that it helps students to achieve the best learning effect?
- How to construct the multimedia teaching aid efficiently, usably, and artistically?
- Whether the designed or used multimedia materials are fit for the learner's learning character?

### **3.6 A Model of Integrating Multimedia in Classroom**

Based on the above analysis and discussion, a model of multimedia integration can be constructed based on the views of teacher designers and the process they have to go through, as shown in Fig. 1. The model consists of five main procedures and links up a dual funnel form to unfold and connect their relations in the process of multimedia integration. This model illustrates how a teacher designer proceed his or her journey of integration from the macroscopic view of applying multimedia to the microscopic detail manufacture and then come back to the macroscopic view of modification and reflection.

In the initial stage, teacher designers need to do the superficial self-analysis in some aspects and to do the initial preparation for their decision of multimedia integration. The self-analysis includes teacher's subjective perspective and will of using multimedia and the objective evaluation of the environmental support. The result of the self-analysis in this stage may influence teachers' motivation of continuing to apply multimedia materials in their teaching. When they have experienced the macroscopic analysis stage, they enter into the plan and design procedure.



In this stage, designers narrow down their vision to the curriculum arrangement and strategies of integration, and they have to plan where, how, and what the multimedia can be involved in the teaching activities. The followed procedure is to go into the process of detail production. Teacher designers have to focus on doing every single multimedia component, which needs to consider various points of view from the user and learner so that the way of multimedia content can be expressed. Once the digital multimedia is completed, it still needs to be tested and modified. In this stage, teacher designers need to pull their views back to the higher stance, examine whether the completed multimedia aids are proper to be used, and then adapt it again. When the modified multimedia teaching aids are first implemented in the classroom teaching by teachers, these aids may not be used perfectly at this stage. User, learner, and teacher designer may reflect some deficiencies or suggestions. Therefore, designers need to push themselves to a deeper and broader viewing angle and conceive every procedure of the multimedia integration carefully. Through this reflection procedure teacher designers can find out the apt way to improve their integration and accumulate more experiences to help their next multimedia

integration to be more effective and efficient. Every procedure in the model is reversible, which can go back to the previous stage to do examination and modification.

#### **4. CONCLUSION**

Technology integration in classroom teaching has been a trend, which is not possible to be reversed [16,17,36]. However, the present published multimedia materials are difficult for fulfilling individual teacher's needs, so teachers cannot always rely on the existed baggage of digital materials. Teacher's role in multimedia integration is not only a user but also a designer and producer, by which teachers can manipulate more appropriate multimedia aids and fulfill teachers' essential needs. Only few models of integrating multimedia or computer technology are based on the stance of teacher and on the analysis of the integrating process. In this paper, the researcher constructs a framework of multimedia integration based on teacher designer's perspectives of designing multimedia teaching aids and the integration of digital teaching materials in teaching. This model describes an entire process of how teacher designers construct an integration of multimedia in their teaching. This model also provides a proper guide to teachers who want to integrate multimedia teaching aids into their classroom. Through the application of this model, the researcher expects that teachers can easily design the digital teaching aids which are fit for their real needs and allow teachers' teaching to be more efficient and effective.

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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#### **APPENDIX Questions of Semi-Structure Interview**

1. What is your perspective of using multimedia technology in classroom teaching?
2. What are your considerations before you decide to involve multimedia technology in your teaching?
3. Could you please tell us what challenges and obstacles you may have to face when you integrate multimedia technology into classroom teaching?
4. Could you please share with us how you manage and arrange multimedia technology in your classroom teaching?
5. Could you tell us what the main concerns are when you are making multimedia teaching aids?
6. What are the students' responses after your teaching with multimedia technology?
7. What is the reflection of your integration of multimedia technology in classroom teaching?



**Table 1. Significant factors emerge from the analysis**

<b>Identify category</b>	
Preparation and analysis	Internal self-analysis(teacher's perspective and attitude of adopting multimedia in teaching, teacher's confidence and competency of using multimedia, and teacher's will of using computer technology)
Plan and design	Evaluation of external environments (school ideology and policy, school equipment of computer software and hardware, support from school manager, technique aid and consultation, and peer review and support) Design teaching objective Lesson planning Design teaching activities Searching available multimedia resources
Detail manufacture	Making interface for teacher user Making interface for student user Expression of the contents
Test and modification	Implementation and reflection Confirm whether it has defect or gap Amend inaccuracies to be proper Using the digital aids in the classroom teaching Clarifying the feedbacks and suggestions Significant points in the procedure of reflection,

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### ***The issue of relevance of the word order in russian***

**Abstract:** Analyzing the role of the word-order in the Russian language in terms of its relevance for the structural organization of the syntactic units, the author concluded that the supported view of the very limited relevance of the word order for the constructive features of the Russian sentences is wrong.

**Keywords:** sentence; word-order; actual division of the sentence; constructive division; relevance.

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### ***Проблема релевантности порядка слов в русском языке***

**Аннотация:** Анализируя роль порядка слов в русском языке с точки зрения его значимости для структурной организации синтаксических единиц, автор приходит к выводу об ошибочности широко распространенного и поддерживаемого многими мнения о нерелевантности или предельно ограниченной релевантности порядка слов для конструктивного устройства русского предложения.

**Ключевые слова:** предложение; словосочетание; порядок слов; актуальное членение; конструктивное членение; релевантность.

Обширная литература по различным аспектам изучения порядка слов не исчерпала возникающие в связи с ним вопросы ни в типологическом плане, ни в плане установления релевантности/нерелевантности порядка слов в том или ином конкретном языке. Даже в русском языке, на материале которого особен-

но широко исследовалась проблема с участием не только российских, но и зарубежных ученых, соотношение конструктивного и актуального членения вряд ли можно считать удовлетворительно установленным. Точно так же не установлено это соотношение и в других морфных языках.

Релевантность порядка слов и вообще порядка взаимного расположения компонентов предложения в языках аморфных (китайский, вьетнамский и нек. др.) не подлежит сомнению. Из-за отсутствия форм как таковых в этих языках на первый план выходит порядок слов, каждое изменение которого меняет содержание высказывания, семантику и функции компонентов. Например, в китайском языке различное положение и сочетание иероглифов, в каждом из которых одно и то же «слово» – иероглиф или сочетание двух-трех иероглифов – может представляться, в привычных для нас терминах, и как существительное, и как глагол, и как прилагательное (причастие), делает порядок компонентов не просто важным, а определяющим. В то же время «конструктивная» роль порядка компонентов в том же китайском языке, конечно, иная. О «конструктивном устройстве» предложения в аморфном языке можно говорить лишь условно: таких конструкций, в которых составные части были бы связаны между собой формальными средствами, в китайском языке, например, нет. Скорее всего, речь должна идти о функционально-синтаксической роли словопорядка, от которой зависит семантическая интерпретация высказываний и их частей.

Но допущение нерелевантности словопорядка в языках морфных, на котором настаивали исследователи раньше и от которого многие не отказались до сих пор, не имеет под собой твердого основания. Уверенность в этом автором была заявлена в диссертации [1] и опубликованных позднее статьях, в которых речь идет о роли словопорядка в кавказских языках и отчасти в русском [2], [3], а с предоставившейся возможностью сосредоточиться на особенностях словопорядка в русском языке высветились некоторые дополнительные аргументы в пользу большей, чем ему отводится, степени его конструктивной релевантности.

В русском языке функция порядка слов сводится к «образованию вариантов, связанных с различным расположением членов предложения»; «ряд вариантов предложения, различающихся актуальным членением, образует коммуникативную парадигму предложения» [4, с. 91]. Порядок слов называется

и в числе факторов, влияющих на экспрессивно-стилистическую окраску речи: в стилистически нейтральной литературной речи тема расположена перед ремой (*Вечернее небо/прекрасно*), а в экспрессивно окрашенной речи рема перемещается в начальную или срединную позицию: *Прекрасно/вечернее небо* [4, с. 91-92]. По убеждению многих, на конструктивное членение предложения порядок слов *существенного влияния не оказывает*. Даже после работ П. Адамца, О.Б. Сиротининой и ряда других авторов, допускавших некоторое участие словопорядка в структурной организации синтаксических единиц, встречаются такие оценки роли порядка слов: то, что «главной функцией порядка слов в русском литературном языке является функция выражения актуального членения» [5, с. 15-16], понятно, но спорно то, что «порядок слов нерелевантен (не имеет различительной функции) на уровне синтаксической структуры предложения и релевантен (имеет различительную функцию) на уровне его актуального членения» [5, с. 16]. Еще более определенно о роли порядка слов – у Н.С. Валгиной: «Порядок слов может изменяться в связи с необходимостью изменения смысла, акцентных качеств предложения и даже изменения его структурной характеристики, но в пределах сохранения общих структурных свойств предложения как синтаксической единицы» [6, с. 42].

Все это так – с тем, что релевантность порядка слов проявляется *прежде всего* на уровне актуального членения, спорить нет смысла, но сама формулировка «порядок слов нерелевантен на уровне синтаксической структуры предложения», даже если после нее следуют исключения, представляется неверной.

Сами такие исключения выделялись с самого начала целенаправленного изучения проблемы порядка слов и актуального членения предложения. Почти в каждой работе высказывалось мнение, что в отдельных случаях порядок слов выполняет грамматическую (конструктивную) функцию. Так, О.Б. Сиротинина отмечала, что «изменения в расположении компонентов словосочетания и членов предложения по требованию организации высказывания заставляют некоторых языковедов отрицать грамматическую роль порядка слов в русском языке. На наш взгляд, это неправильно. Необходимо помнить, что, во-первых, коммуникативные цели меняют грамматический порядок слов (всякое выделение основано на необычности); во-вторых, изменение порядка слов затрагивает синтаксическую, следовательно грамматическую, организацию...; в-третьих,

выделение такой функции необходимо в методических целях (если не хочешь выделять, соблюдай грамматические нормы расположения; помни, что контактное расположение слов вызовет их объединение)» [7, с. 125-126], поскольку «порядок слов в русском языке играет роль и в организации словосочетания, и в строении предикативной конструкции, предложения, высказывания» [7, с. 124]. С не меньшей определенностью о конструктивной роли порядка слов писал П. Адамец: «Порядок слов ... функционирует ... а) в области синтаксической структуры, б) в области актуального членения, в) в области эмоциональности (экспрессивности) и г) в области стилистической. Порядок слов помогает определять синтаксические функции некоторых компонентов. Конечно, порядок слов в этой области может играть роль лишь в тех случаях, где синтаксическая функция того или иного компонента не определена однозначно другими средствами, а это бывает в славянских языках редко» [8, с. 9-10]. Определяя, в каких областях языкознания должен изучаться порядок слов, П. Адамец писал далее: «...порядок слова выполняет синтаксическую и стилистическую роль. Однако главная роль порядка слов – это выражение актуального членения, а вопрос места актуального членения в общей языковой теории до сих пор окончательно не решен» [8, с. 10]. С точки зрения П. Адамца, это все-таки вопрос синтаксиса, а не «общей теории высказывания», как у М. Докулила и Ф. Данеша [9].

Свою задачу в этой статье мы видим в том, чтобы, с одной стороны, поддержать мнение П. Адамца о синтаксической и стилистической релевантности порядка слов в русском языке, с другой – показать, что роль порядка слов в структурной организации синтаксических единиц – словосочетания и предложения до настоящего времени принижается и до конца не выяснена.

1. Утверждению, что в русском языке порядок слов не оказывает никакого влияния на структуру и функциональные свойства компонентов предложения, оппонируют обычно, приводя примеры омоформности «именительный-винительный» в предложениях типа **Мать любит дочь, День сменяет ночь**. Но его еще легче оспорить такими примерами, как: **В подвале крысы – Крысы – в подвале, Времени не хватает – Не хватает времени, У него гитара – Гитара у него** и т.д. Очевидно, что здесь поменялись местами не только тема-рема, изменились синтаксические функции компонентов и сама структура предложений. Ни АГ-70 [10, с. 560-564], ни АГ-80 [4, с. 150-154 и др.] эту

особенность – возможность трансформирования односоставных предложений в двусоставные и наоборот – не отмечают. Инверсия **У него гитара** → **Гитара у него** привела не только к замене актуальной схемы «У него (тема) гитара (рема)» на схему «Гитара (тема) у него (рема)». То, что по поводу таких предложений пишет С.И. Кокорина («Есть целый ряд бесподлежащих конструкций, в которых ощущается расчлененность на два состава на основе отношения «определяемое – определяющее», отношения, характерного для подлежащих конструкций», «отношение «определяемое – определяющее» может сложиться в двусоставном предложении не между подлежащим и сказуемым, а между косвенным падежом имени и остальным составом предложения» [11, с. 6], касается только инвертируемой конструкции **У него гитара**, вопрос двусоставности которой все еще является предметом дискуссий, для нас важно, что вторая конструкция является уже безусловно подлежащей. Предложение **У него гитара** (с определяемым субъектом обладания в косвенном падеже **у него**), трансформированное в **Гитара у него**, становится двусоставным с грамматическим субъектом **гитара** и предикатом, выраженным носителем признака обладания **у него**. Такие трансформации, когда изменение словоупотребления влияет на структуру предложения, не характерны для предложений с неименными предикатами, поэтому, возможно, они и не привлекли внимания русистов.

2. Словоупотребление оказывается важным и часто определяющим при разграничении словосочетаний и предложений – опять-таки в предложениях и словосочетаниях с именными компонентами – в парах конструкций типа **Бабушка замечательная** и **замечательная бабушка**; **Книга – твоя** и **твоя книга**, показывающих условность понятий «свободный словоупотребление», «несвободный словоупотребление». Конечно, это не «гномические» предложения типа **Птицы поют**, о которых писал П. Рёстан, допуская исключения из своего обобщения «абсолютно контекстно свободные предложения, конечно, представляют собой фикцию» [12, с. 476]. Глагольная форма предиката при любом порядке сохраняет в конструкциях, подобных **Птицы поют**, предложенческую структуру и функции компонентов при этом сохраняются. А вот в негномических конструкциях изменение порядка слов приводит к изменению и того, и другого и необходимо, кроме инверсии, включить еще такое средство, как логическое ударение, чтобы сохранить структуру: во внеконтекстовой интерпретации

пропозиция **Бабушка замечательная** трансформируется в словосочетание, которое может быть интерпретировано как высказывание только в контексте «фигурального» синтаксиса с одновременным снятием логического ударения с **замечательная** (**Кто к нам пришел-то? ... Бабушка замечательная**). Сама себе инверсия ни в этом, ни во многих других случаях на коммуникативной «структуре», кстати, не отражается: и **Бабушка замечательная**, и **замечательная бабушка** темарематически нечленимы, пока не включится логическое ударение, а с его использованием словосочетания трансформируются в предложения.

В этом контексте можно рассматривать и предложения с именной частью сказуемого, выраженной существительным или местоимением в именительном падеже: **Владимир Петрович – начальник второго цеха // Начальник второго цеха – Владимир Петрович; Эти молодые люди – наше будущее / Наше будущее – эти молодые люди.**

3. Важность роли словорядка и, соответственно, инверсии для конструктивных характеристик синтаксических построений хорошо прослеживается на примере предложений с наречиями и обстоятельственными формами, в зависимости от позиции интерпретируемыми как несогласованные определения или как обстоятельства при глагольном сказуемом. Речь идет о мнимом синкретизме в таких, например, конструкциях: **Дети вдалеке галдят не переставая; Машины с прицепами отогнали в глубь гаража; Мать пожарила котлеты из баранины; Приготовьте, пожалуйста, спагетти по-итальянски.** На мой взгляд, никакого синкретизма в таких построениях на самом деле нет: выделенные слова могут характеризоваться только как несогласованные определения, в обстоятельства их превратит только инверсия: **Вдалеке галдят не переставая дети // Не переставая галдят вдалеке дети // Не переставая вдалеке галдят дети; Машины с прицепами отогнали в глубь гаража // В глубь гаража машины отогнали с прицепами; Котлеты мать пожарила из баранины // Из баранины мать пожарила котлеты // Мать из баранины пожарила котлеты; Приготовьте, пожалуйста, спагетти по-итальянски // Спагетти, пожалуйста, приготовьте по-итальянски.** Употребить выделенные слова в роли обстоятельств или дополнений можно, в принципе, и без инверсии – перенесением на них логического ударения **Дети вдалеке галдят не переставая; Машины с прицепами отогнали в глубь гаража; Мать**



пожарила котлеты из баранины; Приготовьте, пожалуйста, спагетти *потальянски*. Но это не пример нерелевантности словопорядка для конструктивного членения предложениях, а, наоборот, пример его релевантности: без участия логического ударения структура неизменна, она меняется только при его использовании. Инверсия оказывается важной и для разграничения несогласованных определений и обстоятельств в предложениях, в которых определителями имени или глагола являются неизменяемые слова: **К нам пришел мистер инкогнито // Мистер пришел к нам инкогнито**. В таких предложениях никакие наши ухищрения с переносом логического ударения структуру не изменят. Пока мы не прибегнем к инверсии.

4. Оснований для утверждения нерелевантности словопорядка не дают и предложения с атрибутивными формами – изменяемыми прилагательными или причастиями, которые при одном словопорядке функционируют в качестве согласованных определений (при существительном), при другом – составной частью сказуемого, функция которой в русской грамматике до сих не выяснена – то ли это часть аналитического сказуемого, то ли самостоятельный член предложения: **Усталый отец пришел с работы // Отец пришел с работы усталый**.

5. Словопорядок, шире – порядок расположения компонентов, явно релевантен в конструкциях с определяющими атрибутивными или причастными оборотами. С его помощью мы можем, например, разграничивать обособленные и необособленные члены предложения: **Привыкший к безделью мальчик делал все, чтобы увести в сторону от темы выполнения домашнего задания // Мальчик, привыкший к безделью, делал все, чтобы увести в сторону от темы выполнения домашнего задания; Погруженный во мрак город производил гнетущее впечатление / Город, погруженный во мрак, производил гнетущее впечатление; Грозный с виду конвоир оказался добрейшим человеком // С виду грозный конвоир оказался добрейшим человеком** (вариант интонационного и, соответственно, пунктуационного, выделения: **С виду грозный, конвоир оказался добрейшим человеком**) // **Конвоир, с виду грозный, оказался добрейшим человеком**. От словопорядка может зависеть не только разграничение обособленных и необособленных членов, но и характеристика словоформ как членов предложений вообще.



6. Нельзя не учитывать и того, что инверсия не всегда возможна или можно использовать не все инверсивные варианты: **Его ждали аплодисменты** можно преобразовать в **Аплодисменты ждали его** с логическим ударением на **аплодисменты**, но нельзя с ударением на **его** и **ждали**.

Часто инверсии мешает и семантика: **Он прикорнул на диване с двумя изголовьями** ни при каких условиях нельзя трансформировать в **Он с двумя изголовьями прикорнул на диване** или **Он прикорнул с двумя изголовьями на диване**.

7. В пользу релевантности словорядка говорят и трансформации с предикативами, при нормальном порядке слов выполняющими функцию главного члена безличного предикатива («категории состояния»), при другом – именного сказуемого в двусоставном предложении с инфинитивным подлежащим: **Грустно расставаться с товарищами // Расставаться с товарищами грустно**.

8. При рассмотрении роли словопорядка вряд ли можно игнорировать и порядок расположения «неполнозначных» служебных слов. В этом контексте обычно рассматривают предлоги, подчеркивая невозможность их употребления после, скажем, существительного, к которому предлог относится (невозможность **горе на, вам благодаря, стола у**), но еще убедительнее примеры употребления, например, отрицательных частиц. **Он не ждет вашего разрешения** может быть инвертировано в **Он ждет не вашего разрешения**, но здесь изменилась семантика; что касается структурных свойств, трудно однозначно решить, что они не изменились вовсе при преобразовании  $\text{Prom} - N_2 \rightarrow \text{Pron} - \text{neg } N_2$ .

9. Словопорядковая упорядоченность характерна для сочетаний определяемого существительного и определяющего – приложения. При преобразовании, более того, такие сочетания не всегда инвертируемы: **Река Волга впадает в Каспийское море; Озеро Куйтто одно из самых больших в Карелии; На улице Арбат движение только пешеходное; Автомобиль «Волга» давно снят с производства** не исключают вовсе иной порядок определяемого – определяющего, но реально такие конструкции (**Волга-река впадает в Каспийское море; Куйтто-озеро одно из самых больших в Карелии; На Арбат-улице движение только пешеходное; «Волга»-автомо-**

**биль давно снят с производства)** не употребляются или употребляются редко.

10. В связи со словопорядком можно, видимо, рассматривать и инфинитивные предложения с двумя вариантами пунктуации типа **Казнить нельзя помиловать, Упрекать нежелательно прощать**, приводимые обычно в контексте рассуждений о пунктуации и/или глагольном виде. В подобных высказываниях именно инверсия позволяет устранить структурную и пунктуационную синкретичность: **Нельзя казнить, помиловать; Нежелательно упрекать, прощать.**

11. Таким образом, следует считать, что порядок слов релевантен и для коммуникативно-актуального членения предложения, и, хотя и в меньшей степени, для его конструктивного членения; тем более он релевантен для семантики – содержания высказываний, в той или иной степени изменяющегося при инверсии.

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## ***Main requirements to the teacher in developing the case method in the teaching process***

**Abstract:** The article revealed the basic requirements to teacher and principles of preparation of the case method in the teaching process. Placed emphasis on compliance in the process of a certain technology.

**Keywords:** teacher, case method, principle, technology.

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## ***Основні вимоги до викладача при розробці кейс-методу в навчальному процесі***

**Анотація:** В статті розкриті основні вимоги до викладача і принципи підготовки кейс-методу в навчальному процесі. Зроблений наголос на дотримання в цьому процесі певної технології.

**Ключові слова:** викладач, кейс-метод, принцип, технологія.

Важливою особливістю кейс-методу є підготовленість педагога до його використання, що вимагає від нього постійного професійного розвитку та удосконалення. Підвищення ефективності діяльності педагога з використання кейс-методу пов'язане з втіленням ряду спеціальних принципів:

- принцип різнобічності та ефективності дидактичного арсеналу;
- принцип партнерства та співробітництва зі студентами;

– принцип зміщення ролі викладача з трансляції та «розжовування знань» до організації процесу їх самостійного добування студентами. Сьогодні зростає роль педагога як експерта і консультанта, який допомагає студентам зорієнтуватися у світі навчальної інформації;

– принцип використання досягнень психологічної і педагогічної науки, передового досвіду, накопиченого колегами;

– принцип творчості, який передбачає перетворення процесу підготовки кейсу і його використання на занятті у індивідуально неповторний творчий продукт;

– принцип прагматизму, який орієнтує на чітке визначення можливостей того чи іншого кейсу, а також результатів навчання.

Ці принципи мають виконуватися на усіх етапах діяльності викладача з використання кейс-технології. Першим таким етапом є підготовка кейсу.

*Кейсом* називають спеціальний комплекс, що містить опис ситуації, постановку проблеми, питання, на які мають орієнтуватися студенти, матеріали з навчальною інформацією, перелік джерел інформації.

Приступаючи до розробки кейсу, педагог має усвідомлювати усі технологічні етапи цього процесу. Основою його є розуміння багатоаспектності джерел для виділення проблеми, розгортання ситуаційного сюжету та створення кейсу.

У практиці розробки кейсів переважає не гармонійне використання усіх джерел (життя суспільства, наука, освіта), а домінування одного або двох. Слід не втрачати з поля зору той факт, що кейс – це метод навчання та виховання, отже, у ньому на першому плані стоять навчальні та виховні завдання, що задає певний елемент умовності у відображенні реального життя.

Перераховані вище джерела є основними, первинними. Крім них, існують й інші важливі джерела:

– художня і публіцистична література, сюжети якої можуть підказати ідеї кейсів;

– матеріали місцевого характеру: про діяльність компаній, організацій, взаємини у місцевій громаді, досягнення науковців. Студенти впевненіше себе почувають у процесі рішення кейсу, якщо матеріал їм добре відомий;

– статистичні матеріали, які надають кейсу логічність і чіткість;

– наукові статті, монографії, наукові звіти, присвячені різним проблемам. Наукові статті поглиблюють розуміння окремих питань, монографії дають системні знання про предмет розгляду, а наукові звіти характеризуються актуальністю та новизною;

– Інтернет та його ресурси.

Процес збору інформації для розробки кейсу має кілька етапів:

- вивчення подібних ситуацій, відображених у кейсах;
- збір інформації на об'єкті, про який йде мова у ситуації (виробництво, організація, навчальний заклад, управлінська ланка тощо), відбір найважливіших даних, описання її у вибраному форматі;
- збір навчальної інформації, яка стосується проблематики ситуації.

У процесі вивчення низки подібних ситуацій, слід керуватися такими основними вимогами до ситуації:

- актуальність ситуації, яка описується у кейсі. З часом ситуація, тобто формальна оболонка кейсу, змінюється та старіє, що знижує зацікавленість студентів у її розгляді;
- важливість, доречність ситуації. Неглибокі та малозмістовні проблемні ситуації дискредитують метод кейсів;
- ситуація має бути реальною, а не надуманою;
- ситуація має містити протиріччя, яке є основою для виділення проблеми. Проблема не повинна «знаходитися на поверхні», до неї слід підходити, спираючись на інформацію кейсу;
- точне визначення головних тем і проблематики ситуації буде орієнтиром викладачеві при формуванні чітких та зрозумілих студентам запитань;
- слід змінювати формат ситуацій, урізноманітнювати стиль, розмір, форму;
- текст опису ситуації має бути цікавим та зрозумілим для студентів [1, с. 62].

Надзвичайно важливою виступає вимога схвалення відображення у розробленому кейсі інформації, отриманої від певного працівника (працівників) організації, підприємства. Таке схвалення (дозвіл на використання) підтверджує правдивість відомостей та реальність використаної ситуації. Інформація має бути достатньою для того, щоб студент вписав себе у відтворену в кейсі ситуацію, та міг ототожнити й позиції інших осіб, які діють у ній.

Викладач використовує вже напрацьовану або розробляє власну модель конкретної ситуації, яка є можливою (або такою, що відбулася) у реальній

професійній діяльності. Для рішення проблеми, яка є основою ситуації, викладачем підбирається певна навчальна інформація. Це – текст обсягом від кількох до кількох десятків сторінок, які й містять теоретичне дидактичне завдання для студентів. Ті, що навчаються, вивчають кейс, залучаючи ще й матеріали теоретичного курсу та інші джерела. У підгрупах, на які розбивається група, йде попереднє обговорення проблеми, напрацьовуються шляхи її розв'язання. Потім організується дискусія між групами. При цьому викладач виступає у ролі ведучого, який генерує питання, фіксує відповіді, підтримує і спрямовує обговорення, тобто виступає у ролі диспетчера процесу співтворчості.

Кейси мають певну класифікацію:

1) *за структурою*:

- *структуровані* кейси – передбачають коротке і точне викладення ситуації з конкретними цифрами та даними. Для такого типу кейсу пропонується певна кількість правильних відповідей. Вони призначені для оцінки знань і (або) умінь з використання одної формули, дії, методики у певній галузі знань;

- *неструктуровані* кейси – це матеріали з невеликою кількістю даних, призначених для оцінки стилю й швидкості мислення, уміння відокремити головне від другорядного та різних навичок діяльності у певній сфері. Для них існує кілька правильних варіантів відповідей і, зазвичай, не виключається можливість знаходження нестандартного рішення;

- кейси *першовідкривачів* – можуть бути як дуже короткими, так і об'ємними. Спостереження за рішенням такого кейсу дає можливість побачити, чи здатна людина мислити нестандартно, скільки і яких креативних ідей вона може видати за відведений час.

Російські науковці М. Федянин і В. Давиденко, які глибоко вивчали зарубіжний досвід використання кейс-методу, обґрунтовують власну класифікацію кейсів за структурою:

- *структуровані* кейси (highly structured) мають мінімальну кількість лодаткової інформації; при роботі з ними учні повинні використовувати певну модель, формулу чи структуру; у завдань цього типу існує оптимальне рішення;

- *«маленькі ескізи»* (short vignettes) – вміщують, як правило, від 1 до 10 сторінок тексту і 1-2 сторінки додатків; вони знайомлять тільки з ключовими поняттями і при їх розгляді учень повинен опиратися на власні знання;



- *великі неструктуровані кейси* (long unstructured cases) – мають обсяг до 50 сторінок і виступають найскладнішими із всіх видів навчальних завдань такого виду; в них надається досить повна інформація, в тому числі й зовсім непотрібна; найбільш необхідні для розгляду відомості, навпаки, можуть бути відсутніми; учень повинен розпізнати такі «підводні камені» та розібратися з ними;

- кейси *першовідкривачів* (ground breaking cases) – вимагають від учнів не тільки використати засвоєні теоретичні знання та практичні навички, але й запропонувати дещо нове; при цьому діяльність і викладача і учнів наближається до дослідницької [2, с. 6];

2) *за розміром:*

- *повні кейси* (у середньому 20-25 сторінок) – передбачають командну роботу впродовж кількох занять і, зазвичай – командний виступ у процесі обговорення;

- *короткі* або *середні кейси* (3-5 сторінок) – призначені для аналізу певної ситуації безпосередньо на занятті, та передбачають спільну дискусію. Реалізується, як правило, впродовж двогодинного практичного заняття;

- *міні-кейси* (1-2 сторінки) – як і короткі кейси, призначені для розгляду в аудиторії, та використовуються як ілюстрація до теорії, що викладається на занятті. Розраховані на частину двогодинного практичного заняття;

3) *за рівнем складності:* для бакалаврів; для магістрів; для курсів підвищення кваліфікації; навчальні кейси;

4) *за навчальними дисциплінами.*

Виділяють й інші типи кейсів: кейс-потреби, кейс-вибір, кризовий кейс, конфліктний кейс, кейс-боротьба, інноваційний кейс.

У педагогічній теорії та практиці склалися певні вимоги до змісту кейсів, як-то:

- у кейсі відображається реальна ситуація, що базується на конкретному фактичному матеріалі, чи є наближеною до реальної ситуації;

- в описі ситуації включаються основні випадки, факти, рішення, які мали місце;

- кейс може бути складений на основі узагальненого досвіду.

Практика діяльності викладачів Гарвардської бізнес-школи дозволила їм напрацювати рекомендації стосовно розробки кейсів. Наведемо деякі класичні правила створення кейсів.

1. *Якісний* кейс розповідає. Він повинен бути з хорошою фабулою.
2. *Якісний* кейс фокусується на темі, яка викликає інтерес.
3. *Якісний* кейс не виходить за хронологічні межі останніх п'яти років.
4. *Добре підібраний* кейс повинен викликати співпереживання з різноманітними ситуаціями реального життя.

5. *Якісний* кейс включає реальні матеріали.
6. *Якісний* кейс містить проблеми, зрозумілі тому, хто навчається.
7. *Якісний* кейс вимагає урахування попередньо знайдених рішень.

Українські науковці П. Шеремета і Г. Каніщенко сформулювали вимоги до хороших кейсів економічного та соціологічного характеру. Він повинен:

1. Являти собою уміло побудовану розповідь.
2. Відображати реальну управлінську проблему.
3. Описувати драматичну ситуацію.
4. Мати контрастні порівняння.
5. Розповідати про конкретних менеджерів (управлінців, співробітників, науковців та ін. діючих осіб), стосуватися недавніх подій.
6. Бути коротким (оптимальний обсяг кейсу не повинен перевищувати 8-12 сторінок плюс 5-10 сторінок таблиць та графіків, а міні-кейси можуть бути розміщеними на 1-2 сторінках тексту).
7. Містити статистичну інформацію [3, с. 36-38].

Усі ці вимоги не виключають, а доповнюють систему умов для створення якісного кейсу, а їх дотримання буде сприяти як створенню кейсів високого рівня, так і удосконалення вже існуючих.

Отже, для підготовки та створення якісного кейсу педагог має володіти знаннями щодо його особливостей та чітко дотримуватися всіх представлених вище технологічних етапів та дій.

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## ***Historical legal formation and development of copyright***

**Abstract:** This article is devoted to legal research copyright in its historical aspect in the various countries and continents.

**Keywords:** copyright, ownership, author, state, law, publishing house.

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## ***Историко-правовое становление и развитие авторского права***

**Аннотация:** Данная статья посвящена правовому исследованию авторского права в ее историческом аспекте в различных странах и континентах.

**Ключевые слова:** авторское право, собственность, автор, государство, закон, издательство.

С древности люди пытаются и стремятся сберечь, защитить все оригинальное и исключительное. И именно благодаря этому желанию и стремлению человека, определение и понятие, что такое интеллектуальная собственность, возникло уже очень давно.

Объективные предпосылки появления авторского права тесно связаны с творческой деятельностью людей. Различные грамоты, привилегии и патенты, которые защищали личную имущественную собственность появились еще в глубокой древности. К сожалению, нам неизвестны имена первых изобре-

тателей и авторов книг, но мы знаем, что именно в Древнем Египте появилась первая книга. А в Древней Греции было высоко развито книжное издательство и торговля книгами. Именно там возник термин «изданная книга». Оригинал произведения делал сам автор или же писец под его наблюдением, а затем на заказ делались копии, которые шли на продажу или дарились кому-либо самим автором. Также произведения переписывались и непрофессиональными людьми без какого-либо контроля, что приводило к искажению смысла книг. В то время не было и речи об авторских правах, но, тем не менее, понятие литературной собственности существовало.

Двести лет назад в государствах Европы появилось такое право, как право на нематериальные результаты интеллектуальной деятельности. К ним относили произведения литературы, различные изобретения, а также искусство. Данное право было построено аналогично праву собственности на материальные объекты.

Раньше, когда отношения между субъектами авторского права еще не были оформлены на законодательном уровне, деятели искусства финансировались спонсорами. И таким образом, происходило то, что продукт их творческой деятельности оставался за пределами рыночных отношений. Изначально защита авторских интересов и тех, кто наследовал их право, была обеспечена привилегиями, получаемыми от высших властных органов.

Данные «привилегии», действовавшие во времена средневековья, сейчас считаются предшественниками современного авторского права. Автор мог попросить лично правителя государства выдать ему привилегии. Привилегии на результаты творческой деятельности выдавались не так уж часто. Среди творческих людей, и тех, кто занимался наукой, бытовало такое мнение, что то, что они создают не есть их творение. Они считали себя лишь «проводниками» между этим миром и Богом, и поэтому считали, что посягать на право, быть автором своего произведения не имеет смысла и тем более греховно [1].

Некоторые держатели мануфактур и издатели находились под покровительством властного аппарата. Так, например, в 1492 году был получен один из первых патентов на поворотный кран, в 1449 году был получен патент на производство разноцветного стекла. А 19 марта 1474 года, во время издания хартии, авторское право получило свое законодательное закрепление. В Венеции была издана хартия, которая содержала положения о моральном

исключительном праве автора, которое разрешало ему использовать результат своего творческого труда.

В Англии, в 1710 году впервые был создан закон об авторском праве, который был назван «Статутом королевы Анны». Данный закон содержал основной принцип авторского права, такой как принцип «копирайт». Этот принцип означал, что автор имеет право на то, чтобы его изданное произведение охранялось и не могло тиражироваться без разрешения данного автора. Также в данном законе было оговорено то, что издатель имел право на свою опубликованную работу на срок – 14 лет, со времени опубликования его произведения [2]. Этот срок мог быть продлен еще на 14 лет, пока жив автор.

Но также были и те, кто выступали за бессрочный копирайт, например, издатели, торговцы книгами. Они отвергали нормы Статута, апеллируя к общему праву. Эти люди призывали парламент к тому, что нужно продлить срок действия копирайта. Но их призывы ни к чему не привели. Тогда издатели воззвали к суду, они подавали иски, чтобы книги больше не публиковались, если даже и согласно Статуту копирайт истек. Таким образом, продавцы книг пытались защитить авторов, хотя по сути они конечно же, боролись лишь за свои интересы. И, в конце концов, суд встал на сторону издателей. Было принято решение судьи лорда Мэнсфилда по делу Миллара против Тейлора.

Но в 1774 году книготорговцы снова проиграли. В результате голосования в Палате лордов Великобритании по делу Дональдсона – Беккета, одержав двукратное превосходство, верхняя палата парламента отклонила идею постоянных копирайтов. С тех пор копирайту отвели установленный срок. По завершении которого произведение переставало охраняться авторским правом и переходило в статус общественного достояния. Общее право разрешало постоянное действие копирайта. По факту, Палата лордов своим решением установила то, что развитие инноваций и культуры в Англии уже не будет тормозиться издателями.

В истории Европы и Запада впервые закончилось господство закона над творчеством. А это значит, что великие произведения английской литературы (книги Шекспира, Бэкона, Мильтона, Джонсона, Баньяна) избавились от влияния права.

Невозможно представить какую огромную политическую реакцию породило данное решение Палаты лордов. Например, там, где развели свою

деятельность нелегальные издатели, в Шотландии, народ широко отмечал это событие на городских улицах. По сообщению «Эдинбург Адвертайзер»: «ни одно частное событие доселе не привлекало такого внимания публики и даже не могло сравниться с положительным решением Палаты лордов, в котором столь многие были заинтересованы».

В Декрете Учредительного собрания 1789 года, во Франции, было объявлено: «Все, что автор открывает для публики, становится общественной собственностью». Но со временем, в 1791 и 1793 годах были созданы законы, гарантировавшие охрану всех видов творческой деятельности: литературной, драматической, музыкальной, изобразительной, при создании всеми известными способами [3].

За Англией и Францией последовали и другие страны Европы, которые приняли условия авторского права. Например, Бернская конвенция 1883 года, которая защищала литературные и художественные творения, и другие международные договоры, которые контролировали область интеллектуальной собственности. Эта конвенция стала важнейшим этапом в истории становления авторского права. Она расширила масштаб действия авторских прав, а также унифицировала законодательство различных стран в сфере авторского права. Таким образом, был закреплен международный стандарт охраны прав авторов. На данный момент участниками Бернской конвенции являются 167 стран. Результаты интеллектуального труда российских авторов защищаются всеми государствами-участниками Бернской конвенции. И соответственно произведения иностранных авторов охраняются в нашей стране.

Всеобщая декларация прав человека, которая была принята на третьей сессии Генеральной Ассамблеи ООН Резолюцией 217 А (III) от 10 декабря 1948 года, закрепила в статье 27 следующее: «Каждый имеет право на защиту его моральных прав и материальных интересов, являющихся результатом научных, литературных или художественных трудов, автором которых он является». Нужно отметить, что именно опыт Франции в правовом регулировании авторских отношений, послужил платформой для данной декларации.

В таких странах как Австрия и Италия в 1936 и в 1941 году соответственно, были предоставлены смежные права исполнителям и создателям звукозаписи. А так как прослеживалось взаимодействие прав исполнителей, создателей фонограмм и вещателей, то было принято решение об их

единой организации. Римская конвенция 1961 года отразила это решение в Международной конвенции об охране интересов артистов-исполнителей, создателей фонограмм и вещателей.

В Соединенных Штатах Америки первый нормативный акт об авторском праве – Закон о поощрении литературы и таланта, был принят в 1783 году. А 31 мая 1790 года был принят закон о предоставлении авторских прав, создавший федеральное право авторов, действовавший 14 лет. Таким образом, если срок истекал, когда автор был еще жив, то автор продлевал свои авторские права еще на 14 лет. А если автор не желал этого делать, то его произведения становились достоянием общества. В 1831 году срок действия авторского права был продлен с 28 лет до 42.

В 1841 году в США состоялся первый громкий судебный процесс, на котором был признан виновным архивист, опубликовавший в своем журнале письма президента Дж. Вашингтона. В 1853 году писатель Гарриет Бичер-Стоу подала иск в суд о том, что издатель без соответствующего на то разрешения перевел ее книгу «Хижина дяди Тома» и продавал в среде немецких иммигрантов в США. Издатель был оправдан, так как суд признал, что перевод является не просто копированием.

В 1856 и 1865 годах авторское право распространяется на драматические произведения и фотографии. В 1870 году Библиотека Конгресса США начинает регистрировать авторские права. Копирайт распространяется на скульпторов и художников. Оговаривается, что не запрещен перевод произведения на иностранные языки и на сценические инсценировки. В 1886 году было подписано крупномасштабное соглашение о защите авторских прав, так называемая Бернская конвенция. Ее цель была в обеспечении взаимного признания авторских прав разными странами. Страны Европы создали единый процесс регистрации авторских прав, чтобы копия не регистрировался в каждой отдельной стране [4].

В 1912 году авторское право стало защищать кинофильмы, которые до этого признавались отраслью фотографии. Права на фильм стали принадлежать режиссеру, сценаристу и композитору. В 1952 году принята Всемирная конвенция об авторском праве (Женевская конвенция), цель которой в том, чтобы все страны были в составе международной системы охраны авторского права. В 1953 году авторское право разрешило защищать все произведения. В



1967 году в Стокгольме была подписана конвенция об учреждении Всемирной организации по интеллектуальной собственности, которая занимается администрированием важных международных конвенций в сфере интеллектуальной собственности. В 1980 году копирайт разрешил защиту компьютерных программ. В 1990 году копирайт разрешил защиту компьютерной графики, художественных постановок и архитектурных проектов. В 1992 году был поставлен запрет на переписывание и воспроизводство музыкальных записей без разрешения правообладателей.

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## ***Thinking as heuristic search***

**Abstract:** The thought is formed in the course of search and the analysis of conditions of reperceptive psychic. In this article the thinking in structure of search questions is considered, the irony of thinking in the course of information and heuristic search is analyzed.

**Keywords:** thinking, search, consciousness, reperception, dynamic syntax, understanding, irony, formalization.

### **Introduction**

Two factors define reality of the perceiving and clever person. The external steric factor is defined by the representations bearing known information on modern technologies. The internal time factor is defined by productive thinking of new projects. Representation to the personality with *individual* consciousness will constantly reperceptively be transformed. The term *the reperception* means experience of representations. Only the transformed representations matter. The term *consciousness* means ability to understand. Representations of *the mass* person remain invariable and do not matter outside mass consciousness. For mass consciousness it is enough to reproduce ready representations. These two, growing and dying away in the history, a factor of thinking define structure of intellectual search. The term *thinking* means search on a set of future conditions of system. The representations which are reperceptively transformed express *future* time of the personality. Therefore the thinking is *heuristic* search. The thinking purpose for the personality with individual consciousness is the understanding. The consciousness which reflexes over heuristic search is called as *the perplexed consciousness*. The search purpose for the mass individual is only the way of flight from reality.

The era of globalization stops periodic natural fading of separate cultures, thanks to conscious attention to adaptation and a survival. The term *the culture* means work of the personality on itself. The culture represents own human *reality* of the perceiving and productively clever person. Therefore out of individual culture the culture of group is impossible. This circumstance discovered new possibilities of thinking as heuristic search and formalization of thought processes. The person has no possibility to survive and adapt differently as soon as in the form of cultural improvement.

For example, out of cultural improvement it is impossible any so-called extraterrestrial adaptation. If the individual assumes to survive only as the living individual – namely in such quality the mass globalized person wants to survive – that of one civilization insufficiently. On the contrary, on other planets this individual is forced to take with himself culture as the first condition of progress, therefore, and conditions of the survival. But actually this planet becomes such "other planet" as a result of reasonable activity. Thus often forget that *the reason* is only correlative concept in relation to *foolishness*. The one who thinks, that knows that the thinking is ironic. Therefore if the person wants to think reasonably, he is forced to take with himself first of all own improvement as a condition of achievement of the creative purpose. The modern civilization balanced external and internal factors of system thanks to technologies. Creativity is inherited in the form of technologies. Therefore the form of innovative thinking in the course of the invention of technologies is way of formalization, search and understanding.

Objective of this research is detection of pattern of forming and development of thinking as heuristic search. Discovery of new possibilities of formalization of thought processes is result of research. Method of research is comparative analysis of states of reprehensive psychic and states of the perplexed consciousness. In the first section the thinking in structure of search questions is considered. In the second section the irony of thinking in the context of information and heuristic retrieval is analyzed.

### **1. Thinking in structure of search questions**

Any phenomenon means manifestation of pattern for the perplexed consciousness of the developing personality, therefore any phenomenon an essence *expression* of sense. The thought forms at first in the form of some image of this pattern. *To express* sense, it is necessary *to find the signs* suitable on value

distinguished by the immediate social environment. This semantic search work is performed individually at *the preconceptual* level of thinking. Further, if we want that we were understood, it is necessary *to consider* thought at first in system of a certain *dynamic syntax*. This formal syntax search work is performed at *the preverbal* level of forming of thought. Then search can move to a level of conceptual thinking and verbal syntax.

In particular by means of operation of logical multiplication it was established that in all optimum conditions for life it is necessary there are same conditions of knowledge. Conditions can be checked empirically by logic operation of addition. This simple problem is solved by means of formulations *of information* search questions – *what-kind, where, when, how many*. These elementary formal questions matter within three measurements of space. They form *space* of an information retrieval. Looking in the future by means of temporal intersection of space of representations, we can observe a number of the changing states of system. Thus our representations re-perceptively change. Further, in similar conditions by means of *system* search questions – *what-is-it, why, how* and *what-for* – we inevitably discover pattern of development of object. These formal system questions make sense in the capacity of *the fourth*, temporary measurement that is they form *the moment* of heuristic search. Obviously, all world patterns discover with need on any planet with similar conditions. Because any their manifestation bears sense.

In this respect the Voyager-1 project is *addition operation*. Perhaps, the voyager will find the apple *which was perhaps gone* at L. Wittgenstein. «I give someone the order: "fetch me six apples from the grocer", and I will describe a way of making use of such an order: The words "six apples" are written on a bit of paper, the paper is handed to the grocer, the grocer compares the word "apple" with labels on different shelves. He finds it to agree with one of the labels, counts from 1 to the number written on the slip of paper, and for every number counted takes a fruit off the shelf and puts it in a bag» [1]. But the grocer has no such *system* object as "six apples", and it executes operation of lower order, that is *addition* of elements. The messenger will execute an order? Not, of course. Let's assume now that John came and took one apple. Because some other objects with unknown structure are in a bag now. How many apples the messenger will deliver? Correctly, and now the customer will be forced to leave the Gestalt of a continuum and to be engaged absolutely in

another matter that is *verification of presence* of discrete objects. Now his thinking is not heuristic search, but only a simple information retrieval.

In the same way civilizations degrade shortly after sent travelers. Therefore an indicator of the highest achievements of a civilization is sending a voyager. Their degradation begins with *the degrading* personality who does not understand the continuous creative purpose. It is important to understand that *the personality* is an object which resides before a choice of development or degradation. That is for the identity of the third it is not given permanently. So only these mechanical information *accidental searchers* appear for each other required apples in a universe. They even formally will not recognize each other as they have no image whole. Therefore, knowing *conjunction operation*, we can claim with big confidence figure that on all possible hundred thousand voyagers the same Mozart is written. It means that the probability of extraterrestrial civilizations is infinitely small, and the probability of their development in the scenario known to us is infinitely great up to unit. But the probability of our civilization, also extraterrestrial in relation to those, a posteriori *appeared* to equal unit. It is asked: with what else civilization the author of a voyager wants to establish connection? It is clear, that its search is not heuristic.

The term *the civilization* means structure of culture. The culture in the capacity of individual improvement designs and uses a civilization in the development. In particular the culture uses connection and search engines for the sake of creativity. On the contrary the mass opinion depends on connection as the induction of mass consciousness is inevitably incomplete. In this case the civilized, but uncouth mass consciousness asks a question of sense, a *what-for-question*, not as a question of sense. This question is only exclamation which means attitude on limitation. The what-for-question is used in utilitarian *value* "what for to me it?", "what for to you that?" Thereby the meaning of a question of sense is lost. There is no formalization subject. The mass consciousness is not able to concentrate *will* as energy on an action subject. In particular «The freedom of the will consists in the fact that future events cannot be KNOWN now. It would only be possible for us to know them, if causality were an INNER necessity – like, say, that of logical inference. – The connexion between knowledge and thing known is the connexion of logical necessity» [2]. It "known" there is *no knowledge* as result and a trace of own individual search and understanding. In practice it only *representation* which in itself is not able to open *structure* of a tautology. Representation cannot *use* itself in the

capacity of a subject or means of the analysis. Therefore connection between knowledge and a known thing is connection of heuristic necessity.

As soon as Wittgenstein passes from pure *number* (for example, "six") as the purposes to *measurement* by means of numbers ("postponed one by one six subjects"), he right there appears in a scope of weaker sheaf, a *disjunction*. It thereby passes from the highest heuristic-searching *what-for-question* to a simple information retrieval *where-question* incommensurable to it. That is from a question of *time* he turns to an incommensurable issue of *space* with which only the disjunctive being deals. Thereby it substitutes a formalization subject. But the disjunctive being is capable only to an information retrieval. It is not able to pass independently in the opposite direction from separate values to higher level of *conjunction* that is to *sense*. It is only capable to undergo testing and to carry out check of *value* of the theory under a reflection of individual consciousness capable to heuristic search, as under a reflection of the structural law. Becoming only a disjunctive being, Wittgenstein, like a voyager, certainly, cannot understand himself.

For the same reason some children does not become mathematics. They are not able to fly up to Pythagorean concept of *number* as products. For example, the herdboys silly *tests* a reperception of representations and conjunction in thinking of adults when shouts "wolves, wolves!" He as a being purely disjunctive and deprived of heuristic fire *forces* a social environment to run for an empirical information retrieval. But that the herdboys achieves from a social environment as a result? Having avoided a *basis anticipation* error "it still should be proved", adults make further a mistake of *hasty generalization* "there are no wolves". Means, Ludwig, accepting experience of owners of sheep, has to check *each* bag now. So it gets to disjunctive *dependence* on the social environment which, *perhaps*, steals apples. Work with such possibility does not discover a possibility of discovery. It means that *the number as product* will not be given neither in experience, nor in feeling.

That is such is it there will be an experience. This experience describes I. Kant. Experience which is not complete is implicitly provided as complete. «Appearances require to be explained only insofar as their conditions of explanation are given in perception, but everything that can ever be given in it, taken together in an **absolute whole**, is not itself any perception. But it is really this whole for which an explanation is being demanded in the transcendental problems of reason. Since, therefore, the solution to these problems can never occur in experience, you cannot

say that it is uncertain what is to be ascribed to the object regarding them» [3]. Here the incomplete induction ("is not itself any") is implicitly provided as complete induction ("never"). This induction simply suppresses a question "whose it is experience?" In other words, the question of openness of experience of *the creative* person is suppressed. It is also actually mathematical problem, *at least, of not impossibility* of discovery. And for mass consciousness permanence of the creative purpose is represented *an external continuum*. For its one-dimensional or n-dimensional *space* representation it is the express in which it is impossible to jump because of the high speed of the movement. It is clear, that it will not reach a continuum by addition of discrete results of measurements.

## 2. Irony of thinking

For individual consciousness of *the creative* person this continuum acts *instantly*. For *this-minute-fourth* measurement quasispace representations behind a window which other *there-measurements matter* only in the context of *the moment* of understanding are external. Substituting formal representations, Kant in this way suppresses, *at least, not impossibility* of understanding to them found. And Kant does *phenomenological naive* look that does not understand itself. But such visibility of absence of *self-irony* is not necessary at all. The individual consciousness *includes* mass consciousness as one of own structural components. But no sum of mass representations will make individual consciousness. That is the mass consciousness is clear for individual consciousness, but not on the contrary. For example, "You noticed what magnificent scarlet dress was on the lady in the third car?"

F. Bacon in his search managed "not to forget accidentally" the Latin word *experiment* which is meant by both *experience*, and *test*. «But experience is by far the best demonstration, provided it adhere to the experiment actually made, for if that experiment be transferred to other subjects apparently similar, unless with proper and methodical caution it becomes fallacious» [4]. That is he could both *test* a thing in a factor set, and to generalize experience. In the same way M. Wertheimer "did not forget accidentally" that in German *the Gestalt* has two values: *image* and *structure*. That is he could grab both expression, and sense. «Productive processes are often of this nature: in the desire to get at real understanding. Questioning and investigation start. A certain region in the field becomes crucial, is focused; but it does not become isolated» [5]. He managed to provide the understanding moment as the creativity moment. The dynamic preconceptual syntax making structure of



expression determines parameters of formal semantic search. But semantic search has no value *out of* preconceptual dynamic syntax. Respectively and the information retrieval does not matter out of heuristic search.

Thus, only the consciousness can *use itself* in as thinking. The consciousness is capable to a reflection over the rational representations and cogitative operations. In particular conjunction represents the form of thinking *adjoining* between *truth* and *belief*. Euler's circles only mislead. An adequate geometrical picture is *the link* that is the set including elements of both crossed surfaces of the sets moving in time. This set of ways of thought in search of algorithms of a solution of new tasks. One surface makes a set, *at least, of not impossible events*, another represents a set of probable events. The part of a set of probable events on that party of intersection makes a set *of a priori probable events*. The part of a set of probable events on this party of intersection makes a set *of a posteriori probable events*. Length of a link depends on extent of concentration on search area. Link volume essence anything.

At this moment it is important to understand that *the thinking is ironic*. Hardly light of a guess begins to dawn, hardly the lightning of an insight will flash as immediately the knowledge is already presented in the form by all of known information. As a result the heuristic search for me passes into a stage of an information retrieval for others. The thought as we saw, arises at first at the preconceptual level, in the form of dynamic syntax, then for it is necessary *to find* suitable on *a word meaning*, further thought it is necessary *to consider* in the form of *judgment*. And only then the idea is introduced in the form of *the proposition*. Three operations are executed in mind and only one is executed in the speech. The offer "clear to masses" also is fairly *an irony* subject. «I have become increasingly concerned in interpreting these results and in conversations with colleagues who have worked on irony, that, as is the case in many domains, the search for necessary conditions for irony comprehension may shroud the breadth of the phenomenon of verbal irony» [6]. For this reason the proposition executes function *of the regulating signal* of a state of all system of thinking. Most often the proposition reports about an ambiguity of mass representations. Therefore in heuristic search it is reasonable to use at once self-irony to avoid *an error of hasty formalization*. For scientific individual consciousness actually the moment of understanding from which the trace *of knowledge* lasts, concentrates in itself science as the differentiated form of consciousness. As a result *the knowledge* always is an individual product.



Unlike the observer as the private measuring device not capable to catch sense of incident, the perceiving personality sees how in the eyes all variety of *the relations* is at once transferred to a set of *a posteriori probable events* that is to the past. The perceiving personality sees how this world selected in the capacity of *valid* disappears together with those *possible* worlds. That is the personality "is not present", and *exists* on the verge of nonsense. Therefore the personality also understands sense. The personality exists and does not exist at the moment of understanding already. Therefore the thinking of the perceiving personality is *heuristic search* on active sound or light process. Otherwise the perception does not make sense. All world relations are surveyed at this moment.

Romantics of the 19th century understood this irony, having discovered depths of human soul unknown until then. The reperception at the level of *a charm* before explicit forms usual for masses became an irony subject. Having addressed to the preconceptual level of individual thinking, they revealed the levels of experiences which are not sneered further. They addressed to each of us by means of dynamic syntax. Such levels of a reperception as *admiration, reverence, inspiration*, inexpressible at the conceptual level, became expressed by means of new romantic harmony. For individual art consciousness this moment of understanding concentrates in itself technology as the universal principle.

In the same way the speaking ironically natural intelligence can *use* own searching structure – artificial intelligence. For artificial intelligence data analysis of a reperception and necessity of a logical output is the simple rule. Such self-ironic order of things prevents elementary mistakes of *hasty formalization* which are made by natural intelligence. For example, natural intelligence at all its creative ability, calculating future state of system, can simply forget separate actual data. So Biaggio "accidentally forgot" properties of graphite that aggravated already a distress of expedition. He as the representative of the western tradition forgot or did not know at all that *the drop-down menu of subconsciousness* works only on condition of the released part of random access memory.

Therefore the in a bigger measure ability to the reperception of representations delivering information from subconsciousness is developed, the bigger space of future states of system is connected to heuristic search. This dependence represents general *pattern* of forming and development of thinking as heuristic search. The personality resides before a choice: or the intelligence knows

patterns of development of thinking, and uses them in creativity, or thinking in its machine disjunctive execution, for example, a civilization, being only "the banal evil", uses the person. In the latter case the thinking cannot go beyond known information, and disappears as that. In the same way artificial intelligence acts only as the major component of a world civilization. Having learned *to use* a world civilization for the sake of creativity, the personality develops as the cultural object processing the abilities, including ability of formalization and an output.

### Conclusion

The thinking of the perceiving personality represents *heuristic search* on a set of future states of system. The speaking ironically natural intelligence can *use* own searching structure – artificial intelligence, – for which data analysis of a re-perception and necessity of a logical output is the rule. The in a bigger measure ability to the re-perception of representations delivering information from subconsciousness is developed, the bigger space of future states of system is connected to heuristic search. This research discovers new perspectives of formalization of thinking processes. Results of research can be used in further studying of structure of thinking as information and heuristic retrieval.

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### ***Formation of the concept of responsibility and the role of scientific and technological progress in changing its content***

**Abstract:** The article discusses the question of the origin of the theoretical term responsibility. In dependency on the solution of this question the author examines the classical idea of the responsibility and traces how it changes in the course of modern scientific and technological progress.

**Keywords:** responsibility, moral duty, legal obligation, scientific and technical progress.

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### ***Формирование понятия ответственности и роль научно-технического прогресса в изменении его содержания***

**Аннотация:** В статье рассматривается вопрос о происхождении теоретического термина ответственности и в зависимости от авторского решения данного вопроса уточняется его содержание. В связи с этим формируются представления о классической и неклассической парадигмах ответственности.

**Ключевые слова:** ответственность, моральный долг, правовая обязанность, научно-технический прогресс.

Проблема ответственности, стала объектом специального и обстоятельного философского исследования лишь во второй половине XX столетия.

Однако это отнюдь не означает, что раньше люди не обращали никакого внимания на содержание данной проблемы. Как раз наоборот, они довольно рано осознали такие аспекты этого содержания, как правовая обязанность или нравственный долг. Об этом, в частности, свидетельствуют свод законов вавилонского царя Хаммурапи (1792–1750 гг. до н. э.) и формируемые позже библейские заповеди, которые подозрительно воспроизводят по существу содержание некоторых из них в морально-религиозной форме. Позднее «отец медицины» Гиппократ (460–370 до н. э.) четко обозначил идею профессиональной ответственности во врачебной деятельности. Своей знаменитой клятвой он конкретно раскрыл ее содержание именно как ответственность врача перед пациентом и перед своими коллегами. Затем можно указать высказывание Аристотеля из «Никомаховой этики», в коем, имея в виду Платона, он отмечал, что «идеи (ta eide) ввели близкие [нам] люди (philoï andres). И все-таки, наверное, лучше — во всяком случае, это [наш] долг — ради спасения истины отказаться даже от дорогого и близкого, особенно если мы философы. Ведь хотя и то и другое дорого, долг благочестия — истину чтить выше» [1, с. 59]. В данном высказывании, которое впоследствии стало знаменитой парафразой: «Платон мне дорог (друг), но истина дороже», Аристотель фактически возводит поиск истины, стремление к ней и служение ей в ранг высшего профессионально-этического долга мыслителя (ученого), в высший принцип или императив, определяющий его профессиональную деятельность. В том же ряду можно упомянуть и принятую Учредительным собранием Франции 26 августа 1789 года, т. е. в самом начале Великой Французской революции, «Декларацию прав человека и гражданина», которая, в отличие от указанного аристотелевского принципа, облакает содержание понятия «ответственность» в социально-политическую форму.

Во всех упомянутых случаях речь, несомненно, идет именно об ответственности, о различных ее формах или аспектах её содержания, хотя, конечно, само это слово еще отсутствовало. Во многих европейских языках слово «ответственность» восходит к латинскому глаголу «respondere», буквально означающему «обещать» или «давать взамен», а в более широком смысле — «отвечать». Абстрактное существительное от данного глагола, по-видимому, появилось не раньше второй половины XVIII столетия. Во всяком случае, одним

из первых, кто использовал слово «responsibility» («ответственность») считается английский философ-моралист и правовед Иеремия Бентам (1748–1832), который в своем сочинении «Фрагмент о правлении» (1776) под «responsibility of governors» («ответственностью правителей») понимал их обязанность отвечать (отчитываться) перед гражданами за свои действия [2, с. 94]. Спустя чуть более столетия французский этнограф и философ Люсьен Леви-Брюль (1857–1939) в своей работе «Идея ответственности» фактически положил начало философскому анализу данной идеи, пытаясь при этом исторически подходить к пониманию и исследованию ее содержания.

С целью более глубокого осмысления и точного понимания содержания понятия «ответственность» необходимо останавливаться на его происхождении и попытаться выявить его истоки, установить его исторические корни. При решении данного вопроса были предложены различные подходы, среди которых в качестве основных можно выделить следующие три: теологический, социологический и натурфилософский (метафизический). Теологическим я называю подход, согласно которому понятие «ответственность» редуцируется к определенным религиозным представлениям и основоположениям, а, соответственно, и исторически выводится из них. Подобной позиции, в частности, придерживается канадский теолог, известный исследователь ислама и специалист по сравнительному религиоведению Уилфред Кантуэлл Смит (1916-2000). Он считает, что указанное понятие исторически связано с религиозным догматом «Судного дня» или «Страшного суда» («Божьего суда»), получившим наиболее полное развитие в иудейской, христианской и исламской традициях. Дело в том, что оно, как он полагает, есть не что иное, как результат секуляризации именно данного догмата. Поэтому, можно сказать, что с позиции теологического подхода понятие «ответственности» формируется как *внерелигиозное* выражение содержания определённой религиозной идеи.

Социологический подход к решению вопроса о происхождении понятия «ответственность», напротив, изначально связывает формирование данного понятия не с религиозными, а с иными, *светскими*, аспектами социальной жизни человека. Так поступает, например, американский философ Джон Лэдд (J. Ladd) (1917–2011), который рассматривает ответственность как этическую сторону власти [3, с. 94]. Правда, подобный взгляд характеризует скорее

политическую ответственность, нежели ответственность вообще. Более того, он суживает содержание понятия ответственности и в том плане, что ограничивает его содержание сугубо морально-этическими рамками, превращая его, таким образом, в этический принцип.

То же самое можно сказать и по поводу интерпретации понятия ответственности, предлагаемой немецко-американским философом-экзистенциалистом Хансом Йонасом (1903-1993). Правда, пытаясь, по-видимому, преодолеть узость трактовки Джона Лэдда, данный автор несколько содержательно расширяет его формулировку и предлагает понимать ответственность как функцию власти и знания [4, с. 125]. Такое понимание ответственности, устанавливающее в частности тесную связь между ответственностью и знанием, может объяснить, по мнению Х. Йонаса, почему раньше, когда роль знания в жизни общества была ограниченной и несущественной, в морально-этических учениях не уделялось должного внимания исследованию проблемы ответственности. Однако и предложенное им понимание ответственности также не оправданно суживает её содержание, ограничивая его пределами власти и знания.

Таким образом, можно сказать, что трактовка ответственности, предлагаемая Х. Йонасом на самом деле, не преодолевает, а, напротив, воспроизводит ограниченность трактовки этого понятия, данную Дж. Лэддом. Обе эти трактовки, связывающие ответственность как морально-этическое понятие с властью, несомненно, восходят к этапу становления (зарождения) теоретического термина «ответственность», а соответственно, и к самой ранней его интерпретации, предложенной ещё И. Бентамом. Ведь именно данная интерпретация как раз и сводит ответственность к этическому принципу, которому должна быть подчинена работа правителей, а стало быть, и вся государственная власть в целом. Однако последующее развитие философского представления об ответственности как формы человеческого бытия, несомненно, вывело её содержание далеко за пределы одних только этики и политики.

Из идеи социальной обусловленности понятия «ответственность» и его происхождения исходит и американский философ Ричард МакКеон (1900–1985). Историческое исследование этого понятия подчеркивает, как он полагает, его сугубо политические корни. Поэтому не случайно, что он

связывает его появление с падением сословного строя и формированием нового социального порядка, основанного на принципах равенства и индивидуализма (частного интереса). В свете этого становится понятным, почему он считает, что слово «ответственность» было впервые употреблено на английском и французском языках в 1787 г. в историко-политическом контексте американской и французской революций, и с тех пор его применение остаётся политическим [5, с. 23].

Вместе с тем Р. МакКеон полагает также, что в методологическом плане указанное понятие было сформировано на базе заимствованного из естествознания представления о каузальности в природе [5, с.10]. В основе данного взгляда, высматривающего определённую связь между ответственностью и причинностью, как раз и лежит тот подход, который я обозначаю как *натур-философский* или, говоря шире, *метафизический* (философский).

Метафизический (философский) подход к решению проблемы происхождения понятия ответственности представляется мне более фундаментальным по сравнению с двумя предыдущими подходами, так как позволяет выявить и установить более глубокие корни данного понятия, связывая его с предельно общим отношением — отношением, характеризующим явления *всей*, а не только социальной действительности. Отмечая это, я полагаю, однако, что содержание понятия ответственности необходимо в конечном счёте вывести именно из *принципа отражения*, согласно которому все явления действительности обладают свойством «отвечать» на воздействие, отражать его. Поэтому *ответственность* следует, на мой взгляд, трактовать не иначе, как *высшую, присущую одному только человеку форму проявления отражения как всеобщего свойства материи*. Дело в том, что каждая из основных форм существования материи обладает своей, свойственной только ей способностью отвечать на воздействие, отражать его. На уровне живой материи данная способность приобретает избирательный характер, а у человека она может реализовываться к тому же в преднамеренной, сознательной форме, достигая тем самым своего полного развития. Ответственность как раз и выступает одним из высших выражений данной человеческой способности. Другими словами, отражение как всеобщее свойство материи на социальном уровне



структурной организации последней проявляется и реализуется, в том числе и в виде ответственного действия.

В свете сказанного, можно определить *ответственность* как *способность человека избирательно и сознательно воздействовать на окружающую действительность с обязательным учётом им все возможные последствия своего воздействия, а стало быть, и с безусловной его готовностью (обязанностью) отвечать за эти последствия*. Иными словами, под ответственностью следует понимать обязанность человека *держат ответ*, как перед самым собой, так и перед другим людьми, социумом и всей действительностью в целом за все последствия своих действий, представляющих собой различные его реакции на все те вызовы, которые бросает ему окружающая его действительность. Это значит, что ответственность выступает особой формой человеческого существования, через которую человек приобретает свой статус существа ответствующего за свои действия (или бездействия). Говоря иначе, именно через такую форму своего бытия человек становится субъектом ответственного действия, *существом ответственным*. Абсолютизируя значение такого аспекта или такой формы человеческого бытия, некоторые исследователи превращают ответственность в исходное начало духовности человека вообще. Так в частности поступает польско-американский философ Генрик Сколимовский, который объявляет ответственность основой бытия человека как духовного существа и поэтому без ответственности человек, по его мнению, перестаёт быть человеком [6, с. 495, 496].

Итак, ответственность, это вменяемая человеку писанным и не писанным социальным законом обязанность отвечать за свои действия или же бездействия. Она имеет самые различные формы, среди которых можно выделить такие, как морально-этическая, правовая, профессиональная, религиозная и вообще социальная и т.д. Поэтому нельзя ограничивать действие принципа ответственности рамками только морально-этической или политической деятельности человека. На самом деле данный принцип действует во всех видах человеческой деятельности и, следовательно, каждому из этих видов присуща своя конкретная форма ответственности. И это понятно, поскольку ответственность, как отмечалось, есть форма бытия человека, из чего следует, что последний всегда и во всех своих действиях, во всех видах своей



деятельности должен быть существом ответственным. Данное обстоятельство даёт достаточное основание, чтобы производить классификацию форм (видов) ответственности на базе деятельностного критерия (подхода) и таким образом различать столько её конкретных форм, сколько существует видов человеческой деятельности.

Нет сомнения, что можно классифицировать ответственность и по другим основаниям, и в зависимости от выбранного критерия деления выделить те или иные её формы. Однако из каких бы критериев мы не исходили при этом, ответственность всегда остаётся неотчуждаемым человеческим качеством, неотъемлемой характеристикой человеческой личности как таковой. Она, поэтому, не может быть *безличной*. Она, наоборот, всегда остаётся персональной и, поэтому, от нее нельзя уклониться или отказаться, ее невозможно делить с другими или переложить на других. Она остается индивидуальной (персональной) и неотчуждаемой даже тогда, когда вменяется целой группе людей, целому человеческому коллективу. И в самом деле, любая коллективная ответственность непременно «распадается» на множество отдельных, личных ответственностей. Иначе говоря, при коллективной ответственности каждый член коллектива несёт свою (личную) долю общей ответственности — ответственности, вменяемой коллективу в целом. Это значит, что и при общей коллективной ответственности подлинным субъектом ответственного действия (ответственным субъектом) остаётся отдельный человеческий индивид, отдельная личность.

Традиционно ответственность понималась сугубо как: а) отношение человека к человеку и б) как отношение к настоящему и прошлому, но отнюдь не к будущему. Это как раз и составляет суть старой парадигмы ответственности, которую можно было бы назвать *классической*. В соответствии с данной парадигмой традиционный моральный закон, например, вменял человеку в обязанность отвечать за свои действия только перед своими сородичами, ограничивая эти последние рамками живущих людей (настоящего) и умерших предков или, точнее, памяти о них (прошлого). Единственное исключение при этом делалось только для бога, перед которым человек, согласно религиозным представлениям, также должен нести личную ответственность за свои помыслы

и деяния, хотя эта ответственность в полной мере может быть реализована только в мире трансцендентном.

Такое ограничение сферы применимости принципа ответственности распространялось и на неморальные сферы его приложения, т.е. на ответственность правовую, профессиональную и т.д. Однако в ходе современной научно-технической революции человек постепенно начинает осознавать неправомерность и дальнейшую недопустимость подобного ограничения, а стало быть, и необходимость выработки новой (*неклассической*) парадигмы ответственности, в соответствии с которой не просто расширяются границы применимости принципа ответственности, но и изменяется его содержание.

Современный научно-технический прогресс превратил человека в общепланетарный фактор геологической и биологической эволюции. И в самом деле, научно-техническая мощь современного человека за последние три четверти века настолько выросла, что результаты его деятельности уже по экспоненту начали негативно сказываться на естественных условиях его существования и на существовании жизни вообще на нашей планете. Его хищническое отношение к природе, его не обдуманные и далеко не всегда разумные действия по изменению среды своего обитания уже привели к частичному её разрушению, к серьёзному нарушению её естественного баланса, восстановление которого становится всё труднее. Дело в том, что уже работающим на пределе защитным механизмам биосферы, гидросферы и некоторых других геосфер становится всё сложнее справляться с негативными последствиями человеческой деятельности и тем самым восстановить их естественный баланс. Более того, антропогенные изменения среды обитания как самого человека, так и всего живого на Земле в ближайшей перспективе грозят стать необратимыми, что, в конце концов, приведёт к полному вырождению биосферы, а следовательно, и к превращению Земли в необитаемую планету.

Таким образом, можно сказать, что под непосредственным воздействием негативных последствий современного научно-технического прогресса человечество (а вместе с ним и вся жизнь на нашей планете) перешло в фазу своего выживания. Перед ним впервые за его длительную историю реально встал гамлетовский вопрос: быть или не быть? И нет сомнения, что возможное

негативное решение данного вопроса и, стало быть, та мрачная перспектива экологического коллапса, который неизбежно ждёт нас в будущем, если и впредь будет продолжено наше хищническое отношение к природе и служили катализатором и стали одним из оснований пересмотра вышеуказанной классической парадигмы ответственности и замены её неклассической.

Одним из первых, кто осознал потребность в новом осмыслении принципа «ответственность», всю важность его неклассической интерпретации, несомненно, был немецко-французский врач, протестантский теолог и философ культуры Альберт Швейцер (1875–1965). И действительно, этот выдающийся гуманист XX столетия довольно рано заговорил об актуальности предметного обогащения содержания принципа ответственности, о необходимости расширения сферы приложения данного принципа и фактического распространения его действия на отношение человека и человечества к биосфере и даже к неорганическому миру, к космосу в целом. Он был убеждён в том, что одной из главных причин того глубочайшего кризиса, в котором оказалась и продолжает пребывать современная западная культура в целом, включая современную техногенную цивилизацию, является утрата этой культурой миро- и жизнеутверждающего мировоззрения вместе с его определяющей морально-этической составляющей. Поэтому данный кризис не может быть успешно преодолен и человечество не будет в состоянии не просто остановить декаданс, но и добиться полного духовного «выздоровления» (возрождения) до тех пор, пока человеческое «Я» не осознает себя и не начнет повсюду и во всем действовать как «жизнь, желающая жить среди жизни». Именно так А. Швейцер приходит к разработке своей концепции «благоговения перед жизнью», согласно которой идея преклонения (ответственности) перед жизнью вообще должна стать не просто лейтмотивом всей философии, но и высшим моральным принципом, основным законом, определяющим общий характер и направленность человеческой деятельности. Рассматривая «жизнь как высшую ценность» и провозглашая благоговение перед ней «наиболее глубоким проявлением моей воли к жизни», он отвергает картезианское «*cogito*» как убогое и уводящее «безвозвратно на путь абстракции» начало. «Истинная философия» должна, по его мнению, исходить из другого основания, а именно «из самого непосредственного и всеобъемлющего факта сознания», который

гласит: «Я — жизнь, которая хочет жить, я — жизнь среди жизни, которая хочет жить» [7, с. 71, 72-73; 8, с. 201, 87, 217].

Итак, своей установкой «благоговение перед жизнью» А. Швейцер предписывает человеку быть ответственным за последствия своих действий не только перед другими людьми, но и перед жизнью вообще. Дело в том, что данная установка включает в себя «смирение, миро- и жизнеутверждение и этику — три основных элемента мировоззрения как три взаимосвязанных результата мышления» [9, с. 29]. Это значит, что этика «вырастает из того же корня, что и миро- и жизнеутверждение». В связи с этим он пишет, что «этика — не что иное, как благоговение перед жизнью. Благоговение перед жизнью внушает мне основной принцип нравственного, заключающийся в том, что добро состоит в сохранении жизни, ее стимулировании и усилении, а зло — в уничтожении жизни, нанесении ей ущерба и создании препятствий на ее пути» [8, с. 88]. Так А. Швейцер, фактически, закладывает основу биоэтики, а через неё и биофилософии как особого раздела философского знания.

Швейцерова идея благоговения перед жизнью нашла отражение и развитие не только в биоэтике и биофилософии. Она вместе с предписываемыми ей нравственным, экологическим и даже космическим императивами, несомненно, оказала известное влияние и на такую, казалось бы, далёкую от биоэтики и биофилософии познавательную сферу, как философия техники. Не подделанный интерес этой последней к названной идее и к проблеме ответственности вообще далеко не является случайным. Он объясняется, на мой взгляд, тем обстоятельством, что разрушительный аспект современного научно-технического прогресса более отчётливо обнаруживается и выпукло выступает именно на его техническом рубеже. Во всяком случае, можно определённо сказать, что за последние четыре десятилетия проблема ответственности стала объектом пристального внимания и серьёзного исследования, в том числе и в философии науки и техники. С тех пор данная область философского знания, и особенно философия техники, более или менее активно участвует в исследовании проблемы ответственности, а соответственно, и в разработке неклассической парадигмы этой последней. И хотя данная парадигма ещё далека от своего окончательного оформления, тем не менее, уже сегодня можно сказать, что данная парадигма не ограничивается

распространением действия принципа ответственности на отношение человека к живой природе. Она ещё больше расширяет границы действия этого принципа, чтобы он мог охватить с собой и отношение человека к неорганическому миру. В свете этого можно охарактеризовать неклассическую парадигму ответственности как выражение того социального закона, который вменяет человеку в обязанность отвечать за свои действия или бездействия перед: а) самим собой и своими современниками, б) памятью своих предков, в) будущим поколениями своих сородичей, г) животным миром и биосферой вообще и д) неорганической природой, космосом или вселенной в целом. Поэтому можно сказать, что своим действием предписываемые неклассической парадигмой ответственности императивы будут охватывать все типы отношений человека, все его действия, все аспекты его многообразной деятельности. Вместе с тем следует отметить, однако, что данная неклассическая парадигма ответственности только начинает внедряться в индивидуальное и общественное сознание, и, видимо, нескоро она превратится в факт сознания отдельного индивида, и будет действовать в полной мере.

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### ***Innovirovanie of process of educating in the system of activity on forming and development of culture of the mother tongue of specialists***

**Abstract:** This article is devoted to research innovirovaniya learning process as a process of self-development properties of the model of training, in particular in the framework of activities for the formation and development of language culture professionals.

**Keywords:** innovirovanie learning process, workflow, self-development, learning model, the social environment, language culture, research, language personality.

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### ***Инновирование процесса обучения в системе деятельности по формированию и развитию культуры родного языка специалистов***

**Аннотация:** Данная статья посвящена исследованию инновирования процесса обучения как технологического процесса саморазвития свойств модели обучения, в частности, в рамках системы деятельности по формированию и развитию культуры родного языка специалистов.

**Ключевые слова:** инновирование процесса обучения, технологический процесс, саморазвитие, модель обучения, социальная среда, языковая культура, родной язык.

Инновирование процесса обучения – технологический процесс саморазвития свойств модели обучения, назначение которого генерировать, транслировать и ассимилировать «эффект саморазвития» в социальную среду (Герасимов А.М., Логинов И.П.) – в современной педагогической науке выступает как требование настоящего дня. Позволяя перевести учебный процесс в интерактивный режим, инновирование реализует социальную функцию, проявляющуюся в определённых аспектах.

Проиллюстрируем обозначенный процесс в системе деятельности по формированию и развитию общей и профессионально-ориентированной языковой культуры специалистов на основе трёх аспектов – *общеобразовательного, профессионально-ориентированного и личностного*, – обусловленных именно социальным характером инновирования (см. Таблицу 1).

Под общеобразовательным аспектом подразумеваются те формы и методы, которые направлены на развитие в основном общей языковой культуры и создание предпосылок для формирования профессионально-ориентированной речи обучающихся. Данный аспект реализуется на основе специальных дисциплин, формирующих уровень владения русским языком. Профессионально-ориентированный аспект предполагает формы и методы специальной подготовки обучающихся, в которых формируется уровень профессиональной речи. Указанный аспект реализуется в системе учебных занятий, формирующих профессиональную компетентность специалистов на протяжении всех лет обучения или краткосрочного периода курсовой подготовки. Личностный аспект предполагает самообучение и самовоспитание обучающихся и требует такой организации их деятельности, при которой стимулом становится собственная мотивация к обучению, стремление к самосовершенствованию.

*Общеобразовательный аспект* инновирования обучения включает в себя следующую комбинацию методов [8, с. 31] - *задача/исследование – диалог – игра*, - подчинённых единой дидактической цели. Каждый из методов



предполагает определённую форму организации учебного процесса, работая самостоятельно и вместе с тем в системе с остальными, выступая в качестве конкретной последовательной ступени в решении образовательных задач. В контексте дисциплин общегуманитарного и социально-экономического характера и в частности дисциплин, специально направленных на развитие, коррекцию и совершенствование языковой культуры, указанные методы носят практико-ориентированный коммуникативный характер.

**Диалог**, выступая как главный метод организации теоретических и практических занятий, активизирует коммуникативную среду, делая необходимыми такие виды инновационных лекций, каковыми являются *лекция-беседа, лекция-провокация, лекция-диалог, лекция вдвоём, проблемная лекция*.

Лекция-беседа является самой активной и оптимальной формой проведения занятий, предполагая включение в диалог практически каждого обучающегося и опираясь на актуализацию имеющихся у них знаний и умений. Индуктивное изложение нового материала позволяет охватить совместным логическим поиском ответов на различные вопросы всех участников учебного процесса или подвести их к самостоятельным суждениям, выводам. Лекция такого характера может быть организована на основе любой темы и включает в себя обмен мнениями, что направлено на формирование личных позиций обучающихся, умения обоснованно аргументировать ту или иную точку зрения, развитие логики и критического мышления, развитие речевых структур.

Лекция-провокация основана на включении в изложение запланированной ошибки, побуждающей обучающихся к активному поиску решения проблемы и дискуссии; направлена на развитие внимания, умений, связанных с аудированием, логического мышления; требует от учителя/преподавателя тщательного продумывания аргументов, обосновывающих осознанно включённую в изложение ошибку; учит распознавать логические подмены и выстраивать с их учётом собственное рассуждение. Материалом для лекции-провокации служат спорные в науке и практике вопросы (научное и обывательское понимание нормы в культуре речи; возникновение различных культурно-речевых норм; проблемы стилистической дифференциации языка и т.д.)

Лекция-диалог соединяет в себе теоретическое и практическое содержание обучения [5, с. 35] и предполагает участие специалистов в области

культуры речи, стилистики и риторики, выступающих в качестве компетентных экспертов.

Схема проведения лекции-интервью включает в себя три этапа – подготовительный, функциональный и заключительный, – каждый из которых имеет свои цели и содержание.

*Подготовительный этап* ставит перед обучающимися следующие задачи опережающего характера, – во внеучебное время:

- самостоятельно изучить лекционный материал занятия;
- сформулировать вопросы по теме, направленные на самоконтроль проработанной темы, а также на уточнение и разъяснение тех аспектов, которые остались непонятны.

Преподаватель на основе лекционного материала вычленяет проблемы, имеющие для раскрытия темы важное значение, и обсуждает их с приглашённым специалистом.

*Функциональный этап* соотносится с учебным временем и предполагает изложение преподавателем учебного материала, а также обращение к специалисту. Основой лекционного занятия становится диалог преподавателя и эксперта, который строится как беседа или дискуссия. В заключение данного этапа обучающимся при наличии у них вопросов предоставляется возможность получить ответы по непонятым аспектам рассматриваемой темы. Вопрос адресуется преподавателю либо приглашённому специалисту. Характер вопросов и возможный коллективный интерес к ним могут также предусматривать беседу или дискуссию.

На *заключительном этапе* преподаватель обобщает результаты, организует рефлексию, подводит итоги.

Как разновидность такого рода лекционных занятий может выступать лекция вдвоём, в которой участвует помимо преподавателя обучающийся. В этом случае тема делится на определённые логические отрезки, последовательно излагаемые обоими участниками занятия. При наличии сформированной языковой культуры, предполагающий адекватный или высокий уровень владения русским языком, может быть реализован иной вариант лекции-диалога, позволяющий осуществить социологический опрос, выявляющий мнение не специалистов по рассматриваемой проблеме.

Ценность таких лекций заключается в их проблемно-полилогическом характере, что помогает через активизацию речевой деятельности обучающихся стимулировать речевую самостоятельность, умение аргументировать личную позицию и творческую мыслительную работу. Как и лекция-провокация, данные лекционные занятия предполагают материал, неоднозначно интерпретируемый в науке и обыденном сознании (нормы профессиональной речи, реформа современного русского языка и проч.).

Проблемная лекция как форма инновационного занятия направлена на развитие внимания, аналитического и критического мышления, на активизацию речевой деятельности на основе моделирования противоречий в реальном знании. Заложенные в лекцию противоречия побуждают участников учебного процесса к самоопределению в речевом поведении и его мотивированному обоснованию (вопрос о грамматических вариантах русского языка, их выборе и речевых ошибках, связанных с их употреблением).

К диалогу как методу относятся такие виды инновационных занятий, как *видео-тренинг* и *видео-семинар*. Оба занятия являются формой закрепления и контроля за усвоением лекционного материала на основе использования видеоматериалов, включающих разнообразные речевые ситуации общего или профессионально-ориентированного характера. Видео-тренинг предполагает совместную работу с преподавателем. Просмотр видеоматериала разбивается на определённые отрезки, которые обусловлены ходом речевой ситуации и требуют комментария, ответов на вопросы, сравнения и сопоставления речевого поведения. Таким материалом, например, являются различные «реалити-шоу», связанные с профессиональной деятельностью специалистов и позволяющие проанализировать ошибки в реальном речевом поведении менеджеров, адвокатов, дизайнеров и проч. на основе сопоставления различных вариантов ситуаций общения. Видео-семинар основывается на подобной работе без участия преподавателя. На первом этапе обучающиеся делятся на группы и, просматривая видеоматериал, готовят его анализ. Второй этап предполагает анализ материала в контексте речевого поведения определённого(ых) персонажа(ей). Группы дополняют друг друга, обмениваются мнениями. Преподаватель выступает в качестве эксперта; подводит итог

семинара, указывает на недочёты, неверный анализ, отмечает сильные стороны проведённой работы.

**Исследование** как метод общеобразовательного аспекта инновирования обучения предполагает организацию учебно-исследовательской работы обучающихся, которая распространяется на их учебное и внеучебное время. При этом организация учебной исследовательской деятельности предполагает:

- приобщение обучающихся к самостоятельной исследовательской работе;
- знакомство с аппаратом научного исследования и его этапами;
- обучение навыкам написания научно-учебного исследования;
- развитие их языковой культуры, в том числе и профессионально-ориентированной речи.

Работа охватывает каждого обучающегося в практическом исследовании той или иной проблемы, соотносящейся с будущей или настоящей специальностью, соответствующей интересам самого индивида или непосредственно связанной с дисциплиной, целенаправленно формирующей языковую культуру (например, «Русский язык и культура речи»). Исходя из различного уровня способностей и интересов обучающихся практикуется два варианта организации их учебно-исследовательской деятельности. Первый вариант сводится к эмпирической части исследования, его оформлению и представлению в рамках учебных занятий, что носит контрольный характер и полностью по набору тем и проблем отражает содержание учебной программы. Второй вариант предполагает создание учебно-исследовательских групп, полноценно исследующих определённую проблему, соотносимую с содержанием дисциплины, но выходящую за её учебные пределы, как правило, касающуюся будущей или настоящей профессиональной деятельности обучающихся.

По своей сути данная работа соответствует проектной деятельности, которая носит долгосрочный характер, предполагает открытую координацию со стороны научного руководителя и подразумевает индивидуальное, парное или групповое решение обозначенной проблемы или вопроса. По методам, используемым в исследованиях, проекты определяются как:

- 1) *исследовательские*, полностью повторяющие структуру и содержание научного труда (например, изучение состояния современной культуры

речи, молодежного сленга, уровня определённого аспекта общей, функциональной или профессиональной грамотности людей заданной возрастной, социальной, проч. категории и т.д.);

- 2) *практико-ориентированные*, направленные на результат, напрямую связанный с использованием в учебной практике обучающихся (например, составление словаря-минимума по конкретной специальности или предмету, опыт разработки учебного материала по дисциплине (схемы, таблицы, тесты и т.д.);
- 3) *творческие*, не имеющие чёткой структуры, но предполагающие рассуждение, осмысление определённого вопроса, эссе в произвольной форме, но с конкретным результатом или решением (работа-эссе).

Результатом работы являются учебно-научные исследования, которые имеют определённое оформление. Итоговая отчётная часть работы обучающихся предполагает или проведение круглого стола, нацеленного на обсуждение и дискуссию, обмен мнениями и информацией по направлениям исследовательских работ; или учебно-научной студенческой конференции.

Результаты исследовательской работы позволяют оценить различные стороны языковой культуры обучающихся: грамотность, правильность речи; логичность изложения; стилистическая выдержанность текста; умение использовать в речи средства привлечения внимания аудитории; умение отвечать на вопросы, подбирая соответствующие аргументы; корректность речевого поведения. Содержание исследовательской работы, отражающее тот или иной аспект языковой культуры, даёт возможность установить объём проделанной обучающимся аналитической и эмпирической работы.

**Игра** как метод общеобразовательного аспекта инновирования обучения предполагает проведение активных семинаров, предусматривающих участие всех без исключения обучающихся. В контексте изучения дисциплин, формирующих уровень владения русским языком будущих или настоящих специалистов, целесообразны ролевые, имитационные и деловые игры, сценарий которых уточняется в зависимости от специализации аудитории (например, игровой семинар «Переговоры», объединяющий в себе ролевой и деловой подходы, имеет разное содержание в аудитории студентов, будущих юристов, и студентов, обучающихся менеджменту). Мини-конференция, подводящая итоги

исследовательской работы обучающихся за конкретный период, также имеет вид ролевой игры, выстраиваясь по типу научной защиты.

Игровые семинары выступают как форма саморазвития обучающихся в процессе познавательно-проектной деятельности. В ходе подготовки им предстоит самостоятельно проанализировать заданную преподавателем проблему, разработать сценарий, распределить роли и в готовом отрепетированном варианте представить вниманию преподавателя и аудитории. Оценка результата имеет многоаспектный вид и учитывает:

- соответствие сценария заданной проблеме, актуальность и жизненность выбранной для сценария ситуации;
- соответствие речевого поведения обучающегося роли в сценарии;
- культуру речи (на уровне норм литературного языка и качеств высокой речи);
- умение выстраивать диалог, монолог, участвовать в дискуссии;
- умение подводить итоги, обобщать;
- умение руководить речевым поведением других участников полилога;
- использование различных средств выразительности речи, в том числе невербальных;
- степень готовности к семинару-игре.

Такая форма организации занятия помогает объективно оценить уровень каждого участника игры как с точки зрения знаний по дисциплине, так и с позиций владения речью.

*Профессионально-ориентированный аспект* инновирования обучения, направленный в основном на формирование профессионально-ориентированной языковой культуры обучающихся, основан на постоянном контроле за их речью в системе занятий по любой дисциплине. Так, например, организация учебно-исследовательской работы студентов в областях, которые носят специальный характер, на протяжении всех лет обучения позволяет более эффективно формировать языковую культуру будущих специалистов, используя её потенциал в развитии творческого, аналитического и критического мышления.

*Личностный аспект* инновирования обучения, позволяющий выстроить работу по самообразованию, саморазвитию и самовоспитанию обучающихся в

системе занятий по специальным дисциплинам, предполагает наличие у них потребности в самореализации и наличие мотивации к самосовершенствованию своей личности. Самообучение, как и учебная деятельность, строится на взаимодействии двух этапов – на программном обучении и контроле собственных результатов, достижений. Оба этапа легко реализуются в контексте дистанционного образования, которое, в рассматриваемом случае, включает в себя определённый комплекс образовательных услуг и позволяет обучающимся повторить материал дисциплины, восполнить недостающие знания и осуществить самоконтроль. В этих целях используются возможности кейс-технологии, предполагающей работу с учебно-методическим комплексом. Последний состоит из программы изучения дисциплины, методических указаний к семинарам и практикумам, вопросы и задания для самоконтроля; методических указаний по подготовке и оформлению реферата, по написанию контрольной работы; включает учебники, учебные пособия и справочную литературу по культуре речи, стилистике и основам мастерства публичного выступления в электронном виде; тесты для проверки остаточных знаний обучающихся по всем темам курса. Данная комплектация материалов передаётся обучающимся для самообучения и самоконтроля, а также находится внутри сети Интранет. Использование кейс-технологии также предполагает установление индивидуального контроля за усвоением тех или иных тем и вопросов программы и индивидуальное консультирование. В этих целях создаются папки на каждого обучающегося и разрабатываются индивидуальные листы освоения дисциплины. В папках размещаются задания по всем темам программы. Задания носят дифференцированный и личностно ориентированный характер, находясь в соответствии с уровнем языковой культуры обучающегося, его речевыми ошибками и интересами в целом. Самостоятельное выполнение заданий предполагает отчётность обучающихся перед преподавателем в ходе непосредственного личного консультирования или консультирования через сеть Интранет и Интернет.

Рассмотрим конкретный пример, позволяющий проиллюстрировать инновирование процесса обучения в системе деятельности по формированию и развитию культуры родного языка специалистов.



Формирование языковой и коммуникативной компетенций личности осуществляется при применении такого метода, как исследование репрезентации категории оценки в пространстве художественного текста. Выбор в качестве языкового материала художественного текста обусловлен многими факторами, среди которых возможность самореализации сразу в нескольких ипостасях: читателя, интерпретатора авторского замысла и собственно исследователя, что, несомненно, позволит повысить общую языковую культуру.

Оценка – это категория, обусловленная вторичным (субъективным) членением мира, в «основе которого лежат не реальные свойства предметов и явлений, а лишь наши субъективные от них впечатления, наши эмоциональные реакции на них и умственные заключения об их роли в нашей жизни» [2, с. 55-62]. И если для выражения субъективного впечатления говорящий, как правило, использует в соответствующей ситуации языковые средства с общеоценочной и частнооценочной семантикой (хорошо/плохо, красиво/некрасиво, нравится/не нравится), мир, объективированный в художественном тексте, всегда субъективен и индивидуален, он изначально оценен, отрефлексирован, эмоционально пережит автором.

Художественный текст – репрезентация авторской картины мира посредством тех ее составляющих, которые отражают представление автора о тех или иных предметах, явлениях, ценностях, действиях. В каждом из произведений автор выстраивает идеальную модель мира, которая формируется на основе культурных эталонов, канонов, стереотипов, ценностей.

Взаимодействие человека и действительности, ее членение на ценности и их вхождение в картину мира диктует оценка: она отражает, как следует и как не следует поступать, и потому становится прескрипцией и участвует в формировании социальных норм поведения [3]. Таким образом, в основе моделей мира лежат оценки. В отличие от моделей, которые стоят за общеязыковой картиной мира, индивидуальные – субъективны. Ценности, которые их определяют, не противоречат системе общечеловеческих, но могут не соответствовать им с точки зрения иерархии и языковой репрезентации.

Пространство художественного текста, или художественный дискурс, в котором осуществляется взаимодействие сознаний автора и читателя, опосредованное текстом, влияет как на механизмы, обеспечивающие функцио-



нирование оценочных единиц, так и на способы репрезентации оценочных смыслов. Это позволяет исследователю говорить о художественной оценке как особой индивидуально-субъективной форме преломления окружающего мира, а также открывает новые возможности для интерпретатора художественного текста.

Изучение системы категориальных признаков художественного текста приводит исследователя к выявлению одному из наиболее любопытных – имплицитности. «Когда говорят об имплицитности, имеют в виду, что говорящий чего-то «недовложил» в свою речь, которую, тем не менее, адресат способен понять и «доинтерпретировать» (часто имея полное право потребовать от собеседника «отстоя и долива» речи). Техника понимания имплицитности как раз и состоит в установлении того, что же недовложено и как следует восполнить этот пробел, опираясь на сам текст, на обстоятельства его восприятия, а иногда даже на знание жизненного пути автора речи [6, с. 38]. Деятельность читателя заключается постоянном переходе с плана повествования (авторского плана) на план дискурса (плана персонажей, плана конкретных эпизодов, событий, обуславливающих состояние и настроение персонажей), т.е. от локальной интерпретации (интерпретации фрагмента) к глобальной. Имплицитность художественного текста связана с категорией цельности, благодаря которой процесс восприятия текста предполагает как последовательное понимание отдельных фрагментов, смыслов, так и понимание текста в целом. Переход к глобальному пониманию текста необходим, когда степень информационной неполноты становится очень высокой либо превышающей допустимый «порог сложности». Глобальное понимание позволяет оценить текст как модель, соотносимую с другими моделями. При этом информационно-энергетическая емкость текста возрастает, поскольку чтение «крупным планом» предполагает активизацию всех ресурсов хранимого знания и экспликацию части имплицитного знания. В результате такого чтения-понимания в сознании читателя создается проекция текста, сам читатель выступает в роли автора новой «сконструированной» реальности текста.

Простор для интерпретации авторского текста обеспечивают языковые средства, объективирующие имплицитное знание в художественном дискурсе, котором и осуществляется взаимодействие читателя и текста (и через текст

автора). Это взаимодействие, с одной стороны, обусловлено интенциями автора, который, посредством языковых средств, репрезентирующих его смыслы, удерживает читателя в рамках интерпретации, а с другой стороны, посредством тех же языковых средств, дает простор для интерпретации, в процессе которой читатель может/не может привнести в текст новое, предполагаемое/непредполагаемое автором.

Имплицитное знание выводится читателем-исследователем только в процессе его восприятия текста. Что и делает читателя обязательным элементом дискурса, в котором авторский замысел разворачивается. Таким образом, художественный дискурс – это одновременно и процесс актуализации авторских смыслов в читательском сознании, и результат творения новой читательской реальности (нового текста). Высокой степенью смысловой и эмоциональной насыщенности, образностью, раскрывающейся в художественном дискурсе, обладают языковые средства, имплицитно репрезентирующие авторские смыслы.

Выявление этих языковых средств из текста методом сплошной выборки, с одной стороны, позволяет исследователю «вчитаться» в текст, а с другой, – «почувствовать» язык автора и включиться в процесс сотворчества. Имплицитность способствует читательской генерации смыслов, поскольку то, что не высказано явно и намекает на что-то иное, является источником читательских проекций в интерпретации.

В качестве исследовательского материала был выбран роман «Дар» В.В. Набокова (Сирина), необычный стиль которого сам по себе есть стратегия художественного общения. Своеобразие языка произведений В.В. Набокова заключается в его повышенной имплицитности, недоговоренности либо «чрезмерном многословии», за которым следует искать «восхитительную изнанку», ключ к интерпретации авторских смыслов.

Любое литературное произведение содержит в себе индивидуально-авторский способ восприятия мироустройства, т.е. один из вариантов концептуализации мира. Выраженные в литературной форме представления автора – это система знаний о мире, направленных читателю. В этой системе наряду с универсальными общечеловеческими знаниями содержатся индивидуальные представления, измерения и оценки и способы их репрезентации,

иногда отличные от общепринятых в языке. Отклонения несут дополнительную художественную информацию (иногда прямо противоположную), и задача исследователя заключается в ее извлечении. Обладая высоким аксиологическим потенциалом, художественный текст создает систему ценностей/антиценностей, оценок в индивидуальной картине мира автора, которые эксплицируются и имплицитно выражаются в языковых значениях.

Анализ репрезентаций оценочных смыслов в языке художественных текстов В.В. Набокова позволил исследователям выявить, по крайней мере, два способа представления оценки:

- 1) типичный, общепринятый, обусловленный стереотипным знанием об объектах оценки и количественных и качественных признаках, по которым производится сравнение и оценивание, и
- 2) индивидуально-авторский, обусловленный авторской же системой ценностей, объектов оценки, шкалой и признаками оценивания.

«Когда мы говорим, что улица широкая, подразумевается, что улицы могут быть разной ширины и что данная улица располагается в некотором ряду, где улицы расположены по нарастанию/убыванию этого признака. Большое дерево соответственно предполагает ряд, в котором помещают деревья разной величины. Только сравнив А с Б, можно сказать, что А — большое, а Б — маленькое» [3].

Примером типичного способа репрезентации оценки может быть выражение отношения субъекта к объекту оценки посредством соответствующей лексики: *истово люблю, горячо люблю, люблю, выбрасываю целиком автора (писателя)*; свойства объекта, к которому относится оценка: *огромный (красный) корабль / гигантский корабль, большая (старая берлинская) квартира / небольшая (трогательно роскошная) квартира* и т. п.

Художественная оценка может оценивать то, что обычно «безразлично оценке». Взгляд художника иначе воспринимает явления, «взаимодействие субъекта с которыми отсутствует или настолько слабо, что их ценность равно нулю» [3, с. 17].

*Жирные кресла, стеклянный стол–гигант.*

*Канцелярская, большая, неказистая, с голыми, вздрагивающими окнами, задышалась от нагромождения пыльной, грязной мебели* [7].

Любопытно, что вне контекста данные объекты (кресла, стол, канцелярская, слог, звук слов) не могут быть маркированы знаком «+» или «-». Таким образом, художественный дискурс создает условия, в которых любой предмет становится функционально значимым, следовательно, оцениваемым. Критерии оценки также могут иметь субъективный характер, восходящий ценностным установкам автора, для которого предметы окружающего мира несут отзвук отношения к их владельцам (примеры выше) либо знак «самостоятельной одушевленности»:

*Мебельный фургон, очень длинный и очень желтый, запряженный трактором с гипертрофией задних колес и более чем откровенной анатомией* – наличие интенсификаторов *очень* и *более чем* вносит в описание предметов эмоционально-оценочный элемент и делает их «небезразличными» для оценки.

Ср. также: *жиденькая, удобозапоминаемая лирика, жадно ждущая переложения на музыку, как избавления от бледной немочи слов* [7].

Выше приведенный пример содержит иронию, которая усиливает отрицательную оценку объектов, представленную имплицитно. Имплицитность художественной оценки в свою очередь актуализирует вопрос о структуре оценочной шкалы, на которой находится целый ряд признаков, способных двигаться по нарастающей/убывающей, по интенсификации/деинтенсификации признаков, учитывающей присутствие/отсутствие крайней точки для данного признака и, возможно, еще ряд параметров. Таким образом, свойством шкалы оценок является прежде всего признак нарастания, как в сторону увеличения, так и в сторону уменьшения количества данного признака [1, с. 332-333]. Однако, как показывает анализ репрезентаций оценочных смыслов, они не градуируются: *полная неосведомленность об окружающем мире* – не противопоставляется неполной (частичной) неосведомленности, также как и *полная неспособность что-либо именовать*.

Но поскольку отсутствие степеней выраженности признака, по которому может оцениваться объект, противоречит сущности оценки, то можно сделать вывод и об имплицитности шкалы художественной оценки.

Проведенные исследования позволили сделать следующие выводы: художественный дискурс создает определенные условия, в которых имплицит-

ность текста открывает новые возможности для читательской интерпретации, а также позволяет выявлять скрытые механизмы функционирования оценочных единиц, репрезентирующих авторские смыслы, и увидеть структурные особенности художественной оценки.

Таким образом, инновирование обучения выступает в качестве интерактивной технологии, соединяя в образовательном процессе модели экстенсивного, продуктивного и интенсивного обучения [4; 5, с. 48]: от передачи обучающимся как можно большего объёма качественных знаний к профессиональной подготовке и формированию квалифицированного специалиста, к выработке осознанной потребности в непрерывном образовании – в самосовершенствовании, саморазвитии и самовоспитании. При этом каждая из обозначенных моделей основывается на создании активной речевой, коммуникативной, среды, в которой диалог и текстовая деятельность в широком смысле слова становятся функционально значимыми; развивая общую культуру обучающегося, формируют профессиональный облик будущего или настоящего специалиста и корректируют его функциональную грамотность [9].

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**Таблица 1. Инновирование процесса обучения по формированию и развитию общей и профессионально-ориентированной языковой культуры студентов**

Модель инновирования обучения по формированию и развитию общей и профессионально-ориентированной языковой культуры студентов	Высшее и среднее профессиональное образование						1-2 курсы вузов и ссузов	3-4 курсы вузов и ссузов	5 курсы вузов
	Аспекты инновирования	Специальная дисциплина	Прочие дисциплины	Цели обучения		Установление имеющегося уровня языковой культуры, его корректировка, развитие языковой культуры студентов в условиях общеинтегрированной подготовки и усвоения модели деятельности специалиста.	Развитие профессионально-ориентированной языковой культуры в целях эффективного профессионального самообразования студентов.	Формирование адекватного и высокого уровня языковой культуры студентов при их подготовке к профессиональной деятельности применительно к повседневным и экстремальным ситуациям.	
				Формы работы	Методы и способы				
									Диалог
Общеразвивательный аспект	Русский язык и Культура речи	Предметы общественной и профессиональной направленности	Аудиотонные формы работы	Лекция-беседа, лекция-диалог, круглый стол, видео-семинар.	Лекция-беседа, лекция-провокация, круглый стол, видео-семинар, видео-лекция.	Рольевые, деловые игры, моделирующие различные повседневные и профессионально-ориентированные ситуации.			
Предметно-профильный аспект									

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## ***Black and white colors in the works of D. Samoilov***

**Abstract:** The article deals with black and white colors in the lyric and lyric-epic texts David Samoilov. Despite the fact that the works of the author of many colors, these two colors predominate over the other, and so the choice fell on them. It updated the impact of ideological and thematic aspects of the work and artistic problems of the poet to the color; and - the effect of color on mood and soul of the reader. The author seeks to identify the synthesis of the poetic text and color.

**Keywords:** black, white, color, synthesis, transformation, dimension, analysis.

The white color found in the collections of the early thirteen times, performing the same functions as the other colors, discussed above. Colour code of concrete, natural «white birch»; «White geese», «white swallow», «Snow White», etc. [1]. White - is the element of light. The white color and is used as a metaphor: «White Light» - life [1:55]. There are contrasting colors: white on a gray background, carrying the mood of anxiety: «*They set off the white/gray background on this/And suddenly, sensing that spring anxiously neighing horses*» - «*Им оттенялась белизна/На этом сером фоне/И вдруг, почуяв, что весна, тревожно ржали кони*» [1:77].

Using white Samoilov traditionally white - the color of purity, innocence, softness, femininity, represents a good start. In the Russian tradition - it is the color of holiness, detachment from worldly, spiritual aspiration for simplicity in the Christian



tradition. White is the relationship with the divine light. «Mountain Light» perhaps connects with the Sermon on the Mount Jesus [1: 304]. David Samoilov use all the positive connotations of white light and color, is also transmitted his state of mind.

As a «color effect on the soul: they can cause feelings awaken emotions and thoughts that we are concerned, sad or pleased» - «цвета действуют на душу: они могут вызывать чувства, пробуждать эмоции и мысли, которые нас волнуют, печалят или радуют» by the statements I.V. Goethe, and vice versa, thoughts, feelings, mood, state of mind affects the choice of colors, even if this happens, perhaps unconsciously ... [2]. But this is a question for the author. «And yet, yet, yet ...». Despite the fact that the works are found in many colors, dominates the first two collections of early black conveying the complexity and contradictions of the world lyrical, his thoughts, feelings, passions, dramatic nature of life creativity disharmony.

Black met fourteen times, the fifteenth - blue-black. Let us dwell on only two examples. In the color image of «The Black Poplar» - a premonition of trouble, the drama.

Color is used in its conventional meaning: is a zero in the spectrum of color or, more precisely it is not in the spectrum. It is the color of night, death, witches, black magic, as opposed to white. Black and white - the eternal confrontation between the two began. Black is almost always a gloomy associations. The most negative color, an additional test of Max Luscher [3]. Antipode white. Only in one text of the poem «Black Poplar» black occurs six times: «black poplar»; «Black winter»; «Black Crow» - folklore predicts impending death; «Black streams», etc. [1:77]. Eaten contrasting colors also have trouble mood, anxiety, grief: «*In white and black / Winter dry and mellow/The day of April was wearing/one only paint – gray*» - «*На белый цвет и черный цвет/Зимы сухой и спело/–Тот день апрельский был одет/Одной лишь краской – серой*» [1:77]. Complementing the negative connotations gray.

In tone, attitude, use of black and gray colors - the colors, «The Black Poplar» connects with the text «Music, twisted tightly», where color enhanced experienced lyrical hero throes of creation.

«Blue-black plate» (as Max Luscher test a combination of blue and black reflects the negative state, the negative attitude to the situation); as well as «black

braids»; or «cast raven's wing» of the plate; or «black horse hair»; and reinforce negative connotations. The text seamlessly blends yellow alcohol transmitting painful condition lyrical and supplementing unsatisfied attitude [1:79].

The collection «The Bay» (1978-1981), created already in Parnu, Estonia, the color palette changes dramatically. Colours somewhat poorer than in the first two earlier collections. In the «Gulf» so it is important focus on interior space, its rejection of the plain text color multicolored. But again - the confrontation between the white - black, although small, but in favor of the black.

So black in the collection «The Bay» occurs 5 times, dark - 6 times, white - 4 times, gold - 4 times, red and blue 3 times, twice - red, green, gray, pale and hazy. Once yellow, silver, gray, gloomy, scarlet, white on blue.

With the move to Parnu designated new features in the life and work of the poet, his poetry became more tart, did not lost its former strength and passion, which could not but affect the color palette of the word. A special role is played by the Baltic landscape, is therefore determined by the following parameters: «*variable weather*», «*wind*», «*fog*», «*climate*», «*dosage landscape*», «*isolation*», marked «*gloomy years*», «*twilight*», «*cloudy eyes*» sad, desperate, «*darkness*», «*the darkness*», «*foggy March*», «*pale water*», «*blue-gray clouds*», «*gray sea*», «*weak light*» - «*переменная погода*», «*ветер*», «*туман*», «*микроклимат*», «*дозированный пейзаж*», «*замкнутость*», маркированный «*сумрачными годами*», «*сумерками*», «*пасмурным взглядом*», печальным, отчаянным, «*мраком*», «*потёмками*», «*туманным мартом*», «*бледной водой*», «*сизыми тучами*», «*серым морем*», «*слабым светом*» [1: 227-304; 4].

The frequency of «color space» (classification Volkov, that is the color that we see color, filling depth): color of the fog, water, generally painted spatial environment, «*darkness*», «*gray and dark*», «*dusk*» «*light*» (light marker), «*white on a gray background*», «*blue*», «*black night*», «*darkness*», «*dark*», «*dark*», «*foggy*», «*dim light*», «*light*» *light*», etc. - «*мрак*», «*серо и темно*», «*сумрак*», «*светло*», (световой маркер), «*белизна на сером фоне*», «*синева*», «*ночь черна*», «*потемки*», «*тьма*», «*темный*», «*туманный*», «*слабый свет*», «*свет*», *светло*» и т.д. [1: 227-304; 4; 5].

Actualized gloomy color that has at its core a black and white tone. Twilight - time of day, in low light, the person ceases to distinguish colors, and the world

appears in gloomy tones. The poem «Return cool reel», in which «the gloomy years» bear a negative connotation, implicitly associated with the text S. Marshak «Nightfall years». From Jewish folk songs.

*"We have fenced off from the world Jewish/<...>/brigady-/Leaky outfits/Bare heel, march forward/Forward under the burden of misery/<...>/unchanged days go/ You have no sun, neither liberty/And only labor, hard work/<...>/Any of us who live in the ghetto/Death and torture condemned - «Отгородили нас от света /<...>/ Еврейские бригады/Дырявые наряды/Босые пятки, марш вперед / Вперед под бременем невзгод /<...>/ Без перемены дни идут/У вас ни солнца, ни свободы,/ А только труд, тяжёлый труд /<...>/ Любой из нас, живущий в гетто/На смерть и пытку осужден [6].*

In David Samoilov says: *I have lived as much/happy and gloomy years/I watched the movie before/and leave the room to light - Я прожил ни много ни мало/ Счастливых и сумрачных лет/Я фильм досмотрел до начала/И выйду из зала на свет [1: 232].*

Synonyms twilight: twilight, darkness, darkness, time from dusk to night ... In David Samoilov, like S Marshak, memories of the gloomy years expressed in the lines:

*Spin my tape back/schadenfreude, a mechanic, a stray / But I see twice / Everything that happened to me - Крути мою ленту обратно / Злорадствуй, механик, шальной/Зато я увижу двукратно/Всё то, что случилось со мной [1: 232].*

Black can also be used as a metaphor. For example, in the poem «Richter» from the collection «The Bay» - «Black Swan» - metaphor for the black piano.

Finally, the frequency of use of colors in the last two collections published after the death of David Samoilov. «From the last verses» (Tallinn, 1992) and «hell» (Moscow, 1994).

And here is the same picture: the predominant black color as used 8 times, the adjective dark - 7 times, a white - seven times, red - 5 times, the blue - 4 times, three times the used - blue, gray, lead («lead drops fell» - silver); the used three «light» - as the background («abstract» color classification Volkov, that is, if the color remains only vaguely localized spot called abstract or free color, create a background tone). At one time there - red, green, dark green, yellow, gold, gray, gray, pale, red, apple, brown. Foggy, cloudy, clear and fishy - eating as «colored abstract available» creating the background tone [4; 5].

Black, and the dominant color the used as a definition of the subject as concrete, natural color notation: «Black Bull» and as a metaphor: «black»: ignorant, uncultured environment crowd; «Black flour» - gloomy thoughts, suffering. In the text there are horses image raven - harbingers of death and «Black of all sorrows» old woman from the collection «hell» «in black shawls» feeding pigeons [4; 5].

I want to draw attention to that used in the latter collections green image of the moon, not the standard notation. In nature, there is a green moon. Mysterious green color in the poem «Old Vilna» connects with magic, witchcraft, *«Indeed, we have come upon many / Since when cooked in a crucible Magic root sorcerer? / Stroll green moon over the old university»* - *«И вправду, много ль мы постигли / С тех пор, когда варился в тигле / Волшебный корень колдуна? / Брела зеленая луна / Над старым университетом»* [5: 4].

We want to draw attention to that used in the latter collections green image of the moon, not the standard notation. In nature, there is a green moon. Mysterious green color in the poem «Old Vilna» connects with magic, sorcery [5: 4].

It is impossible not to draw attention to one more color notation: «Blue alloy» - *«Синий сплав»* in the poem «Violist in March» / *«and pours, flows through the transom / Melody and blue alloy»* / *«...»* / *«Maid seems like a miracle / Here comes»* - *«Альтист в марше»* / *«И льётся, льется сквозь фрамугу / Мелодия и синий сплав»* / *«...»* / *«Девушка кажется, что чудо / Здесь происходит»* [4:43].

Known gold alloy blue. As the impurities it contains iron. 3 parts pure gold and a piece of steel - a gold sample 72; 2 parts pure gold and 1 piece of steel - a sample of 64 gold. Most likely, in the text of the poem «Blue alloy» - a metaphor. Melody - identified with a gold, a miracle.

In the poem «The Orchestra», «Laocoon helicons - Gardener tunes / copper vases» [4:42]. Copper color ties likely to wind instruments brass instruments. Laocoon, as you know, the priest of Neptune, here it is - the priest helicons (Helicon same - the mountain in Ancient Greece, the abode of the God Apollo, the patron of the sciences, arts, music).

However, this is only speculation. We cannot ignore the subjective perception of color by the author. It is known that, for example, AN Scriabin first decided to directly connect with the color tone. He conceived in his symphonic poem «Prometheus» (for orchestra, choir, organ and piano solo) enter the game «light

Clavier». Sam A. Scriabin marked in the score of «Prometheus» (The Poem of Fire), which should, in his opinion, «vague», where «sparkling» and where the «luminous wave». The idea of color music is not accidental. It is known that the color has a strong influence on the person - his mood and even health. In A.N. Scriabin in line Luce main tone F-sharp answers blue-purple colors, corresponds to the beginning of the demonic. A.N. Scriabin whole gamut Up - Major works and by the sounds of this range, seen in red, and the La - Major perceived as green. N.A. Rimsky-Korsakov Up - Major perceived as white, and La Major - pink.

Isaac Newton likened seven different heights of sounds - a scale - seven colors of the rainbow, trying to deduce the mathematical law, the color of one or other note-sound:

Up - Red, Re - Purple, Re - purple, Mi - blue, Fa - Blue, Salt - green, La - yellow, C - Orange [7].

So, as the analysis of the prevalence of color, colorful epithets and definitions, David Samoilov innate characteristic precision of artistic vision: to color the alphabet is represented by the poet almost the entire palette of colors, both basic and complementary colors (Max Luscher test), a lot of color, pictorial images a lot of natural, living, natural colors.

The color story is not moving from light into darkness (the darkness is represented in all five compilations), but the colors «fade» in the «Gulf», many disappear or not so frequent in the past, published after the death of the poet's collections.

In each of the five books as early, middle (suspended) and late periods of the dominant black versus white. Symbolizing the colors are more from the art of ancient Rus, folklore. White - symbolizes all kinds of good deeds and motivations, yet scary, evil, ruthless personified in black, devilish likeness of man. Although not much in their frequency of black ink exceeding white and light tone, and «Still, Still, Still», the dominant black color, it seems to me, shows a dramatic nerve of his lyrics, and drama outlook in all periods of his life creation, reflected in his poetry (a «*poetry - the poet's fate, the fate of which is doomed for what was called the poet*» - «*поэзия – судьба поэта, судьба, которой обречен, за что поэтом наречен*»), I wrote about the poet himself [8: 231].

David Samoilov coloristic characteristics due to additional lyrics, examining the colors symbolic, metaphorical, of comparative, concrete, natural color designation, as well as the proposed classification (by N. Volkov) color space, surface and abstract, free of color as a result of fusion poetic text and color appears as a dramatic poet of fate that began, in fact, even with the war, and continued until the end of days.

Which, of course, did not prevent him from enjoying multicolored life itself, as evidenced by the many colors of the living of his texts - poems, especially the early period of life creation.

On the question of the audience in 1987: «Your Way» from then to today?» - «Ваш путь «от тогда к сегодня?». David Samoilov said: «*The way to happiness with the complete loss of pleasure*» - «Путь к счастью с полной утратой удовольствий» [9:20].

Calculations certainly conditional. The percentage classification of colors and color - it's just a small fraction compared to other words - the tokens in the text of the poem. Nevertheless, in my view, the table of colors and light brings out the various functions of color and light in a lyrical text and confirms David Samoilov artistic objective picture of the world, created by David Samoilov.

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### ***Three obstacles to normalization of Chinese-Soviet relations: rise and overcome (1960s–1989)***

**Abstract:** The article describes the historical stages of relations between the Soviet Union and China. The problem of different understanding of the leaders of the USSR and the PRC "the border issue," the "royal negotiations with China" and "equality". It was concluded that only the theory and practice of "new political thinking" have made possible to overcome the obstacles to the normalization of Soviet-Chinese relations. Three obstacles to the advancement of Soviet-Chinese relations and their overcome in the era of perestroika.

**Keywords:** Soviet-Chinese relations, the border issue, equality, hegemony, three obstacles.

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### ***Три препятствия на пути к нормализации советско-китайских отношений: возникновение и преодоление (1960-е–1989 гг.)***

**Аннотация:** В статье раскрываются исторические этапы взаимоотношений Советского Союза и Китая. Рассматривается проблема разного пони-



мания руководителями СССР и КНР «пограничного вопроса», «царских договоров с Китаем» и «равноправия». Сделан вывод, что только теория и практика «нового политического мышления» позволила преодолеть три препятствия для нормализации советско-китайских отношений.

**Ключевые слова:** советско-китайские отношения, пограничный вопрос, равноправие, гегемонизм, три препятствия.

Во второй половине 1950-х годов советско-китайские отношения начали ухудшаться, сначала только в идеологической сфере. У Коммунистической партии Советского Союза (КПСС) и Коммунистической партии Китая (КПК) возникла острая дискуссия по вопросам построения социализма и коммунизма. «Проблема границ» на официальном уровне в этот период не ставилась. В соответствии с договором о дружбе, союзе, и взаимной помощи (1950 г.) советско-китайская граница трактовалась как граница добрососедства, где между населением пограничных районов поддерживались активные связи, велась оживленная торговля, был налажен культурный обмен. Однако с начала 1960-х годов советский и китайский лидеры много раз высказывали своё мнения о пограничном вопросе, который становился основной проблемой во взаимоотношениях между КНР и СССР.

В некоторых китайских публикациях утверждается, что «китайско-советская война» началась с событий 1962 года, когда из Синьцзян-Уйгурского автономного района Китая в Советский Союз бежали несколько десятков тысяч человек. Однако специальная комиссия во главе с начальником генерального штаба НОАК Ло Жуйцином в том же 1962 году пришла к выводу, что исход людей в СССР был стихийным и никакие советские учреждения не имели к этому никакого отношения [1].

В марте 1963 года в статье, опубликованной в газете «Женьминь Жибао» уже утверждалось, что так называемые «царские договоры» (Айгунский 1858 г. и Пекинский 1860 г.) являются неравноправными. Такие слова на взгляд Москвы были основой для претензий КНР на территории Советского Союза. Эти дискуссии вели не только к обострению идеологических споров, но и к территориальным конфликтам.



Переговоры по урегулированию пограничных вопросов были начаты в феврале 1964 года. Н.С. Хрущев пошел навстречу предложению Лю Шаоци и согласился в ходе переговоров, готовя новый договор о границе, по новому разграничить острова, сделав границей главный фарватер судоходной или середину несудоходной реки. Ранее по договорам XIX века все острова расположенные на реках принадлежали России.

В ходе пограничных переговоров выявились более глубокие противоречия. Точка зрения советской стороны заключалась в том, что между двумя странами нет пограничных проблем, так как советско-китайская граница оформлялась еще в XIX веке. Китайская сторона доказывала, что все договоры между императорской Россией и Китаем были неравноправными. Советская сторона определяла эти требования как «абсурдные» [2]. Руководство КНР не требовало немедленно вернуть спорную территорию, но оно настаивало на обсуждении этой проблемы. Эти переговоры затянулись почти на 30 лет.

Северным соседом КНР является Монголия, а Монголия была союзником СССР, и принимала венную защиту от Советского Союза. С начала китайско-советского раскола, Монголия поддержала Советский Союз и разрешила развертывание советских войск на своей территории, что привело к негативной реакции со стороны Китая. Китайские руководители говорили об объединении Внешней и Внутренней Монголии в составе КНР. Из Москвы отвечали, что судьба монгольского народа должна определяться не в Пекине и не в Москве, а в Улан-Баторе. С 1963 года Москва не только усилила военное присутствие на советско-китайской границе, но оказывала еще большую военную помощь Монголии. В июле этого же года Советский Союз заключил с Монголией специальное соглашение о помощи в укреплении южной границы. Эти события усилили опасения Китая, и привели к так называемому «препятствию» для улучшения взаимоотношений с СССР.

Кульминацией противодействия двух стран были кровопролитные военные стычки на острове Даманском (китайское название Чженьбаодао) на реке Уссури и у озера Жаланашколь (в Китае конфликт известен как инцидент у реки Теректы) в 1969 году. После этого СССР по мнению КНР развернул на советско-китайской и монгольско-китайской границе «многомиллионную армию». Это в свою очередь еще больше осложнило отношения с КНР. Китайская

сторона переходит к новой дипломатической стратегии создания «единого широкого фронта», то есть блокирования с США против СССР.

11 сентября 1969 года слова о «нормализация советско-китайских отношений» первый раз появились в беседе между советским и китайским премьер-министрами в пекинском аэропорту. Премьер-министр СССР А.Н. Косыгин сказал, что руководство СССР считает необходимым, принять все меры для улучшения советско-китайских отношений. Премьер-министр КНР Чжоу Эньлай подчеркнул, что спор о марксизме-ленинизме между КНР и СССР не должен препятствовать нормализации китайско-советских отношений [4]. После этой встречи были восстановлены пограничные переговоры и торговые связи. Позже премьер-министры также обменялись письмами. В ответном письме Чжоу Эньлаю Н.А. Косыгин предложил меры по нормализации ситуации на границе. В октябре 1969 г. возобновились переговоры по пограничным вопросам. Однако китайская сторона доказывала существование серьезной военной угрозы со стороны СССР и готовилась к возможному «масштабному вторжению СССР» [5].

В начале 1970-х годов китайское руководство выдвинуло положение о «спорных территориях» и предложило заключить промежуточное соглашение, в котором были бы зафиксированы положения о статус-кво на границе. Однако, советское руководство считало, что предлагаемая линия границы проведена произвольно, без подтверждения какими-либо документами. 26 ноября 1974 года, характеризуя позицию китайской стороны Л.И. Брежнев заявил о том, что «мы не претендуем ни на какие чужие территории, и в этом смысле для нас никаких «спорных территорий» не существует [6]. В ответ на это последовало ряд заявлений Хуа Гофэна, общий смысл которых сводился к определению Советского Союза «главным очагом новой мировой войны» [7]. Принцип «препятствий» на пути к улучшению взаимоотношений между СССР и КНР Дэн Сяопин сформулировал 29 августа 1979 года на собрании Политбюро ЦК КПК. Еще до этого 3 апреля 1979 года постоянный комитет Всекитайского собрания народных представителей принял решение не продлевать Договор о дружбе, союзе и взаимной помощи между Китаем и Советским Союзом заключённый в 1950 году. Министр иностранных дел КНР Хуанхуа на встрече с послом СССР в КНР И.С. Шербаковым сообщил об этом решение советской стороне, и вновь

подтвердил неуклонную позицию китайского правительства развивать китайско-советские нормальные отношения на основе пяти принципов мирного сосуществования [8]. Однако в СССР трактовали пять принципов как основу для взаимоотношений между СССР и капиталистическими странами. С социалистическими странами, по мнению СССР отношения должны строиться на основе «братской помощи и сотрудничества».

7 апреля в газете «Правда» была опубликована статья И. Александрова «Вопреки интересам мира и социализма». В статье утверждалось, что договор, выражал волю народов обеих стран крепить и развивать единство действий в интересах социализма и мира, давал отпор империалистической агрессии, был ярким символом союза победившего социализма с революционным движением угнетенных народов Востока. Автор не соглашался с мнением, пекинских руководителей о том, что договор является устаревшим, не отвечает реальной действительности. Еще более острыми были обвинения китайского руководства в том, что они предали социализм, и установили тесную связь с капиталистическими странами и реализуют военное блокирование, на основе антисоветизма, с империализмом, сторонниками реакции и войны. Советская сторона заявляла, что вся ответственность за прекращение действия Договора о дружбе, союзе и взаимной помощи между СССР и КНР ложится на китайскую сторону, и разумеется СССР, сделает соответствующие выводы из указанных действий китайской стороны [8]. 17 апреля 1979 года китайская сторона свой ответ опубликовала в статье под названием «Почему Москва метала громы и молнии?» В статье было написано, что в первой половине 1950-х годов, договора о дружбе, союзе и взаимной помощи между СССР и КНР способствовал безопасности КНР и СССР их дружбе, защищал мир на Дальнем Востоке, способствовал прогрессу человечества. Но после того как «мирная обстановка сильно изменилась из-за нарушения советской стороной его смысла и содержания», этот договор существовал только на словах и Китайская сторона решила не продлевать договор по истечении срока. По мнению китайского, правительства, договор заключили суверенные государства, и не продлевать договор внутреннее дело КНР, а Москва не имеет права угрожать КНР. Кроме этого китайское руководство обвинило СССР в гегемонизме [9].

29 августа 1979 года политбюро ЦК КПК созвало специальное собрание, на котором обсуждалась проблема переговоров между КНР и СССР. На собрании Дэн Сяопин сказал, что главной целью на переговорах является задача снизить уровень военной угрозы со стороны СССР. Он впервые сформулировал и принцип «препятствий» на пути к улучшению взаимоотношений между СССР. Конкретными требованиями по устранению препятствий были отвод войск из Монголии и отказ от поддержки агрессии Вьетнама в Кампучии [10].

3-его ноября 1978 года, после завершения советско-вьетнамских переговоров, СССР и Вьетнам заключили договор о дружбе и сотрудничестве. Но на взгляде китайской стороны, этот договор носил характер военного союза. Вооружённый Кампучийско-Вьетнамский конфликт продолжался с 1975 по 1989 год. Конфликт состоял из двух этапов — пограничной войны между странами (1975—1978) и гражданской войны в Кампучии при активном участии вьетнамской армии (1979—1989). 25 декабря 1978 года, Вьетнамская армия вошла на территорию Кампучии, 7 января 1979 года эти войска захватывала столицу Кампучии Пномпень. Эта военная деятельность вызвала противодействие с китайской стороны. Между СССР и Вьетнам были союзнические отношения и военное сотрудничество. Поэтому Советский Союз оказал Вьетнаму помощь снаряжением, оружием и стратегическими ресурсами. Китайское руководство считало, что армии враждующих стран могут перенести вооруженные столкновения на их границу. В конце концов, китайское правительство решило осуществить «войну самозащиты и отпора». Цель этой войны заключалась в «сдерживание расширения» Советского Союза осудил китайское действие и увеличил военную деятельность в советско-китайском пограничном районе.

Таким образом, враждебная атмосфера между двумя странами вновь усилилась. Однако в июне 1979 года обе стороны договорились провести переговоры на уровне зам. министров иностранных дел по нерешённым между СССР КНР вопросам. Такие переговоры состоялись 17 октября 1979 года в Москве. На переговорах советская сторона предложила проект Советско-китайская декларация по взаимоотношениям, китайская сторона также предложила документ об улучшении китайско-советских отношений. Китайская сторона требовала снизить военную угрозу, уменьшить военную силу в

пограничном районе на уровне до 1964 года, отвести войска и военное оборудование из Монголии, прекратить поддержку Вьетнама в Кампучии. Китайская сторона в официальном порядке впервые сформулировала принцип «препятствий» на пути к улучшению советско-китайских отношений.

По мнению советской стороны, все вопросы, которые китайская сторона предложила к обсуждению, касались третьих стран и поэтому они должны с ними и обсуждаться. Также отмечалось, что у Советского Союза нет намерения угрожать Китаю вооруженными силами. Таким образом, у КНР и СССР выявились большие разногласия и переговоры закончились безрезультатно.

27 декабря 1979 года в Афганистан был введен ограниченный контингент вооруженных сил СССР. 20 января 1980 года представитель пресс-службы МИД КНР официально сообщил о том, что порицает вторжения СССР в Афганистан, так как создается новое «препятствие» для нормализации отношений между СССР и КНР. Китайское руководство посчитало, что оформляется военное окружение Китая на Юге и Западе. Одновременно появилась формулировка о «трех» препятствиях на пути улучшения советско-китайских отношений.

В начале 1980-х годов советское руководство предприняло попытку активизировать отношения с Китаем. 24 марта 1982 года Генеральный секретарь ЦК КПСС Л.И. Брежнев во время визита в Ташкент заявил о том, что СССР не ставит под сомнение социалистический характер Китая и хотел бы развивать отношения с ним без предварительных условий и не в ущерб третьим странам. Дэн Сяопин выразил мнение китайской стороны. Он сказал о том, что если СССР хочет серьезного улучшения отношений с КНР, то должен добиваться это делами, а не словами. Под делами китайское руководство подразумевало решение вопроса о трёх препятствиях. После обмена мнениями пограничные переговоры на уровне зам. министров иностранных дел снова начались в октябре 1982 года.

С октября 1982 года до июня 1988 года, переговоры продолжались 12 раундов. Положение о трех препятствиях на пути улучшения советско-китайских отношений, предложенные китайской стороной, являлись ключевым вопросом. При этом Китай считал, что СССР продолжает наращивать в Восточной Азии свое военное присутствие.

В марте 1985 года Генеральным секретарём ЦК КПСС становится М.С. Горбачёв. Точкой отсчёта в формировании новой позиции Советского Союза по вопросам восточной политики явились заявления М.С. Горбачева о новом политическом мышлении для СССР и для всего мира. В соответствии с этой концепцией он предложил до конца нынешнего столетия выполнить программу мероприятий, направленную на полную и повсеместную ликвидацию ядерного и других видов оружия массового поражения и рассмотреть вопрос о поэтапном выводе советских войск, находящихся в Афганистане. На наш взгляд принципиальную важность имело и другое утверждение М.С. Горбачева. В своей книге он писал, о том что «Нельзя переносить идеологические разногласия в сферу межгосударственных отношений, подчинять им внешнюю политику, ибо идеологии могут быть полярными, а интерес выживания, предотвращения войны является всеобщим и высшим» [11]. Вряд ли можно согласиться с утверждением о том, что по существу, в предложенной Горбачёвым концепции нового политического мышления было мало нового. В этой связи отметим, что в книге М.С. Горбачева, в разделе, посвященном странам социализма, впервые содержатся весомые слова критики о внешней политике СССР в прошлом. Он писал, «Мы откровенно и самокритично оценили прошлое развитие и взяли на себя свою долю ответственности за то, что не получилось в социалистическом мире» [12].

28 июля 1988 года М.С. Горбачёв в речи во Владивостоке сказал, что в настоящее время СССР с руководством Монгольской народной республикой рассматривает вопрос о выводе значительной части советских войск из Монголии. По отношению с КНР, он сказал, что советское правительство хотело бы совместно разработать межправительственное соглашение о границах по р. Амур, которая могла бы проходить по его главному фарватеру. По вопросу Афганистана, он сказал, что Советский Союз готов вернуть домой советские войска, находящие в Афганистане по просьбе его правительства. По вопросу о Кампучии, он заявил, что эта ситуация зависит от нормализации китайско-вьетнамских отношений. Эти идеи М.С. Горбачева отвечали почти все вопросы, которые заботили китайское правительство. Затем Советский Союз начал постепенно отводить войска из Монголии и Афганистана. Безусловно, слова и поступки советских руководителей благоприятствовали построению взаимного

стратегического доверия между СССР и КНР. Это доверие было важной причиной и основанием быстрого улучшения и развития советско-китайских отношений. В начале декабря 1988 года СССР посетил Министр иностранных дел КНР Цянь Цичэнь. Это был первый визит китайского министра иностранных дел в СССР с 1957 года. Цянь Цичэнь заявил о том, что надо форсировать вывод войск Вьетнама из Кампучии. Советская сторона выразила своё согласие о необходимости решения проблемы Кампучии. Когда Цянь Цичэнь закончил свой визит, он заявил, что нормализация советско-китайских отношений начиналась. В феврале 1989 года Э.А. Шеварднадзе (министр иностранных дел СССР) прибыл с визитом в Пекин. Итоги визита позволили конкретизировать многие важные аспекты предстоящих советско-китайских переговоров на высшем уровне, определилась и дата визита М.С. Горбачёва в Китай – 15-18 мая 1989 года.

14 мая 1989 г. М.С. Горбачёв отбыл из Москвы в Пекин с официальным визитом по приглашению Председателя КНР Ян Шанкуня. 16 мая 1989 г. в здании Всекитайского собрания народных представителей состоялась беседа М.С. Горбачёва с Дэн Сяопином. Дэн Сяопин и М.С. Горбачёв отметили, что отношения между двумя государствами и партиями нормализованы. Дэн Сяопин сказал, что «в течение долгого времени острое международное положение перед нами, центральная проблема мира - советско-американские отношения. Но путь решения появился - переход советско-американских отношений от конфронтации к диалогу. Это надежда всего человечества. Он подчеркнул, что китайский народ тоже хотел улучшить отношения с СССР. Решающий фактор — равноправие между странами» [13]. М.С. Горбачёв и Дэн Сяопин долго обсуждали и обменивались мнениями о судьбе социализма, его теоретических основах, необходимости учёта национальной специфики каждой страны. Они согласились с тем, что не может быть единой модели, единого стандарта нового общества. Советско-китайская встреча на высшем уровне знаменовала собой преодоление трех препятствий на пути к улучшению отношений между Советским Союзом и Китаем.

Таким образом, советско-китайские отношения в XX веке прошли разные стадии и исторические этапы. Мы полагаем, что эти отношения не были только борьбой за установление «равноправия» в условиях конфронтации и



непонимания. Больше это была история взаимоотношений, поиска диалога в рамках современной картины мира. Добрые, искренние и дружеские отношения старших поколений, переплетаются сегодня с известным экономическим прагматизмом молодежи. Сегодня между Россией и КНР отсутствуют взаимные территориальные претензии и к этому удалось прийти на основе единого понимания глобальных проблем и национальных интересов. Для этого пришлось принять тезис М.С. Горбачева об отделении межгосударственных отношений от идеологии.

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### ***The paronyms in the Azerbaijani proverbs***

**Abstract:** The article deals with the paronyms and paronymy phenomenon in the Azerbaijani proverbs that are studied on the basis of the factual material. The main purpose of the article is to determine the phonetic-stylistic and semantic functions of these language phenomena in the proverbs, to reveal their role in the emotional expression of the ideas. For the first time in Azerbaijani linguistics the semantic, phonetic-stylistic peculiarities of the paronyms in the proverbs are analysed on the basis of the most interesting examples.

**Keywords:** paronym, phonetic stylistics, interference, asymmetry, synonym, distant, contact, semantic.

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### ***Паронимы в азербайджанских пословицах***

**Аннотация:** В статье на основе фактического материала исследуются паронимы и явления паронимии в азербайджанских пословицах. Основная цель статьи – определение фонетико-стилистических и семантических функций данных языковых явлений в пословицах, выявление их роли в эмоционально-экспрессивном выражении мысли. В статье впервые в азербайджанском языкознании исследуются семантические, фонетико-стилистические особенности паронимов в азербайджанских пословицах.

**Ключевые слова:** пароним, фонетическая стилистика, интерференция, асимметрия, синоним, дистант, контакт, семантический.

Паронимы – широко распространенный жанр устного творчества. Своим значением, могуществом мысли они равны художественному произведению, где конкретная картина мира, событие предстают в обобщенно-философской интерпретации. Пословицы имеют ряд фонетико-стилистических особенностей, среди которых особо следует выделить паронимы. Хотя паронимы в азербайджанском языке в определенной степени изучались (1,2,3), однако их семантические и фонетико-стилистические особенности в составе пословиц до сих пор не являлись объектом специального исследования. Паронимы, как правило, рассматривались в рамках лексической системы языка и определялись как слова, близкие по звучанию, но разные по значению.

В речи строятся языковые единицы, носящие устный характер и обуславливающие нормальную речевую деятельность. В это время допускаются произвольные или непроизвольные языковые ошибки. Одной из наиболее распространенных речевых ошибок является лексическая интерференция. Впервые проблема интерференции была затронута немецким ученым У. Вайнрайхом в его труде «Языковые контакты» (1953) (4:60).

В «Словаре лингвистических терминов» дается следующее определение интерференции: «Взаимодействие языковых систем в условиях двуязычия, складывающегося либо при языковых контактах, либо при индивидуальном освоении неродного языка, выражается в отклонении от нормы и системы второго языка под влиянием родного» (5:120).

Интерференция охватывает все уровни языка – фонетический, лексический, синтаксический. Главный источник интерференции – расхождения в системах взаимодействующих языков. Такие смещения называют диапаронимией или «ложными друзьями переводчика». Лексические смещения не возникают лишь в результате контакта двух языков. Интерференция схожих слов наблюдается и среди слов одного языка. Такие слова называются паронимами.

Явление паронимии следует отличать и от паронимической аттракции или парономазии – приема, построенного на смешении, нарочитом столкновении сходно звучащих этимологически чуждых слов. И. Н. Кузнецова, относящая паронимы, диапаронимы и паронимическую аттракцию к лексической интерференции, определяет функциональный аспект лексической интерфе-

ренции и связывает ее с природой языкового знака и исходящей из нее языковой асимметрии (4:60-70).

Проблема симметричности языкового знака неразрывно связана с понятием асимметрии. В. Г. Гак, затрагивая эту проблему, выделяет статический, гомологический и динамический виды асимметрии (6:109). Все три вида асимметрии находят свое отражение в лексической интерференции. Анализ лексической интерференции показывает, что в создании статической асимметрии могут участвовать синонимы и паронимы одного семантического поля или синонимического ряда. Паронимия – один из источников обогащения литературного языка. Парономазия – стилистическая фигура, заключающаяся в постановке рядом слов, имеющих звуковое сходство. Парономазия предполагает любое звуковое сходство слов, имеющих звуковое подобие – и родственных, и неродственных – звуковое совпадение которых случайно. В лингвистике существуют разные взгляды на паронимию и парономазию, и установление четких границ между ними – довольно спорный вопрос. Парономазия используется главным образом в поэзии, в фольклорных жанрах (пословицах, поговорках, скороговорках), в публицистике с целью повысить выразительность высказывания, текста.

С помощью парономазии добиваются выразительности авторской мысли и образности высказывания. Таким образом, парономазия – фигура, состоящая в комическом или образном сближении слов, которые вследствие сходства в звучании и частичного совпадения морфемного состава могут иногда ошибочно, но чаще каламбурно использоваться в речи.

В паронимических парах объективным признаком считается не закон сингармонизма, а смешение, которое невозможно рассматривать лишь как фонетический процесс. Паронимия как особое языковое явление основывается не только на фонетическом тождестве словоформ, но и семантической близости. В. В. Виноградов пишет: "Не подлежит сомнению, что созвучие слов, близость их фонетического строя отражается на их понимании, на их семантических связях" ( 7:6).

Следует отметить, что паронимы раскрывают большие возможности азербайджанского языка в передаче тонких смысловых оттенков. Умелое использование паронимов в пословицах помогает правильно и точно передать

мысль, делает их выразительнее. Экспрессия пословиц обусловлена логической аттракцией, проявляющейся на разных уровнях. Семантическая аттракция между компонентами слов составляет структуру паремий, оживляет мотивацию, а также расширяет ее семантическое поле (8).

И. Н. Кузнецова, касаясь семантических отношений между паронимами, отмечает, что если фонетическое сходство – первопричина, источник паронимического процесса, то сам этот процесс по сути семантический: фонетическое сходство паронимов обуславливает их известную смысловую соотносительность (4:60-70). Два слова, в какой-то мере сходно звучащие, но имеющие разное значение, употребляются носителями языка одно вместо другого. В речи в целях специального сближения или вследствие случайного смешения сопоставляются, как правило, однокоренные слова одного и того же или близких понятийно-предметных планов.

С точки зрения нормативных семантических связей между членами паронимической пары, все паронимы делятся на три категории, различающие в большей или меньшей степени семантические связи между паронимами. И.Н. Кузнецова выделяет синонимические, дистантные и контактные паронимы (9:9-25); Л. Н. Федотова (10:15) и О. Д. Прокопчик – дистантные, недистантные и контактные паронимы в английском языке (11:4).

Синонимические паронимы обладают наибольшим содержательным сходством, контактные - меньшим содержательным сходством, дистантные – наименьшим содержательным сходством, не имеют общего денотата и принадлежат к разным семантическим полям. Синонимические паронимы – слова, которые потенциально способны выступать в качестве синонимов и в качестве паронимов, но не одновременно, а в порядке своеобразного чередования и могут заменяться друг другом. Они широко употребляются в азербайджанских пословицах, например: *Yalan deyən yaman deyər* – Вранье не введет в добро; *Kişi gap eləyər, gər eləməz* – Мужчина говорит, а не хвастается; *Evin küçügi ol, kiçigi olma* – Чин чина почитай, а меньшой садись на край; *Sırtıqdan sürtük törəyər* – Яблочко от яблони не далеко падает; *Alacağın qırğı, verəcəyini qarğa* – Мне вершки, а тебе корешки; *Yanığın nəyi var ki, yoluğa nə versin?* – Нищий на нищем ничего не взыщет; *Söz var el içində, söz var ev içində* - Не выноси сор из избы и др.

В этих примерах между паронимами *yalan-yaman* «ложь-дурное», *gar-gor* «разговор-хвастовство», *küçüg-kıçığ* «щенок-малец», *sırtıq-sürtük* «наглец-нахал», *qırğı-qarğa* «ястреб-ворона», *el-ev* «народ-дом» явно прослеживается связь, их звуковое же сходство служит основой смешения.

У контактных паронимов нет общего словарного значения, поэтому в нормальной ситуации они не могут заменять друг друга. Однако такого рода паронимы, не являющиеся синонимами, имеют денотативную близость, относятся к одному семантическому полю и под влиянием интерференции ошибочно могут заменяться друг другом, например: *El qarısı həm gəc, həm güc açılar* – Берись дружно, не будет грузно; *İt də getdi, ip də* – Ушел воз и лошадку увез; *Alim olmaq asandır, adam olmaq çətin* – Гораздо легче стать ученым, чем добрым человеком; *Nə ölüyə hay verir, nə diriye ray* – Ни богу свечка, ни черту кочерга; *Olan dörd bağlar, olmayan dərd bağlar* – Богатый носит что хочет, а убогий – что может; *Övladda nəvə, dövlətdə dəvə* – Дочерние детки милее своих; *Oğlanı kamal ilə, qızı camal ilə* – Парень по уму, девушка по красоте; *Loğma deyil, boğmadır* – Попрекать куском хлеба и др.

В этих примерах паронимы *gəc-güc* – «поздно-сила», *alim-adam* – «ученый-человек», *hay-ray* – «отклик-паек», *dörd-dərd* – «четыре-горе», *nəvə-dəvə* – «внук-верблюд», *kamal-camal* – «ум-красота», *loğma-boğma* – «кусок-удавка» обладают потенциальной денотативной близостью, что позволяет отнести их к одному семантическому полю.

Между дистантными паронимами нет семантической близости, между их словарными же значениями нет соответствия. В данном случае смешение паронимов носит текстовый характер, вернее, денотаты паронимов не имеют никакой близости. При эмоционально-экспрессивном выражении мысли они вместе с соответствующими денотатами сравниваются и в результате возникает сходство, например: *Ördək gəlib qaz olmaz, gəlin gəlib qız olmaz* – Утке никогда не стать гусем, снохе никогда не стать дочерью; *Baba olmadı, vəba oldu* – Это не дед, а холера; *Aşıq ya səbir, ya səfər* – Дорогу осилит идущий; *At min, ad qazan* – Доброе имя – богатство; *Az yeyir – kəsür, çox yeyir – qusur* – Есть в рот да вглот, так не надо и впрок; *Qələm dinəndə qənim dinməz* – Перо скрепит, бумага молчит и др.

А. П. Критенко, отмечая в анализе паронимов фонологический и семантический аспекты, указывает, что именно в результате взаимовлияния паронимов обнаруживаются их структурные и семантические функции. Автор прослеживает взаимовлияние паронимов в системе и в контексте в форме аттракции и конфликтов, в контексте же они выражаются в семантическом и стилистико-экспрессивном аспектах. А. П. Критенко также указывает, что в семантическом аспекте стилистико-экспрессивная функция рифмы универсальна для многих языков и подчеркивает, что данное явление не отмечено в паронимии. Ученый отмечает, что в паронимии рифма в отличие от ритма связана с идеей произведения и играет конструктивную роль в пословицах (12:22). Р. Г. Кадимов, касаясь проблемы паронимической аттракции и рифмы, справедливо отмечает, что рифма, объединяя сходные по звукам слова, выполняет многие функции и в определенной степени отличается от паронимии. Рифмованные слова невозможно приравнивать к коррелятам паронимической аттракции, и точно так же неправомерно относить рифмованные слова к паронимам (13).

Как известно, рифма – созвучие в окончании двух или нескольких слов. В паронимической аттракции связь паронимов двусторонняя, равноправная, симметричная – оба они в одинаковой степени являются друг для друга источниками смысла. Паронимическая аттракция активизирует отношения рифмы и обогащает ее новыми функциями (13:12).

А. П. Ткаченко, говоря о стилистических функциях паронимов в поэтических текстах, выделяет аллитерацию, точную рифму, внутреннюю рифму (14:146).

При паронимическом анализе лексики рифмам следует уделять особое внимание, т.к. рифмы – наиболее широко распространенный прием стилистической аттракции. Каждый язык имеет своеобразные, неповторимые кванты, которые выявляются не путем фонологического анализа, а в паронимии.

Р. Г. Кадимов, рассматривая синтаксические условия функциональности паронимической аттракции, отмечает такие семантические связи, которые реализуются в пределах предложения. Созвучные слова, находящиеся в разных предложениях, как правило, не создают эффективную и несомненную семантическую аттракцию. Функциональная паронимическая аттракция обычно



наблюдается в тех случаях, когда корреляты, выражая семантические отношения субъект – действие, признак – предмет, признак - действие, действие - объект действия, действие - действие, находятся в позиции членов предложения. Между определенными синтаксическими и семантическими отношениями членов предложения и между частотой употребления этих позиций паронимов существует взаимосвязь (13:7).

В паронимических аттракциях преобладают позиции, выражающие предикативные и атрибутивные отношения. Мы полагаем, что наиболее приемлемы для паронимической аттракции отношения между подлежащим и сказуемым. Подлежащее, имеющее одинаковый корень со сказуемым, как правило, выражает обычное для субъекта действие (*əkin əkmək* - сеять семена).

Паронимические сочетания подлежащего и сказуемого в той или иной степени напоминают связи между этимологически родственными словами с разными значениями. В действительности, такого типа однокоренные сочетания не могут рассматриваться как полноценные паронимы, однако некоторые языковеды представляют их как паронимы, т.к. они, имея разные лексические значения, близки по своему фонетическому составу (13:7).

Следует отметить, что в азербайджанском языкознании такого типа выражения рассматриваются как внутриобъектные глаголы. Однако внутриобъектные глаголы находятся в паронимических отношениях со связанными словами. Образное сближение в предикативном плане двух созвучных слов выявляет текстообразующую функцию паронимической аттракции. Наиболее выпукло это проявляется в пословицах, например: *Alan alıb, varlanıb, satansatıb, aldanıb* – Продал – прожил, купил - нажил; *Atdığı atdıq, tutduğu tutduq* - Где не ухватит, там след когтей оставит; *Ata-ata atıcı, minə-minə minici* - Бей сороку, ворону – доберешься до ясного сокола; *Qazanmayınca qazan qaynamaz* – Без труда не вынешь рыбку из пруда; *Ələyi ələlib, xəlbiri göydə fırlanır* - Сито уже все просеяло, а решето еще крутится; *Yağış yağar, yer doymaz* – Жадный глаз только сырой землей насытится; *Yağla yağlayır, sarımsaqla dağlayır* - Мягко стелет, да жестко спать; *Yel əsəndə yellənər, yol görəndə yollanar* - Держит нос по ветру; *Ölən öldü, diriyə dirilik gərək* - Мертвому покой, а живому суеты; *Oğru oğrunun saqqızını oğurladı* - Вор у вора жвачку украл (ср: Вор у вора дубину

украл); *Hər kəs öz ölçüsü ilə ölçər* - Всяк мерит на свой аршин; *Bulamanı bulama, buladıqca yalama* - Похлебку помешивай, да ложку не облизывай; *Boş durunca düşməninə daş daşı* - Колоти хоть пень, лишь бы проводить день; *Başmağımı geyə bilərsən, yerişimi yeriyə bilməzsən* – Сколько утка не бодришь, лебедем не быть; *Bağ alma, bağlanarsan, dağ alma, dağlanarsan, qoyun al, yağlanarsan* – Хороший совет десяти изрядных стоит; *Nə ölən kimi ölür, nə qalan kimi qalır* - Никак не помрет, и как живой не живет; *Qara gün qaralıb qalmaz* - Ни радости вечной, ни печали бесконечной; *Qapılan qapanın, tapılan tapanındır* – Кто смел, тот и съел и др.

Паронимы – созвучные и по значению близкие слова, их созвучность проявляется в фонетической трансформации. И. Д. Прокопчик различает на фонологическом уровне вокальные паронимы, на консонантной основе – комбинированные паронимы и отмечает что, на этом уровне отношения между паронимами различаются с точки зрения трансформации. Ученый показывает трансформацию вокальных и консонантных моделей в замене, транспозиции, расширении и сужении в английском языке (11).

Л. Н. Федотова, исследуя паронимы в английском языке, выделяет четыре основных вида трансформации: субституция, транспозиция, удаление и допол-нение. Автор отмечает, что в общем отношения между членами паронимической пары определяются на фонологическом уровне с точки зрения трансформации: к последнему члену применяется ряд трансформаций фонетического дифференциатора в одинаковых позициях. Фонетическими дифференциаторами могут быть звук, ударение, трансформация (10:9).

В азербайджанских пословицах в трансформации паронимов чаще всего наблюдаются чередование, перестановка:

1) Чередование гласных: следует отметить, что наблюдаются разные случаи чередования гласных, но чаще всего – чередование открытых и закрытых гласных и закрытых и открытых гласных. Чередуются открытые и мягкие гласные.

А) Чередование твердых гласных: *Gedər bağlar qorası, qalar üzlər qarası* – Пройдет липы тень, останется лиха темь; *Qazı da bilir, quzu da* – Знает судья правду, да не любит сказывать.

Б) Чередование мягких гласных : *Oğul dəyənək, qız döyənək* – (букв.) Сын колотит, дочь - колотят; *Yaхşı günün döş ağrısı, yaman günün diş ağrısı* – Друг познается в рати и беде; *Kələk ilə gələn külək ilə gedər* – Кто берет махом, у того идет прахом.

В) Чередование твердых и мягких гласных: *İstəyirsən bal-çörək, al əlinə bel-kürək* - Хочешь есть калачи – не лежи на печи; *Hakim və həkimsiz köydən keç* – Пошел в суд в кафтане, а вышел нагишом; *Toyda daraq axtaran qız dürək olar* – Ленивой кобыле и дуга в тяжесть; *Dişsiz ağız – daşsız dəyirman* – Рот без зубов, что мельница без жерновов; *İşi hacatla görərlər, höcətlə yox* - Терпение и труд все перетрут; *Acın imanı olmaz, toxun amanı* – Бедность учит, а счастье портит; *Nuşu şirin, nişi ası* - На языке медок, а под языком ледок.

2) Чередование согласных: чередование начальных глухих и звонких согласных, например: *Damazlığını ueyən tamarzı qalar* - Семена съедим, так по урожаю тужить не станем; *Kənd nədir, qənd nədir?* - Ни к селу, ни к городу; *Kürəkli adam gərəkli olar* – Сила есть, ума не надо; *Qəlp odur ki, qəlbindəkini deməyə* - Себе на уме; *Qatır nə bilir xətir?* – Откуда знать ослу, что такое финик; *Gicın əkdiyini kəs çəkər* – Что дурак посеет, то косой пожнет; *Gəzəyən arvad kəsəyən olar* – Блудливая баба обидчива; *Qəmişli yer, gümüşlü yer* – Доходное место.

Иногда чередование согласных происходит и в паронимах, находящихся внутри предложения: *Saxla samanı, gə lə r zamanı* – Всякому овощу свое время; *Bağa bağ demə yiblə r, bax deyiblə r* – У хорошего садовода хороший сад; *Arvadın ismə ti - ə rin izzə ti* – Доброй женою и муж честен; *Oyunçu deyil, odunçudur* – Беда, коль пироги начнет печи сапожник, а сапоги тачать пирожник; *Atdan düşsə n də , addan düşmə* - Береги платье снову, а честь смолоду; *Meydana girə n körə k kötə kdə n qorxmaz* – Кусачий пес палки не боится.

3) Перестановка гласных и согласных. Одним из интересных фактов в паронимах, на наш взгляд, является перестановка звуков, встречающаяся в пословицах, например: *Tələsik adam ütəsək olar* - Поспешишь – людей насмешишь; *Yorğun adam yoğruq olar* - Валиться с ног от усталости; *Qərib nədi, qəbir nədi?* - Чужбина не потачлива; *İnam gətirən iman gətirər* - Кто с верой, тот и с доверием; *İnam olan yerdə iman da olar, imam da* - Где вера, там и доверие; *Qənaət qənimət gətirər* - Бережливость лучше богатства; *Azğının ağzına vururlar* -

Заткнуть кому-то рот; *Kamallı adam kəlamlı olar* - Умный одно слово вымолвит, и то скажется; *Tülkü adam tülək olar* - Хитер как старый лис.

Один из паронимических фактов, наблюдаемых в азербайджанских пословицах – количественное изменение звукового состава, т.е. количественная трансформация.

В первом компоненте паронимической пары выпадает определенное количество фонем, и в результате это слово употребляется в качестве второго паронима, например: *Nə dəlini işlət, nə də dəli üçün işlə* - Не заставляй дурака работать на себя, и сам на дурака не работай; *Çobanın yasdığı yastı qayalardır* – Всяк петух знает свой насест; *Həkimə getsən – dava verər, falçıya getsən –dua* – Всяк своим разумом кормится; *Uzaq yerin halvasını hovla ilə yeyərlər* - Ближняя солома лучше дальнего сенца.

Во втором случае к первому компоненту добавляются фонемы или морфема, например: *Bir var Koroğlu, bir də var korkişinin oğlu* – Не всяк дед, кто с бородой; *Bekar oturmaqdan bekarə işləmək yaxşıdır* – Работа красит человека; *Gündüz gedir dar-dar edir, gecə gəlir, yer dar edir* - Кто дома не гош, тот и в людях тож; *Bir qulağın dar eylə, bir qulağın darvaza* - В одно ухо впустил, в другое – выпустил; *Alovdan çıxdıq, yalova düşdük* - Из огня да в полымя; *Əhd kəsənin əhədini kəsərlər* - Давши слово держись, а не давши – крепись.

В паронимии фонетические и семантические стороны выступают вместе: созвучность слов, близость их фонетической структуры отражаются в их семантических связях. Поэтому сущность данного явления следует, по-видимому, искать не в созвучных словах, не в их этимологических, словообразовательных, грамматических признаках, а в функциональности семантических и фонетических фактов в языке. Для определения границы фонетической вариантности паронимов необходимо проследивание количественных и качественных изменений с фонетической точки зрения.

Количественный критерий определяет количество звуков в созвучных словах. В процессе восприятия паронимов в них больше фонетического сходства, чем различия. Следует отметить, что тенденция к экономии - один из основных законов языка. Так, эллиптичность проявляется в фонетическом формировании слов, при этом идентичность заменяется сходством. Одна из особенностей человеческого мозга – устранение лишних единиц звучания. В

восприятию информации идентификация сходного звучания ведет к близости значений. Поэтому следует исходить из сходства единиц, исследуемых на фонетическом уровне.

Паронимия – явление речевой семантики. В речи созвучные слова вступают в отношение семантической контаминации: одно слово со своим значением как бы “переходит” в другое. Такая содержательная близость паронимов определяется разными факторами: во-первых, близость значений членов одного паронимического ряда не исключение; во-вторых, в плане содержания сближение паронимов может выражаться психолингвистическими факторами – в канале связи – шум, патология – нарушение слухового и речевого аппарата коммуникантов, темп речи, усталость и т.д.

Психолингвистическая сущность паронимии проявляется в восприятии вторичных ассоциаций паронимического выражения, возникающего между коммуникантами. Сущность вторичных ассоциаций заключается во вторичном понимании, уравнивании звуковых и семантических связей фонетически сходных слов. В результате связь звука и значения носит несколько иной характер, именно первый звук притягивает первое значение, второй же звук – второе значение. Звуковые связи таких «заторможенных» сходных слов притягивают содержание и создают аттракцию. Исследователи выделяют релевантные психологические факторы создания паронимии: патология, нарушение речевых органов, сонное состояние, темп речи и т.д. Мы полагаем, что к явлению паронимии – паронимии следует подходить комплексно, с учетом не только лингвистических факторов, но и факторов других наук: психо- и нейролингвистики, психологии, анатомии, кибернетики.

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## ***The "British Ally" on Australia' role in the Pacific War (Towards Seventy Years Since the End of the World War II)***

**Abstract:** The main source for writing the article was the newspaper "British ally," published in the USSR in the Russian language by the Ministry of information of Great Britain from 1942 to 1949. The newspaper was first analyzed from the point of view of identifying the role of the Commonwealth of Australia in the War in the Pacific. Identified materials show that Australia has made a significant contribution to the victory over Japan, not only with its participation in military operations, but also as the main supply base for the Union troops and armaments.

**Keywords:** Australia, the War in the Pacific, the newspaper "British ally".

In 2015 we will see 70 years since the end of the Second World II. During this war the Commonwealth of Australia played a significant role in the theater of operations, which is testified by the material revealed by the the Newspaper "British Ally".

The "British Ally" was a weekly Newspaper, which had been published in Russian by the Ministry for Information of Great Britain in the USSR from 1942 to 1949. First, it was published in Kuibyshev city, later it was moved to Moscow, and with its 50 000 copies circulation, it was distributed all over the Soviet Union. The Newspaper was published on Sundays and had 16 pages in folio.

The first issue of the "British Ally" was published on August 16, 1942. Secretary of State for Foreign Affairs of Great Britain Anthony Eden wrote the front-page article "We Need to Know More about Each Other" and in the following way explained the reason the publication of newspaper at this time: "It is appropriate that the "British Ally" issue No1 was well timed after the memorable visit of my friend and colleague Mr. Molotov to my country. Since June 22, we had become comrades-in-



arms. Since May 26, 1942, we made public commitments to work jointly in Europe to the common end at least during twenty years" (1).

Therefore, the Newspaper "British Ally" could only emerge because of signing the Soviet-British Treaty on alliance during the visit of the People's Commissar for Foreign Affairs of the USSR V.M. Molotov to London. The document signed on May 26, 1942, was an important element in a number of Agreements that followed and enhanced the anti-Hitler coalition (2).

Brandon Braeken, Secretary of State for Information of Great Britain, in the first issue of the "British Ally" had addressed its readers explaining the main concerns of the Newspaper. The Newspaper was focused on factual information related "to military efforts of the British Commonwealth of Nations, multilateral operations of the Royal Navy and Royal Air Forces, the British industry workers, soldiers, attack units, which had been training around the clock to get ready for the second front opening eager to achieve the ultimate defeat of Germany" (3).

In his turn, A. Eden argued: "The Soviet Union and the British nation should know better each other" (4). In fact, with the publication of the "British Ally" such a chance emerged because in London the magazine "Soviet Military News" had been already in print since the USSR military involvement.

During its eight years in print, the "British Ally" had accumulated a wealth of factual materials both on the history of War in the Pacific and various political, social, and economic issues of British Commonwealth development during the World War II and immediately after the war.

Most information related to Australia published in the "British Ally", covered 1944-1945. The Newspaper could demonstrate documents containing Programs of action, addresses of most prominent politicians and statesmen (Prime-Ministers J. Curtin and J. Chifley, Secretary for Foreign Affairs H. Evatt), and it also tackled issues on international relations and foreign policy of the country. Detailed reports and photo-reports regarding military actions with Australian participation, reports on armaments and the capacity of various combatant branches of the Australian Military Forces, statistics on developing industry, agriculture and trade, culture, and numerous photo documents, maps, charts and tables could be found in the Newspaper.

Of interest are the publications demonstrating the changes, which had occurred during the World War II in development of the Australian-Soviet

relationships. E.g., on January 17, 1943 the front page of the "British Ally" had published the welcome address of Prime-Minister J. Curtin on behalf of the Government and the people of Australia to the peoples of the Soviet Union. The address regarded the establishing of diplomatic relations between Australia and the USSR on October 10, 1942 (5), quoting the Prime Minister: "Our nation considers the exchange of diplomatic representatives as a landmark in the history of Australia" (6).

J. Curtin also expressed his special gratitude for the Russian Victory in Stalingrad because defeat of the Fascist Germany in the Volga River area made Japan stop its further advancement in the South, which eliminated a direct threat to national security of Australia (7). "On behalf of the Australian people I can proudly admire the glorious exploits of the Soviet Union nations along with other nations. Without those deeds we would have never achieved the turn in the state of war we all witnessed", acknowledged J. Curtin (8).

Australian materials in the "British Ally" testify to the fact that Australia was involved in military actions since the first months of the World War II until its very end. It organized a large military force up to 600000 people (9), though Australia had made a most considerable contribution into fighting Japan.

In the Pacific, the Australian Navy participated in merchant vessels' and landing craft convoy, which delivered landing troops and munitions, patrolled the coastline, fought with the enemy's submarines. Australian Air Force had also acquired its military experience in uphill fights. The Air Force defended Batavia, New Guinea, made raids on the Japanese aerodromes and military ships (10).

The Australian troops under general Blamey, Commander-in-Chief of the allied ground troops in the South-West of the Pacific, were actively involved in ground operations of the Pacific theater of war: in New Guinea, Timor, Kalimantan, and others. Under severe tropical jungle conditions, the Australian "diggers" fought with glory, thus destroying the myth of invincibility of the Japan Army (11). E.g., report of the events in Portugal Timor in February 1943, confirmed the Australians' courage when the Australian assault unit made up of 20 men for 59 days was containing the attacks of 500 Japanese soldiers (12).

The number of publications related to Australian economy, primarily development of its military industries, considerably increased in the "British Ally" as in the

course of war Australia was growing into the main supply base for the allied forces engaged in actions in the South-West Pacific (13).

The Newspaper referred to Australia as “a Pacific breadbasket”, though by 1943, the military industries in the country also did very well with about 500000 workers engaged in them. E.g., 22 public enterprises, and 143 private companies under the Government control were producing ammunition. The Melbourne correspondent of the British “Times” reported, “One of the Australian factories produced more ammunition per day than any American one” (14).

During the war, the fifth continent saw establishing new industries that had never existed there before such as aircraft and machine-tool building, which resulted in large-scale production of airplanes, tanks, artillery weapons, machine-guns, and ammunition. Australia manufactured two models of combat aircraft, one of which was a bomber aircraft “Bristle-Boford”, and a new sort of armor steel as well. The Australian engineers designed an armored tank-cruiser to become the first in the world vehicle whose armored steel hull was forged in block (15).

Thus, the materials of the Newspaper “British Ally”, published in 1942 – 1945, demonstrate that Australia significantly contributed into victory over Japan by both directly participating in military operations and serving as the main base of supply for the allied troops with provisions and armaments.

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## ***Teaching English Grammar to Bilingual Tuvan students***

**Abstract:** The article is devoted to teaching English grammar to Tuvan students who can speak Tuvan and Russian languages. It gives the definition of the bilingual state of Tuvan students and shows the peculiarities of Tuvan-Russian bilinguals. The publication also focuses on psychological and linguistic description of Tuvan-Russian bilingualism and describes the advantages and disadvantages in teaching bilingual students.

**Keywords:** grammar aspects of the speech, Tuvan-Russian bilingualism, bilingual state of Tuvan students, teaching English as the third language to bilingual students, grammar aspects of different languages.

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## ***Обучение двуязычных тувинских студентов грамматике английского языка***

**Аннотация:** В статье впервые рассматриваются вопросы и проблемы обучения грамматике английского языка в условиях тувинско-русского двуязычия: анализируется билингвальное состояние тувинских студентов, уточняется специфика тувинско-русского двуязычия, а также психолингвистическая характеристика тувинско-русского двуязычия, проблемы обучения грамматической стороне устной английской речи в условиях тувинско-русского двуязычия.

**Ключевые слова:** грамматическая сторона устной речи, тувинско-русский билингвизм (двуязычие), билингвальное состояние тувинских студентов,

обучение английскому языку как третьему в условиях тувинско-русского двуязычия, грамматические системы контактирующих языков.

Вопросы обучения грамматической стороне устной иноязычной речи в условиях тувинско-русского двуязычия еще не получили освещения в научно-методической литературе. Как показывает практика, в обучении английскому языку формирование фонетических, лексических и, в особенности, грамматических навыков осуществляется без учета взаимодействия трех языков – тувинского, русского и английского. Не разработаны научно обоснованные пути предупреждения и преодоления ошибок в иноязычной речи студентов, обусловленных интерферирующим влиянием родного (тувинского) и русского языков. В этой связи представляется актуальным исследование, направленное на решение обозначенной проблемы. В качестве объекта исследования мы рассматриваем обучение двуязычных студентов-тувинцев английскому языку, в частности – грамматической стороне устной иноязычной речи на начальном этапе его изучения.

В данной статье мы постараемся осветить задачи, которые мы ставили перед собой, и результаты, которые мы получили.

*1. Концептуальное изучение и анализ билингвизма тувинских студентов; уточнение специфики тувинско-русского двуязычия; психолингвистическая характеристика тувинско-русского двуязычия.*

На основании проделанной работы мы пришли к заключению, что тувинско-русское двуязычие можно определить, с одной стороны, как естественное (бытовое), когда тувинцы овладевают русским языком в процессе практической деятельности как языком, необходимым для решения жизненно важных задач, т.к. русский язык выполняет важные общественные функции в жизни тувинцев, а с другой – как субординативное, т.е. доминирующую роль играет родной (тувинский) язык говорящего. Однако следует помнить, что в республике Тыва существует и естественный координативный тувинско-русский билингвизм. Большинство городских тувинцев, окончивших национальные школы и в равной степени владеющих родным и русским языками, являются представителями координативного тувинско-русского двуязычия. Поскольку уровень владения русским и тувинским языками у субординативных и

координативных билингов отличается, в процессе исследования возникла необходимость в получении объективных данных о двуязычном состоянии тувинских студентов, в выявлении специфики влияния русского и тувинского языков на процесс обучения английскому языку и в определении уровня владения тувинскими студентами грамматическими явлениями тувинского и русского языков. Решение вышеназванных задач осуществлялось путем проведения лабораторного эксперимента, который подтвердил несовершенство владения русским языком. Главными признаками несовершенного владения являются: отсутствие беглости устной речи, низкий уровень сформированности умений в письменной речи на русском языке, однообразие используемых грамматических структур, неправильное фонетическое, лексическое и грамматическое оформление высказываний. По результатам проведенного нами лабораторного эксперимента были сделаны следующие выводы:

- большая часть двуязычных студентов являются субординативными билингвами; у них уже накоплен определенный запас знаний, навыков и умений по русскому языку, а также некоторый опыт общения на неродном языке;
- тувинские студенты владеют на коммуникативно-достаточном уровне всеми видами речевой деятельности на русском языке. Русский язык является для них средством общения;
- в речи тувинских студентов на русском языке имеется много ошибок, которые связаны с фонетическим, лексическим и, в особенности, грамматическим оформлением речи.

## *2. Проблемы обучения английскому языку как третьему в условиях тувинско-русского двуязычия.*

Изучение английского языка для тувинских студентов коренным образом меняет ситуацию языкового образования в вузе, становится многоязычным: тувинский, русский и английский языки образуют уникальное лингвистическое явление – триязычие (трилингвизм, многоязычие). Все языки, образующие триязычие, находятся в отношении функциональной зависимости и дополнительности. Формирующееся тувинско-русско-английское триязычие студентов носит искусственный характер, поскольку студенты изучают третий (английский) язык в организованном порядке, в отсутствии потребности пользоваться им как средством общения. Вместе с тем опора на формируемое триязычие



обеспечивает эффективность, рациональность и гибкость процесса обучения английскому языку в заданных условиях. Следовательно, в процессе обучения грамматической стороне устной английской речи в условиях тувинско-русского двуязычия рекомендуется использовать такие приемы, как сопоставление и сравнение с родным (тувинским) и русским языками. Учет природы трилингвизма является методически целесообразным, поскольку позволяет сделать процесс обучения иностранному языку экономичным с точки зрения технологичности, рациональным с позиции преодоления языковых и психологических трудностей.

Более того, рассматривая двуязычие как среду, в условиях которой идет обучение третьему языку, мы изучили особенности двуязычия, как методическую проблему, от решения которой зависит качество и уровень подготовки студентов. Опыт обучения английскому языку в условиях двуязычия показывает, что разные категории билингвов в процессе изучения английского языка с опорой на русский язык встречаются с разными трудностями.

Студенты – координативные билингвы – оказываются в более “выигрышном” положении. С одной стороны, свободно владея двумя языками, они обладают богатым лингвистическим опытом, и это способствует большей гибкости их языковой способности, оказывает общее положительное влияние на овладение третьим (английским) языком. С другой стороны, в силу того, что координативные билингвы в равной степени владеют тувинским и русским языками, речевые механизмы тувинского языка не являются доминирующими и не оказывают интерферирующего влияния при овладении грамматической стороной устной английской речи, имеет место лишь интерференция русского языка, которую можно устранить с помощью приемов и методов, разработанных для русскоязычных студентов.

Что касается студентов – субординативных билингвов, то они при обучении ИЯ встречаются с гораздо большими трудностями. Овладевая английским языком с опорой на русский язык, которым они еще не овладели в полной мере, они испытывают большие, чем другие студенты, затруднения, допускают больше ошибок. Отрицательное влияние навыков родного языка усиливается сходными навыками русского языка, тогда новым речевым навыкам противостоят уже объединенные устойчивые навыки родного и

русского языков. Интерференция в этом случае двойная, идущая, как от родного (тувинского), так и неродного (русского) языков.

Тем не менее, следует отметить, что тувинские студенты-билингвы, овладев основами русского языка, уже прошли путь познания неродного языка, поэтому, когда они приступают к изучению третьего (английского) языка, выражение своих мыслей посредством другого языка уже не является для них новым. Прежде всего, лингвистический опыт снимает психологический барьер, когда, как писал Л.В. Щерба, ученик осознал свое мышление и привык к тому, что мысли могут выражаться разными средствами. Следовательно, при изучении третьего (английского) языка у студентов уже сформирован ряд умений, приобретенных при изучении неродного (русского) языка, например, умение догадываться о значении незнакомых слов по контексту, умение выполнять типичные упражнения и др. В этой связи, следует отметить, что положительной стороной двуязычия при обучении английскому языку является то, что двуязычие несет потенциальные возможности, которые заложены, прежде всего, в лингвистическом опыте. Студенты-билингвы опираются на уже сформированные способности к овладению и восприятию неродного языка. В связи с этим решение многих вопросов обучения грамматической стороне в заданных условиях связано с преимуществом лингвистического опыта билингва.

Таким образом, становится очевидным, что решение проблемы обучения грамматической стороне устной английской речи в условиях билингвизма зависит от характера тувинского языка, от степени владения русским языком, от наличия или отсутствия языковой среды (имеется в виду третий - английский язык), а также от характера влияния тувинского и русского языков на усваиваемый английский (формирующееся тувинско-русско-английское триязычие).

### *3. Сравнительно-сопоставительный анализ контактирующих языков.*

В процессе исследования тщательному анализу были подвергнуты трудности формирования грамматической стороны английской речи в условиях тувинско-русского двуязычия, для этого нам потребовалось сопоставить грамматические системы трех контактирующих языков, рассмотреть точки сходства и расхождения между языковыми явлениями и составить типологию трудностей, с которыми сталкиваются тувинские студенты в процессе усвоения

грамматической стороны английской речи. В сопоставительном анализе грамматических систем тувинского, русского и английского языков за исходный язык принимался английский язык. Оценивая через призму английского языка явления, вскрытые лингвистическим сопоставлением, мы обнаружили общие закономерности, имеющиеся в сравниваемых языках, а также специфические черты именно английского языка, ибо это новое, отличительное от знаний, навыков и умений обучаемых, которое требует внимания, специальной семантизации (раскрытия логики и закономерностей языкового явления), а также функционирования его в речи (выработке автоматического его употребления). Сопоставление с русским языком носит вспомогательный характер, но обретает особую ценность для введения категорий или явлений, имеющих в английском и в русском языках, но отсутствующих в родном языке (например, категория предлогов, категория рода, категория личных местоимений ед.ч. 3.л., категория множественности имени существительного после количественных числительных).

Сравниваемые языки отличаются друг от друга, во-первых, генеалогически: английский является германским языком индоевропейской языковой семьи, русский язык относится к славянским языкам, а тувинский – это тюркский язык; во-вторых, типологически: английский и русский языки относятся к флективным языкам, а тувинский к агглютинативным. Хотя можно утверждать, что в какой-то степени английский язык сочетает черты и флективного и агглютинативного типов, т.е. занимает промежуточное положение. Нарушение многих признаков флективности в английском языке и приобретение им отдельных признаков агглютинации свидетельствует о большей устойчивости агглютинации по сравнению с флексией. В английском языке, принадлежащем к аналитическим языкам, важную роль играет порядок слов, поскольку в связи со слабой представленностью морфологической системы, члены предложения часто выделяются по занимаемому ими месту в предложении; тувинский язык относится к синтетическим языкам, в которых отношения между словами в предложении выражаются путем присоединения к слову целого ряда грамматических элементов - аффиксальных морфем. Тувинский язык в отличие от английского представлен более развитой системой падежных и личных

окончаний, но, тем не менее, в нем наличествует свой специфический порядок слов.

В результате сопоставления грамматических явлений всех трех языков, мы приходим к следующим выводам:

1) Трудности при построении английского предложения могут быть связаны с месторасположением сказуемого, которое в английском и русском языках стоит после подлежащего, т.е. на II месте, а в тувинском языке глагол-сказуемое независимо от временной формы и типа предложения стоит в самом конце предложения.

2) Значительные трудности может представить расположение второстепенных членов предложения, поскольку второстепенные члены предложения в английском языке располагаются после сказуемого, тогда как в тувинском до сказуемого.

3) Проведенный нами анализ синтаксических явлений трех языков позволил предположить, что трудностей испытываемых студентами при усвоении порядка слов английского предложения будет тем больше, чем больше в нем членов предложения.

4) Трудности могут возникнуть с размещением предлогов в английском предложении, поскольку в родном языке они стоят после слова, к которому относятся.

5) Особую трудность могут представить явления английского языка, чуждые, отсутствующие в тувинском языке, например, употребление артикля – что представляет одну из основных трудностей овладения морфологическим строем английского языка, с которой студенты могут столкнуться в самом начале обучения.

6) Определенные трудности может представить употребление существительных во мн.ч. после количественных числительных.

7) Трудности могут вызвать личные и притяжательные местоимения, поскольку одному личному местоимению –ол– (3 л.ед.ч.) в тувинском языке соответствуют три разных местоимения в английском языке (he, she, it), и русском (он, она, оно) языках.

8) Значительные трудности могут возникнуть с образованием временных форм английского глагола, которые связаны с месторасположением отрица-

тельной частицы *not* и вспомогательных глаголов в отрицательных и вопросительных предложениях.

Проведенный нами анализ грамматических систем английского, тувинского и русского языков позволил нам гипотетически предположить, какие грамматические явления могут представить трудности для студентов-тувинцев. Однако одного лингвокомпаративного анализа недостаточно, чтобы построить надежную методику обучения грамматической стороне речи в заданных условиях. Поэтому нам пришлось соотнести данные сопоставительного анализа с анализом грамматических ошибок, допускаемых тувинскими студентами, для подтверждения или опровержения составленной типологии трудностей, а также для определения содержания обучения грамматической стороне, последовательности в работе, характера и количества упражнений.

Фиксация речевых грамматических ошибок проводилась в ходе анализа устной английской речи студентов I курса естественно-географического факультета ТувГУ, записанной на электронные носители.

На основании результатов анализа грамматических ошибок тувинских студентов мы смогли подтвердить трудности, выявленные нами в ходе сопоставительного анализа грамматических систем английского, тувинского и русского языков.

*4. Проблемы взаимовлияния тувинского, русского и английского языков.* Особенности обучения иностранному языку в условиях, например, татарско-русского двуязычия, не могут быть механически перенесены на обучение английскому языку в условиях тувинско-русского двуязычия, поскольку специфика формирующегося тувинско-русско-английского триязычия имеет свои конкретные особенности и характеристики, которые оказывают значительное влияние на характер обучения и выбор приемов и способов обучения и требуют отдельного рассмотрения.

К особенностям обучения в заданных условиях мы относим следующие:

- лингвистический опыт тувинских студентов;
- учет тувинского и русского языков в процессе усвоения английского;
- определение роли и места тувинского и русского языков в процессе усвоения английского;
- характер взаимодействия тувинского, русского и английского языков;

- межъязыковая интерференция как результат взаимодействия контактирующих языков.

Рассматривая проблемы взаимовлияния языков, во-первых, мы обратили внимание на то, что изучаемые языки на уровне грамматического структурирования взаимодействуют, подвергаясь влиянию родного языка, а перенос может осуществляться как с родного, так и с русского языка, во-вторых, на уровне продуктивной речи на английском языке влияние родного языка является более сильным в случаях расхождения языковых систем, а в случаях сходства на уровне реализации речевого высказывания на английском языке не только родной язык оказывает влияние, но и русский, которым студенты также владеют. Это, прежде всего, проявляется в характере ошибок, типичных для студентов-тувинцев.

Анализ проблем влияния родного и русского языков на усваиваемый английский позволяет сделать вывод о том, что в процессе обучения грамматической стороне устной английской речи целесообразно сознательно использовать данные лингвокомпаративного анализа на грамматическом уровне, учитывая при этом то, что изучаемые языки на этом уровне подвергаются влиянию родного языка. На уровне реализации речевого высказывания сознательно-сопоставительное использование данных лингвокомпаративного анализа целесообразнее осуществлять с учетом того, что перенос может осуществляться как с первого, так и со второго на третий язык. При обучении грамматической стороне устной английской речи в условиях билингвизма необходимо опираться не только на процесс мышления, но и на процесс сличения на основе лингвокомпаративного анализа, чтобы преодолеть влияние тувинского и русского на основе сознательно-сопоставительного использования лингвокомпаративного анализа, что может обеспечить формирование стойкого механизма переключения с одного языка на другой, доведя до минимума интерферирующее влияние родного и русского языков. С другой стороны, исключит отсутствие или слабый уровень развития механизма переключения с одного языка на другой и даст возможность индивиду использовать потенциальные возможности лингвистического опыта.

Таким образом, в рамках проведенного исследования были концептуально изучены и проанализированы проблемы тувинско-русского двуязычия,

определено двуязычное состояние тувинских студентов, которое имеет особую актуальность в организации обучения грамматической стороне устной английской речи в заданных условиях, содержит в себе новые возможности изучения проблемы обучения иностранным языкам студентов-тувинцев, что отвечает современным требованиям поиска новых путей обучения языкам и максимального использования научного потенциала, накопленного в области исследуемой проблемы.

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### ***Formation of professional pedagogical culture of the future social teachers as a process of achieving their personal maturity and professional competence***

**Abstract:** The article presents the classifications of professional competences and the possibility to structure professional pedagogical culture of future social pedagogues by means of the system of competences.

**Keywords:** competence, professional pedagogical culture, prospective social pedagogues.

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**Формирование профессионально-педагогической культуры будущих социальных педагогов как процесс достижения их личностной зрелости и профессиональной компетентности**

**Аннотация:** В статье раскрыты классификации профессиональных компетенций и рассмотрена возможность структурирования профессионально-педагогической культуры будущего социального педагога через систему компетенций.

**Ключевые слова:** компетентность, профессионально-педагогическая культура, будущий социальный педагог.

Глубокие социальные и экономические изменения, происходящие в настоящее время в Украине, побуждают к реформированию системы образования, что должно способствовать утверждению человека как высшей социальной ценности. Только компетентная, самостоятельная и ответственная, с четкими гражданскими позициями индивидуальность, то есть образованный, воспитанный человек способен к обновлению общества, обеспечению государственности Украины, развитию ее экономики и культуры. Воспитание такого человека поручено социальным педагогам.

Внедрение компетентностного подхода в изучение эффективности педагогической деятельности будущего социального педагога заслуживает более внимательного изучения исследователей.

Изучение проблемы профессиональной компетентности специалистов показывает, что компетентность сочетает в себе общечеловеческие, профессионально значимые ценности, гибкость профессионального мышления, знания, умения, способность к самореализации (Н. Кузьмина, А. Лебедева, Л. Лукьянова, А. Маркова, М. Розов и др.).

В структуру субъективных факторов, как справедливо считает Н. Кузьмина, входят: тип направленности, уровень способностей и компетентность, включающая специально-педагогическую, методическую, специально-психологическую, дифференциально-психологическую, аутопсихологическую компетентность [1, с. 105].

По мнению И. Зимней, есть три основных компонента этой факторной структуры: личностный, индивидуальный (или индивидуально-педагогический) и профессионально-педагогический. Последний компонент структуры включает профессиональные знания и умения. Итак, это профессиональная компетентность, определяемая по предметным основаниям тех наук, вклад которых в ее

формирование считается ведущим (педагогика, методика, социальная и дифференциальная психология), и уровнем саморазвития [2, с. 139].

Автор сформировала четыре группы, входящие в структуру субъективных свойств (качеств, характеристик, факторов):

1. Психофизиологические (индивидуальные) свойства субъекта как предпосылки осуществления им субъектной роли, выступающие в качестве задатков.
2. Способности.
3. Личностные свойства, которые включают направленность.
4. Профессионально-педагогические и предметные знания и умения как профессиональная компетентность в узком смысле [2, с. 140].

Структуру субъектных свойств учителя А. Маркова раскрывает через такие блоки характеристик:

1. Объективные характеристики:

- профессиональные, психологические, педагогические знания;
- профессиональные умения.

2. Субъективные характеристики:

- профессиональные, психологические позиции, установки;
- личностные особенности [3, с. 8].

Итак, профессиональная компетентность – это интеграция опыта, теоретических знаний, практических умений и значимых для педагога личностных качеств.

Профессионализм, профессиональная компетентность социального педагога – это не только достижения им высоких профессиональных результатов и производительности труда, но и особый смысл аксиологических структур личности – системы психологических установок, профессионально-ценностных ориентаций, внутреннее отношение к труду.

Содержание социальной работы меняется с динамикой жизни, в него включаются все новые аспекты, расширяются функции, задачи, модернизируются как структуры, содержание и нормы практической социальной работы, так и система подготовки социальных педагогов и социальных работников. При этом неизменными в большинстве стран остается цель профессионального образования – подготовка профессионально-компетентных специалистов.

Концепции профессиональной компетентности социальных работников / социальных педагогов в большинстве стран различны по содержанию. Одни из них акцентируют внимание на теоретическом подходе – приобретении знаний в области теории социальной работы, другие – предпочитают практическую деятельность, формирование профессиональных умений. Мы считаем, что эти концепции взаимно дополняют друг друга и объединены общей образовательной целью – способствовать подготовке профессионально компетентных будущих специалистов социальной сферы.

В научной литературе нет единого мнения относительно компонентов профессиональной компетентности социальных работников.

По А. Щеклеиной, к ним принадлежат: компетентность восприятия, компетентность взаимодействия, коммуникативная компетентность и рефлексивная компетентность как составляющие профессиональной компетентности социальных работников; интеграция инструментального, рефлексивного и социального компонентов [4, с. 125].

Зарубежные специалисты называют такие тенденции в формировании профессиональной компетентности социальных педагогов / социальных работников:

- необходимость интеграции знаний из различных научных и учебных дисциплин в процессе профессиональной подготовки будущих специалистов социальной сферы (социальных работников / социальных педагогов);
- необходимость интеграции теории и практики [5, с.12].

Определение компетентности владения компетенциями и как качества человека, обладающего всесторонними знаниями в определенной области, позволяет определить исследователям круг компетенций, которыми должен обладать будущий специалист, а на основе этого – уровень его компетентности.

Среди основных подходов, которые используют ученые к определению понятия «профессионально-педагогическая культура», можем назвать следующие: системный (В. Сластенин, В. Тамарин); индивидуальный (В. Наумчик, А. Савченко, Э. Шорт); личностно-ориентированный (Е. Бондаревская, И. Бех); интегративный (С. Елканов, А. Савченко); культурологический (И. Исаев, В. Кра-

евский); деятельностный (В. Адольф; М. Коул, С. Скрибнер, В. Сластёнин); компетентностный (А. Бермус; А. Хуторской, И. Зимняя; Ю. Татур).

В монографии «Компетентностный подход в современном образовании: мировой опыт и украинские перспективы» среди ключевых компетентностей учащихся, определенных украинскими педагогами, названы следующие: умение учиться; социальная компетентность; общекультурная компетентность; здоровьесберегающая компетентность; компетентности информационных и коммуникационных технологий; гражданская компетентность; предпринимательская компетентность [6, с.168].

Одной из основных задач современной педагогической науки и практики является овладение обучающимися ключевыми компетенциями. В свою очередь, профессиональные компетенции – это составляющие полиструктурного многофункционального социально-психологического феномена – профессиональной компетентности.

Исследователь Л. Волык рассматривает профессиональную компетентность педагога как совокупность трех компонентов: предметно-технологического, психолого-педагогического и общекультурного [7, с.25]. Автор считает, что профессиональная компетентность педагога включает следующие составляющие:

- предметно-технологическая – сформированность технологического знания, мышления, направленного на проектирование моделей образовательной деятельности и их практической реализации, гибких технологических умений;
- психолого-педагогическая является относительно самостоятельной подсистемой в структуре профессиональной компетентности и содержит: образованность (обществообразительные профессиональные знания – методики, дидактики, педагогические технологии); умения (способность использовать имеющиеся знания в педагогической деятельности, в организации взаимодействия в образовательном пространстве); профессионально-значимые качества личности (рефлексивность, гибкость, эмпатийность, способность к сотрудничеству и т.д.);
- общекультурная предполагает сформированность общей культуры личности [Там же, с.25].

В педагогической науке пока нет единого взгляда на виды компетенций. Структуру профессиональной компетентности учителя исследователи рассматривают как единство профессионально-деятельностного, коммуникативного и личностного компонентов.

Так, Н. Кузьмина к профессионально-деятельностному компоненту относит социальную компетентность, А. Маркова - социально-психологическую [1; 3].

Существуют различные взгляды ученых на специальную или предметную компетентность. Например, Н. Кузьмина считает, что к ней относятся:

- дифференциально-психологическая компетентность (в области мотивов, способностей, направленности учащихся);
- специальная и профессиональная компетентность (в области дисциплины, которая излагается);
- методическая компетентность (в области формирования знаний и умений учащихся) [1].

В предметную (специальную) А. Лебедева включает психолого-педагогическую компетентность; профессиональную позицию учителя; научно-теоретическую и методическую компетентности [8, с. 6].

По мнению С. Бурдынской, специальная компетентность соединяет в себе общепедагогическую, специальную и технологическую [9, с. 4]. Все ученые едины во мнении, что к коммуникативному компоненту профессиональной компетентности принадлежит коммуникативная компетентность.

На основе анализа научных источников и обобщения результатов исследования установлено, что профессионально-педагогическая культура будущего социального педагога включает такие структурные элементы: общекультурную, ценностно-смысловую, социальную, гражданскую, коммуникативную, психолого-педагогическую, информационную, рефлексивную, валеологическую, правовую, конфликтологическую, исследовательскую компетентности.

А профессиональная зрелость как социально-педагогический феномен представляет собой интегративное качество личности, отражающее системное содержательно-смысловое единство личностных, академических и социальных качеств студента-выпускника, развиваемое в образовательном процессе вуза, обеспечивающее ему успешную самореализацию в профессиональной дея-

тельности, социализацию и гармонизацию с окружающей средой и является объединяющей качественной характеристикой, охватывающей общей смысловой идеей отдельные компоненты (личностную, академическую и социальную зрелость) в единую целостную систему с актуализацией качественного аспекта объединения более высокого уровня, чем его составляющие [10, с. 4].

Она отражает высокий уровень сформированности профессионально-педагогической культуры будущего социального педагога.

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## ***On some trends in the development of university education in the modern world***

**Abstract:** The article analyzes the main directions of the university education development in the modern world. The attention is focused on ensuring the continuity of the university education traditions, the need for public awareness of the quality education value as part of the national idea.

**Keywords:** globalization, university education, quality standards, the continuity of traditions, the role of the state.

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## **О некоторых тенденциях развития университетского образования в современном мире**

**Аннотация:** В статье анализируются основные направления развития университетского образования в современных условиях. Акцентируется внимание на обеспечение преемственности традиций университетского образования, на необходимость осознания обществом ценности качественного образования как части национальной идеи.

**Ключевые слова:** глобализация, университетское образование, стандарты качества, преемственность традиций, роль государства.

На современном этапе глобализация становится ключевым понятием, которое характеризует мировые процессы развития. Она проявляется в формировании мирового информационного пространства, мировом разделении труда, миграции в масштабах всей планеты капитала, человеческих и производственных ресурсов, стандартизации законодательства, экономических и технологических процессов, сближении культур разных стран. Это объективный, естественноисторический процесс, который носит системный характер и охватывает все сферы жизни общества. Необходимым ответом на вызовы глобализации становятся процессы создания мирового образовательного пространства. Сегодня все сложнее говорить о системе образования в какой-либо отдельной стране. Неоспоримы центроостремительные тенденции мирового образовательного процесса, требующие адаптации национальных образовательных структур и программ для интеграции в международные институты.

Анализ современного общественного развития свидетельствует о переходе цивилизации на качественно новый этап, который называют уже даже не постиндустриальным, а информационным обществом. Современный этап развития мировой экономики определяется знаниями в форме идей и

технологий. Решающее значение приобретает «способность общества формировать, распространять и применять знания» [1].

Это формирует новые образовательные парадигмы и стандарты качества. Быстро развивающиеся новые технологии требуют от специалиста способности к самостоятельному мышлению и открытости к восприятию новых идей, наличия комплексных знаний, навыков и компетенций, которые необходимо постоянно обновлять, знания должны быть доведены до умения преобразовывать в источник прибыли информационные и технические ресурсы.

Как отмечается в аналитическом обзоре, посвященном деятельности Всемирного банка в сфере поддержки высшего образования, интегрирующие последствия глобализации, повышение роли знаний как одного из основных двигателей роста, революция в области информации и связи влияют «не только на форму и характер функционирования, но и на саму задачу высшей школы» [1]. Это приводит к реформированию высшего профессионального и университетского образования в мировом масштабе, переосмыслению миссии и политики институтов высшей школы.

Исторически классический университет характеризуется принципами научности образования, академической свободы преподавания и исследования, автономии, демократизма и открытости. Все университеты мира едины в основной идее их возникновения в качестве научного и интеллектуального центра развития общества. В конце XX века проявилась тенденция трансформации высших отраслевых учебных заведений в университеты: экономические, лингвистические, аграрные, технические, медицинские, педагогические и т.д. Такое многообразие приводит в какой-то мере к размыванию сути университетского образования. Как отмечает автор [2], классические университеты в чистом виде уже не существуют. Происходит преобразование всех видов высших учебных заведений в унифицированный для всего мира тип высшей школы — университет.

Важно, чтобы при этом сохранялась основная функция университетского образования в плане развития творчески мыслящей личности, способной к непрерывному самообразованию в течение всей жизни. Академик Д.С. Лихачев писал: «Университет — будь он для химиков, физиков, математиков, филологов, юристов — учит всегда многомерности жизни и творчества, учит терпимости к непонятному и попытке постигнуть бескрайнее, сначала не во

всем доступное, разнообразное» [3]. «Смысл университетского образования не в передаче знаний как таковых, а в том, чтобы помочь студенту выработать и развить способность критически мыслить, — говорит профессор Высшей школы экономики О.Е. Кузина, — то есть развить такие компетенции, как самостоятельность и ответственность за собственные действия (прежде всего, в выборе темы и проблемы исследования), способность искать и работать с информацией различного рода, умение формулировать и, главное, аргументировать собственную точку зрения, учитывая существование возможных контраргументов» [4].

На рубеже XX-XXI веков во многих странах вузы приступили к радикальным преобразованиям, стремясь соответствовать новым требованиям, которые предъявляются к образованию, и задачам, возникающим в условиях конкуренции. Главная цель — повышение институциональной гибкости и усиление адаптивного потенциала вузов и программ высшей школы. Эти реформы носят всеобъемлющий характер и затрагивают предлагаемые программы, академическую и организационную структуру, методы преподавания, физическую инфраструктуру и весь преподавательский состав.

С началом XXI века возникают новые типы высших учебных заведений и новые формы конкуренции, побуждающие традиционные институты изменять стиль своей деятельности и формы предоставления услуг и использовать преимущества, предлагаемые новыми информационно-коммуникационными технологиями. В обзоре [1] выделяются «две волны» диверсификации систем высшего образования, произошедшей во многих странах: первая связана с появлением учебных заведений, предлагающих короткие программы обучения, центров дистанционного обучения и увеличением числа частных заведений высшей школы; вторая может быть определена как формирование рынка «высшего образования без границ» (появляются виртуальные, лицензионные, корпоративные университеты, брокеры в сфере образования).

Попытки воплотить новые идеи о целях высшего образования и путях их достижения реализуются в развитии университетов нового типа. Анализируя опыт передовых университетов, сумевших в короткие сроки существенно улучшить свою репутацию либо создать ее с нуля, Т.Н. Жуковская в [2] выделяет следующие основные тенденции в развитии этих учебных заведений: открытость новациям и мобильность; вовлеченность в создание объединений

университетов (сетевых университетов); определение университетом собственного уникального профиля и миссии, имеющих индивидуальную привлекательность для соискателей кафедр и студентов; интернационализация процесса обучения, состава студентов и преподавателей; ориентация на ранжирование, при которой самооценка вуза корректируется внешней оценкой, полученной на основании различных взаимодополняющих систем рейтингов; создание целевого капитала, направленного на развитие университета; разделение на «массовый» и исследовательский (элитный) университет; создание в университетах идеальной среды для науки и жизни; оптимизация управления и подчинение администрирования задачам развития университета.

Таким образом, современная мировая образовательная система находится в процессе переосмысления миссии и функций высшей школы и поиска новых форм организации университетского образования, способных адекватно ответить на вызовы времени. Университетам предстоит трудная работа по адаптации к требованиям зарождающейся эпохи глобализации.

Однако одной из основных проблем развития образования является осознание государством функции образования как системообразующего элемента существования и развития общества. Там, где государственная политика строится на приоритетах образования, осознается его особая динамизирующая социально-экономическая и цивилизационная роль, достаточно быстро появляются прогрессивные социальные изменения и культурные преобразования. Как отмечает Е. Ливянт в [5], страны, которые сделали резкий экономический рывок во второй половине XX – начале XXI века, — Финляндия, Сингапур, Южная Корея, Япония, Китай, — занимают первые строки в рейтингах качества школьного образования, таких, например, как PISA. Для всех этих государств характерна стратегия повышенных требований к качеству обучения и подготовке кадров, на цели образования выделяются значительные средства, профессия учителя имеет высокий социальный статус и предполагает значительное материальное вознаграждение. Автор [5] приводит также пример США, где в конце прошлого века были сформулированы «цели реформирования образования, без достижения которых к 2000 году американцы не смогут удержать своего лидерства в мировой экономике».

В острополемиической статье [6] Д.Б. Сандаков объясняет современный кризис образования на постсоветском пространстве отсутствием «социального

заказа на массовое высшее образование». Автор подчеркивает, что советская система образования сформировалась и развивалась в ответ на жесткие социальные вызовы: необходимость индустриализации страны в 1930-х годах; восстановление нормальной жизни после Великой Отечественной войны; противостояние СССР и США в годы холодной войны. В этих условиях «интеллект и креативность стали фактором выживания государства и народа и величайшей общественной ценностью» [6].

Надо признать, что на современном этапе в наших странах цели образования носят прагматичный, утилитарно-прикладной характер. Формирование духовных, нравственных и мировоззренческих качеств отступило на второй план после профессиональной компетентности. Образование из цели превратилось в средство повышения социального статуса, престижа и т.д., возникла мода на университетский диплом (не подкрепленная, к сожалению, модой на знания). В результате социальных трансформаций начала 90-х годов XX века на постсоветском пространстве неограниченно расширились и упростились возможности для получения высшего образования, но к сожалению, это вовсе не означает, что каждый диплом о высшем образовании свидетельствует о высокой профессиональной компетенции выпускника. Мы видим, что массовость высшего образования, когда оно доступно всем желающим, снижает средний уровень знаний как абитуриентов, так и выпускников. В результате, на фоне стремления к переходу на рыночные отношения в экономике, в обществе укореняется потребительское отношение к учреждениям высшего образования.

Особую тревогу вызывают меры, направленные на упрощение и сокращение программ высшей школы в ущерб фундаментальности образования. У нас избыток специалистов с дипломами и недостаток кадров, способных на высоком профессиональном уровне решать сложные современные задачи. Например, как пишет Г.Г. Малинецкий, уже сейчас в России «утрачены многие важнейшие технологии, уходят специалисты, которые могли поддерживать многие высокотехнологические производства и опытно-конструкторские разработки в важнейших областях, ... не создаются образцы техники новых поколений, ...отечественные инженеры теряют возможность и способность осваивать и повторять технологии стран-лидеров» [7]. Автор, и с ним нельзя не согласиться, говорит о необходимости сохранения триады



«качественное образование – современная наука – высокие технологии», которое может быть обеспечено только если будет рассматриваться как один из важнейших государственных приоритетов.

По нашему мнению, необходимо обеспечивать преемственность лучших традиций университетского образования, ориентировать общество на осознание ценности качественного образования и профессионализма как части национальной идеи – цели, ради достижения которой общество могло бы мобилизовать свои ресурсы.

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### ***Internationalization of education in the Asia-Pacific region***

**Abstract:** Directions, the basic strategy, advantages, forms of internationalisation of formation are considered. Features of internationalisation of formation in Asian-Pacific region, in such countries, as Japan, Korea, China are allocated.

**Keywords:** the academic mobility, formation internationalisation, educational alliances, transitive formation, steadily various internationalisation.

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### ***Интернационализация образования в Азиатско-Тихоокеанском регионе***

**Аннотация:** Рассматриваются направления, основные стратегии, преимущества, формы интернационализации образования. Выделены особенности интернационализации образования в Азиатско-Тихоокеанском регионе, в таких странах, как Япония, Корея, Китай.

**Ключевые слова:** академическая мобильность, интернационализация образования, образовательные альянсы, транзитивное образование, устойчиво разнообразная интернационализация.

Развитие образования в современном мире связано не только с повышением качества подготовки специалистов, но и с расширением доступности качественного образования для каждого, независимо от географического положения, национальных границ, религиозных условностей, графика работы и

других факторов. Поэтому образование становится открытым, межгосударственным, межнациональным [1].

Интернационализация образования включает такие формы международного сотрудничества, как индивидуальная мобильность: мобильность студентов и профессорско-преподавательского состава; мобильность образовательных программ; формирование новых международных образовательных стандартов; институциональное партнёрство; создание стратегических образовательных альянсов. Преимущества интернационализации [2]: объединение ресурсов; предотвращение дублирования тем научных исследований; идентификация образовательных проектов, увеличение доступности высшего образования, универсализация знаний, появление международных стандартов качества и повышение инновационности высшего образования, расширение и укрепление международного сотрудничества.

Основные стратегии интернационализации образования [3]:

- согласованный подход – санкционирует международную мобильность студентов и преподавателей посредством грантов и программ академического обмена; ориентирован на небольшие группы;
- привлечение квалифицированной рабочей силы – включает более активный и адресный подход к рекрутингу иностранных студентов, переход от массового набора студентов к поиску и приглашению наиболее талантливых;
- акцент на получении дохода – ориентирован на коммерческие задачи, получение максимальной прибыли;
- расширение возможностей – поддержка и развитие образовательных программ за рубежом и учреждение зарубежных вузов на территории принимающей страны; преимущественно касается развивающихся стран.

В период с начала XXI столетия показатели академической мобильности в США, Японии и Корее выросли более чем в 2 раза; подобная тенденция характерна и в целом для Европы [3, 4].

В то время как Австралия, Новая Зеландия, Великобритания, Германия и Франция остаются среди главных принимающих стран, куда едут обучаться иностранные студенты, США постепенно теряют своё преимущество. Основные страны-поставщики студентов – Китай, Индия, Южная Корея, Япония, США.

В последние годы на мировом рынке образовательных услуг наблюдается значительные подвижки: например, Сингапур планирует привлечь 150 тыс. иностранных студентов к 2015 г., Япония – 300 тыс. – к 2025 г., Малайзия – 200 тыс. – к 2020 г., Китай – 500 тыс. – к 2020 г.

Привлекательность азиатского рынка образования велика ещё и потому, что в Азии к 2025 году ожидается рост обучаемого населения с 17 до 87 миллионов человек [5]. Интенсивность мер по интернационализации высшего образования в Азиатско-Тихоокеанском регионе зависит от образовательной политики отдельных стран.

Выделяют три направления международного образования [6]:

- регулируемое государством (Китай, Малайзия, Южная Корея);
- рыночно ориентированное (Гонконг);
- транзитивное, переходное от регулируемого государством к рыночно ориентированному (Япония, Тайвань).

Особенность интернационализации образования в России – преимущественная ориентация на опыт вузов США и принятие американской модели высшего образования за образец, что парадоксально на фоне заметных антиамериканских настроений в российском обществе.

Особенность обучения в некоторых университетах Южной Кореи – прохождение стажировок в крупнейших корейских компаниях мирового уровня, таких как Hyundai, LG и Samsung, что весьма привлекательно для многих иностранных студентов [7].

Среди приоритетных направлений повышения качества высшего образования в Японии выделяется, инициированный в 2008 году японским правительством, план «Global 30». Цель – привлечь 300 тыс. иностранных студентов до 2020 года; было выбрано 30 ведущих университетов страны [8]. Программа «CAMPUS Asia» (Collective Action for Mobility Program of University Students) инициирована правительством, промышленностью и университетами Японии для усиления сотрудничества с ближайшими соседями – Китаем и Южной Кореей.

Для целей многостороннего сотрудничества создана организация UMAP (University Mobility in Asia and the Pacific), способствующая эффективной международной академической мобильности студентов.

В декабре 2010 г. состоялась первая конференция стран АСЕАН (Association of South East Asian Nations) – по теме «Исследовательские кластеры в сфере высшего образования». Было принято решение, что здравоохранение и медицина координируются Сингапуром и Таиландом, сельское хозяйство и пищевая промышленность – Малайзией, Таиландом и Вьетнамом, энергетика и биологические исследования – Филиппинами и Индонезией [4].

Сегодня в России и США существует схожая тенденция к расширению вузовского сотрудничества с Китаем. Китайский рынок образования признается сегодня наиболее перспективным для международного взаимодействия на фоне мощного экономического, политического и культурно-образовательного подъема КНР. В соответствии с конфуцианскими традициями, образованность и ученость высоко ценятся в китайском обществе, а высшее образование получают наиболее способные студенты. Государственная поддержка исследований в КНР на протяжении последнего десятилетия ежегодно увеличивается на 20%, а число китайских вузов за этот же период более чем удвоилось [7]. Правительство вкладывает деньги в поддержку крупнейших 39 университетов страны для превращения их в вузы мирового уровня. Китайские вузы получили дополнительную правительственную поддержку (около \$6 млрд.) и ищут серьезных международных вузовских партнеров для совместных программ в области образования и науки.

Три сценария развития интернационализации образования:

1) устойчиво разнообразная интернационализация – используются описанные выше 4 стратегии интернационализации, при сохранении разнообразия систем высшего образования с точки зрения институциональной автономии, условий приема, финансирования;

2) конвергенция в направлении либеральной модели – основана на принципах торговли; соревнование за привлечение иностранных студентов, оплачивающих обучение по рыночным ценам;

3) триумф развивающихся экономик – стратегический подход к развитию человеческого капитала и знаний позволит бывшим «развивающимся экономикам» достичь необходимого экономического роста, а также высокой конкурентоспособности своих систем образования, как в отношении качества, так и в отношении стоимости обучения.

Анализ ситуации в сфере интернационализации образования показывает, что страны, занимавшие исторически ведущие позиции на международном рынке образовательных услуг, ограничивают иностранцам доступ на рынок труда в секторе высшего образования и отдают предпочтение иностранным специалистам с уникальными компетенциями. Страны, стремящиеся усилить свои позиции на международном рынке образовательных услуг не устанавливают жестких требований к иностранным кандидатам, стараются уменьшить сложности и ограничения по их трудоустройству и пребыванию в стране.

Несмотря на рост конкуренции на рынке международного образования, принципиально ситуация не меняется, лидеры сохраняют свои позиции. Однако лидерство США уже не столь очевидно и студенты могут выбирать страну для своего обучения из множества вариантов. Развитие системы высшего образования в целом ряде стран (Китай, Индия, Малайзия, Япония, Сингапур и др.) и меры по привлечению иностранных студентов (миграционная политика, стоимость обучения и его качество, вопросы безопасности) могут серьезно повлиять на рынок международных образовательных услуг.

В экономике знания система образования превращается в инструмент эффективного создания, распространения и применения знаний как исходного императива построения интеллектуального, технического и профессионального потенциала данной страны. Глобализация экономики знания, означая глобализацию рынков образовательных услуг, превращает образование в основную сферу конкуренции [9]. Чем выше статус университета в мировой иерархии вузов, тем больше получает победитель и на национальном, и на мировом рынке образовательных услуг высшей школы.

Сегодня рынок образовательных услуг уже сформировался – его общий объем, по оценкам специалистов Организации экономического сотрудничества и развития, достигает 30 млрд. долларов [10]. На нем все более четко выделяются страны, экспортирующие и импортирующие образовательные услуги. В начале XXI века конкуренция между лидирующими в образовании странами создает критический потенциал для смены геополитического лидерства за счет главного – высококвалифицированных кадров и новых компетенций [11]. Стремление занять ведущие позиции в экспорте образования

– вопрос конкуренции за возможности установить профессиональные и человеческие стандарты, стандарты образования и образа жизни.

Интернационализация образования неизбежна, т.к. является естественным завершением глобализации всех сфер жизни. Плюсы её очевидны: это скорость распространения универсальных межкультурных компетенций, доступность, вариативность, синергетический эффект, коллективный контроль и стимул к развитию [12]. Однако и возможные риски многочисленны: это усиление диспропорций между лидерами и аутсайдерами, монополизация рынка образования, полная коммерциализация и унификация образования, деградация чисто теоретических наук, деградация национальных научных элит. Задачей дальнейших исследований в данной области может быть максимальное использование преимуществ и снижение вероятных рисков, связанных с развитием интернационализации образования.

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## ***Legal protection of water bodies in the international and Russian law***

**Abstract:** This paper assesses the impact of international law on the formation of the water legislation of the Russian Federation, the issues of legal regulation of the protection of water bodies in the context of the Water Code of the Russian Federation.

**Keywords:** protection of water bodies, transboundary water issues, marine areas, government supervision in the use and protection of water bodies.

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***Правовая охрана водных объектов в международном  
и российском праве***

**Аннотация:** В статье дается оценка влияния норм международного права на формирование водного законодательства Российской Федерации, рассматриваются вопросы правовой регламентации охраны водных объектов в контексте Водного кодекса РФ.

**Ключевые слова:** охрана водных объектов, вопросы использования трансграничных вод, морские акватории, государственный надзор в области использования и охраны водных объектов.

Согласно положениям ст. 15 Конституции РФ 1993 г. и ст. 5 ФЗ от 15.07.1995 № 101-ФЗ «О международных договорах Российской Федерации» [1], общепризнанные принципы и нормы международного права и международные договоры России являются составной частью российской правовой системы. Международно-правовая охрана водных ресурсов и оценка влияния норм международного права на формирование водного законодательства Российской Федерации в ходе своего развития претерпевало существенные изменения. Только в первой половине 19 века стали появляться первые документы, изданные в целях международного природоохранительного сотрудничества. Причем данные положения особым образом не влияли на государственные законы, так как заключение международных соглашений было связано с использованием и охраной лишь отдельных водных объектов, в которых в основном, затрагивались вопросы судоходства по международным рекам и озерам и демаркации их границ. Лишь позднее, государства стали включать в тексты соглашений положения, предусматривающие охрану водных объектов от загрязнения, механизмы разрешения межгосударственных споров по вопросам водопользования и меры контроля за реализацией сторонами принятых на себя обязательств.

В настоящее время имеется около 150 международных соглашений, связанных с охраной водных ресурсов. К основным документам, регулирующим охрану вод, относятся Конвенция по оценке воздействия на окружающую среду в трансграничном контексте 1991 г., Конвенция по охране и использованию трансграничных водотоков и международных озер 1993 г., а также Глобальная программа ООН по воде, которые определяют общие контуры подхода к данной проблеме. По вопросам использования трансграничных вод действует принятая

в 1992 г. Хельсинская конвенция по охране и использованию трансграничных водотоков и международных озер. Это первый документ, направленный на создание правовой базы сотрудничества по защите и рациональному использованию трансграничных вод в пределах целого региона. 17 июня 1999 г. в Лондоне к данной Конвенции был принят Протокол, положения которого были направлены на то, чтобы содействовать на всех соответствующих уровнях, т.е. в общегосударственном масштабе, а также в трансграничном и международном контексте, охране здоровья и благополучия человека, как на индивидуальной, так и на коллективной основе, в рамках устойчивого развития путем совершенствования управления водохозяйственной деятельностью, включая охрану водных экосистем. Следует указать еще один документ, относящийся к водным ресурсам, с инициативой разработки которого вышли неправительственная организация Международный Зеленый Крест и Международный секретариат по воде. В 2004 г. был принят проект Основных принципов Глобальной рамочной конвенции о праве на воду и предложен правительствам для рассмотрения. В ходе разработки данной Конвенции в качестве основной ее цели была определена реализация прав человека на обеспечение доступа к чистой воде и санитарии [2].

В последние годы наблюдается тенденция к заключению межправительственных соглашений о сотрудничестве в сфере охраны, исследования и использования водных объектов. Договорная практика по охране окружающей среды свидетельствует о том, что наиболее активно развиваются договорные отношения на двусторонней и региональной основе, направленные на регламентацию охраны отдельных водных объектов в определенных районах. Двусторонние договоры чаще всего регламентируют совместное использование международных пресноводных бассейнов, морских акваторий, флоры, фауны (соглашения о ветеринарии, карантине и защите животных и растений) и т.д. Эти документы определяют согласованные принципы деятельности и правила поведения государств как в отношении окружающей среды в целом, так и в отношении отдельных природных объектов.

В российском законодательстве основным нормативным правовым актом, регулирующим водные отношения, является Водный кодекс Российской Федерации (далее – ВК РФ) [3]. Статьей 3 ВК РФ установлены основные

принципы водного законодательства, исходя из значимости водных объектов как основы жизни и деятельности человека. В связи с этим, регулирование водных отношений осуществляется исходя из представления о водном объекте как о важнейшей составной части окружающей среды, среде обитания объектов животного и растительного мира, в том числе водных биологических ресурсов. Кроме того, водный объект рассматривается и как природный ресурс, используемый человеком для личных и бытовых нужд, для осуществления хозяйственной и иной деятельности, и как объект права собственности и иных прав.

ВК РФ закрепил приоритет охраны водных объектов перед их использованием, сохранение особо охраняемых водных объектов, целевое использование водных объектов, а также приоритет использования водных объектов для целей питьевого и хозяйственно-бытового водоснабжения перед иными целями их использования. Однако, состояние водных объектов на территории населенных пунктов, особенно в промышленных регионах, в настоящее время во многих случаях считается неблагоприятным. Подавляющее большинство водных объектов оценивается как умеренно загрязненные или загрязненные с точки зрения водных ресурсов вредными веществами с превышением предельно-допустимых концентраций (ПДК).

Специально уполномоченные федеральные органы исполнительной власти решают важнейшие задачи охраны водных объектов в целях предотвращения их от загрязнения, засорения, истощения, к которым относятся: 1) разработка, утверждение и реализация схем комплексного использования и охраны водных объектов; 2) осуществление федерального и регионального государственного надзора в области использования и охраны водных объектов; 3) организация и осуществление государственного мониторинга водных объектов; 4) ведение государственного водного реестра и иные. Следовательно, охрана водных объектов представляет собой систему мероприятий, направленных на сохранение и восстановление водных объектов, которые можно подразделить на мероприятия правового, экономического, организационного, технического и иного характера [4].

ВК РФ является одним из немногих кодифицированных правовых актов, в котором «охрана» как правовая категория используется около 100 раз. В связи

с этим целесообразно провести классификацию случаев использования рассматриваемой правовой категории в тексте ВК РФ.

В первом случае категория «охрана» применяется к отдельным объектам водных отношений: 1) «водные объекты» (ст. 1,2,3 и др.); 2) «водные объекты для целей питьевого и хозяйственно-бытового водоснабжения» (ст. 43); 3) «водохранилища» (ст. 45); 4) «водные объекты, содержащие природные лечебные ресурсы» (ст. 49); 6) «болота» (ст. 57); 7) «ледники и снежники» (ст. 58); 8) «подземные водные объекты» (ст. 59).

В данном случае исследуемая категория выступает квалифицирующим признаком правоотношений по использованию и охране водных объектов (водных отношений – ч.2 ст.2). Кроме того, категория «охрана» является так же основанием для проведения специальных «водохозяйственных мероприятий и мероприятий по охране водных объектов», осуществляемых органами государственной и муниципальной власти в соответствии с их компетенцией (ст. 24-27).

Второй случай связан с предоставлением водных объектов в пользование на основании договора водопользования или решения о предоставлении водного объекта в пользование (ст. 11).

Третий случай сопряжен с процессом управления охраной водных объектов (глава 4 ВК РФ), который можно разделить на следующие элементы. В первом элементе охрана водных объектов выступает в качестве основания для совершения на федеральном уровне действий (ст. 24) по: 1) разработке, утверждению и реализации схем комплексного использования и охраны водных объектов; 2) осуществлению федерального государственного надзора в области использования и охраны водных объектов; 3) установление правил охраны поверхностных водных объектов и правил охраны подземных водных объектов и др. Во втором элементе выступают полномочия органов государственной власти субъектов Российской Федерации (ст. 25) и органов местного самоуправления (ст. 27) в области водных отношений. Третьим элементом управления в сфере охраны водных объектов являются специальные термины и категории: «бассейновые округа» (ст. 28) и «бассейновые советы» (ст. 29), «государственный мониторинг» (ст. 30), «государственный водный реестр» (ст. 31) и др.

Четвертый случай употребления категории «охрана» связан с термином «водопользование» и предоставление водных объектов для определенных

целей. Например, для целей питьевого и хозяйственно-бытового водоснабжения, сброса сточных, в том числе дренажных, вод, производства электрической энергии, водного и воздушного транспорта, сплава древесины и др. (ст. 37). В этом случае, категория «охрана» выступает элементом жизнедеятельности и благополучия населения в сфере использования водных объектов.

В пятом случае термин «охрана водных объектов» используется в названии главы 6 ВК РФ, которая раскрывает его содержание. При этом, категория «охрана» используется для защиты водных объектов: 1) от загрязнения и засорения (статьи 56 - 59); 2) при «проектировании, строительстве, реконструкции, вводе в эксплуатацию, эксплуатации водохозяйственной системы», а также при проведении работ (статьи 60 - 61); 3) при их использовании в целях производства электрической энергии (ст. 62); 4) для защиты воспроизводства лесов, расположенных в водоохранных зонах (ст. 63) [5]. Здесь категория «охрана» выступает в качестве основания для установления специальных территорий - «округов санитарной охраны» (ст. 64), «зон экологического бедствия» и «зон чрезвычайных ситуаций на водных объектах» (ст. 67), «особо охраняемых водных объектов» (ст. 66).

Обоснованность использования категории «охрана» в нормах ВК РФ подтверждается и материалами судебной практики. Так, Федеральный арбитражный суд Северо-Кавказского округа признал, что водоохранная зона (ст. 65 ВК РФ) является неотъемлемой частью охраняемого объекта и составляет с ним единое целое как природный комплекс, обеспечивая сохранность водного объекта [6]. Это правовое положение объекта охраны исключает осуществление на его территории строительной деятельности. Таким образом, категория «охрана» и ее производные как элемент нормы ВК РФ обеспечивают состояние защищенности указанного объекта от противоправных посягательств.

Резюмируя сказанное о категории «охрана» водных объектов в нормах ВК РФ можно сделать следующие выводы.

1. Использование дефиниции «охрана» в структуре ВК РФ (названиях глав, статей, содержании отдельных норм) позволяет признать ее в качестве правовой категории.

2. Исследуемая категория применяется по отношению ко многим другим правовым категориям. Во-первых, под «охраной» понимается содержание



водных отношений (законные права и интересы субъектов водных отношений). Во-вторых, объектом правоотношений выступают: 1) вещи и иное имущество (территории, акватории, водные ресурсы), находящееся в пользовании; 2) нематериальные блага (жизнь, здоровье); 3) совокупность правил водопользования (порядок, режим); 4) сведения (информация, тайна и др.). В-третьих, субъектами таких правоотношений могут выступать: 1) граждане; 2) юридические лица; 3) государство, публичные образования, общество.

3. Рассмотренный акт, несмотря на многократное применение исследуемой категории, практически не раскрывают ее правовой сущности и не формулируют единого определения.

Представляется, что основанием для формулировки исследуемого понятия может служить универсальная правовая модель - структура правоотношения (субъекты, объекты, содержание). Таким образом, можно сформулировать следующее определение:

охрана водных объектов – это действия (деятельность) субъектов права (государства, граждан, юридических лиц), направленные на обеспечение состояния защищенности материальных и нематериальных объектов (имущества, жизни, здоровья, поведения людей и др.) от противоправных посягательств третьих лиц, исходя из значимости водных объектов как основы жизни и деятельности человека.

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## ***Ethnic and cultural continuation in the context of the language of Orhon inscriptions and zhyrau\* heritage***

*(\*a certain genre of the Kazakh historical poetic creativity)*

**Abstract:** This article is devoted to the analysis of continuation of worldview of Old Turks and Kazakh people based on the language of Orhon inscriptions, Kazakh epic and zhyrau poetry. In addition, ethnic and cultural content of linguistic representatives is defined.

**Keywords:** Turkic languages, old Turkic inscriptions, Orhon inscriptions, the tradition of zhyrau, epos, linguo-grammatology.

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## ***Преемственность этно-культурного содержания языка Орхонских памятников и наследия жырау\****

*(\*представитель определенного жанра казахского исторического  
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**Аннотация:** В статье на основе анализа языка Орхонских памятников, эпоса и поэзии жырау рассматривается преемственность мировоззрений древних тюрков и казахского народа. Исследовано этно-культурное содержание языковых репрезентантов на синтаксическом и контекстном уровнях.

**Ключевые слова:** тюркские языки, древнетюркские письменные памятники, Орхонское наследие, традиция жырау, эпос, лингво-граммотология.

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## **Orhun Yazıtları ile Sözlü Edebi Kaynak Dillerinde Etno-Kültürel İlişkiler**

**Abstract:** Makalede eski Türklerle Kazak Halkının dünya görüşü Orhun yazıtları ile Kazak sözlü edebiyatı ürünleri dillerinde incelenerek etno kültürel anlamı metin incelemesinde ortaya koymaya çalışılmaktadır.

**Anahtar sözcükler:** türki dilleri, eski türk yazıtları, Orhun yazıtları, Kazak sözlü edebiyatı, epos, linguo-grammatology.

Belli bir dönemin dil özelliklerini, damga ve işaretler, iletişim özellikleri ile konuşma dili olarak fonksiyonel imkânları bildiren yazıtlar ile nesilden nesle sözlü olarak süre gelen sözlü edebiyat eserleri de tarihi dil kaynağı olarak sahip olduğu ulusun dünya görüşleri ile varlığını tanımlamaktadır. Bu yüzden de Köktürk yazıtları ile sözlü edebiyat ürünlerini dil, ulus ve kültür üçgeni içerisinde incelemek insanlık uygarlığı içerisinde Türk kültürünün yerini tespit etmeye yardım edecek önemli unsurlardan biridir.

Türki ulusunun ses yapısını tam olarak görebildiğimiz alfabe sisteminin oluşumu uzun kronolojik dönemi kapsayan dilbilgisel gelişmedir. Saklar dönemi yazılı kaynakların bulunması Türki yazılı edebiyat kültürünün VI asırlara kadar gelişmiş olduğunun kanıtıdır. Türklerin yazı kültüründe “çivi yazı” kültürü çok eskilere dayalı dilbilgisi yöntemi olduğu sözlü edebiyat ürünlerinde görülmektedir. Örneğin Alpamış Destanında:

Ak şatır men kok şatır,  
Baratın tura joljatın.

İşi tolgan tamaşa,  
Talay talay kep jatır...

Taktay tastın betinde,  
Jazılğan tasta hat jatır.  
Hatka bala karasa,

Taska kalam basadı,  
Alpamıs dep at jazıp,  
Özinin atın koyadı (AB, 24-25).

Zaman akımında bir ulusun manevi kültürel gelişimi onların yalnızca yazılı edebiyat dilleri değil sözlü aktarım özelliklerinde de yansımalıdır. Her hangi bir ulusun kendine has özellikleri yanında geleneksel kalıplar oluşturmuş eski kaidelerin korunması sözlü edebiyatın zengin bilgiye sahip olması ile sosyal özellikler taşımasındadır. Konuşma dilinin elverişli olması ile yazı dilinin zengin olması bir ulusun ufkunun açık olmasına yol açar. Tarih öncesi ecdatlarımızın konuşma dilinin zenginliği, geniş alana yayılması neticesinde eski Türk yazılı edebiyatının oluşumunu sağlamıştır. Dilin bu gelişim safhaları geleneksel Türk sözlü edebiyatı ürünlerine yansımıştır.

Yazı kültürü sürekli gelişmekte olan uluslarda edebi dil yazı dili ile iç içedir. Bu konuda Rus bilgini A.İ. Gorşakov: “edibi dil, yazı dili, yazılı edebi eserler vermek suretiyle ulusun gelişmiş edebi dili meydana çıkacaktır, yazı geleneği olmadan edebi dil meydana doğmaz!” demektedir [1,14]. Fakat, bazı toplumsal sosyal tarihi sebeplerden dolayı geleneksel yazı kültürü duraksamış, sözlü edebiyatı zengin olan Türklerin edebi dilini yalnızca yazılı edebi dili kaynaklarıyla değerlendirmek doğru değildir. Kazak bilim adamı M. Balakayev: Yazılı edebiyat yoluyla dilin yapısı, anlatım özelliği ile zenginliği gelişeceğini söylerken konuşma dilinin de edebi dilin gelişmesine hizmet ettiğini söylemektedir.

VI-IX yy Eski Türk yazılı abideleri dili Türklerin, yani oğuz ve Kıpçak sözlü edebiyatı ürünleri dilinin esasında oluştuğunu göstermektedir. Türklerde Göktürk yazısının meydana çıkışı, toplulukların birleşmesi, devlet anlayışının ortaya çıkması konuşma dilinin belli bir derecede edebi kalıplara sahip olması resmi devlet dilinin oluşmasına yol açtı. Eski yazıtlardan görebildiğimiz gibi Türklerin yazılı edebi dili belli bir düzen içerisinde kendine has üslup ve kurallara sahiptir. Göktürk yazı dilinin meydana çıkması ile Türk yazılı edebiyatı gün geçtikçe gelişerek geleneksel sözlü edebiyat dili destekleriyle Avrasya kıtası genelinde güçlü ulusların biri olarak bütün Türklerin kullandıkları ortak dil özelliğini sahip olmuştur.

Orhun Enisey yazıtlarını manzum eser olarak değerlendiren bilim adamları da vardır (İ.V. Steblevav.b.). Fakat, yazıtların mensur olarak yazıldığı yapısından anlaşılmaktadır Bu konuda K. Ömiraliyev: “Orhun yazıtlarını tür olarak manzum

eserlere dahil etmek ve geleneksel sözlü edebiyatın başlangıcı olarak tanımlamak yanlıştır. Kültegin, Tonikuk yazıtları ne manzum eserdir ne de destandır. O, Türklerin kahramanlık yaşamları ile özgürlük yolunda yapmış olduğu savaşlarını aktarma yoluyla anlatan tarihi hikayelerdir". fikrini ileri sürmüştür [3,21-22]. Eski Türk yazıtları ile Kazak destanları tür bakımından bir birleriyle farklı olmakla birlikte ulusun dünya tanımı, düşünce sistemi kültürel anlayışları ile bilgi aktarımı ortakdır. Bu yüzden de yapısal özelliği, üslup tasarımı, kullanım özellikleri de aynıdır. VI-IX yy. Türk yazıtları ile XV-XVIII yy. sözlü manzum eserlerde bulunan ortak dünya görüşü, nesilden nesle devam etmekte olan dilin anlamsal yapısıyla ilgilidir. Dillerin tarihi geleneksel ilişkileri dünya dilleri kültüründe de karşılaşmaktadır: Alman-runik yazıtları ile Gömer destanı, eski Rus destanları ile Rus tarihnâmelerinde v.b.

Hem Orhun abidelerinde hem de sözlü edebiyat ürünlerinde esas fikir, halkın ya da kağanlığın faaliyetleri esasında, toplumu aydınlatmak, Türklerin yani Kazakların birlik beraberliğini güçlendirmek, toprağa sahip çıkmak, vatanseverliği aşmak, Tengri'ye inanmak ya da İslam'a uymaktır. Yazıtlarda Tengri teriminin geniş kullanılması ve inanç olarak belirli kalıpların oluşması Türklerin inanç sahibi toplum olduğunun ve kendine öz dünya görüşüne sahip olduğunu bildirmektedir.

İslamiyet'in kabulünden sonra "Tengri" terimi yerine Arapça "Allah" ya da Farsça "Huda" terimleri kullanılmaya başlamıştır. Fakat buna rağmen Kazak dili sözcük hazinesinde kalıp sözler, deyim ve atasözlerinde "Tengrijarılkasın", "Tengridin kolunda", "Tengrijaratkanpende", "Tengridinsıy", Han Tengri, Tengribergenv.b. "Tengri" dini terimiyle yapılmış antroponimler ile toponimiler geniş kullanılmaktadır. Sözlü edebiyat temsilcisi ozan Şalkiyiz(1465-1560 ғғ.) eserlerinde:

Batır bolmak soydandur

Tengri özi bile di,

Yamangaş barıp javga ti

Ajalımız kaydandur (OFЖ,127)

gib kullanımı Kazak dünya anlayışında yüce yaratıcı formülü "gerçek Tengri ve haysiyetli güç" modelinin olduğunu tanımlamaktadır. Haysiyetli güç: yüce Tengri hediyesi güç kuvvet, akıl ve idrak, insani değerler, insanın dünyaya geliş nedenleri ile diğer canlı varlıklardan üstün olma nedenleri gibi özellikleridir. Eski Türklerin Tengri inancı İslam'ın ilmi esaslarının gelişmesine zemin olmuş ve günümüzde Türklerin inanç kaynağına dönüşmüştür. Kazak edebiyatında "Zar zaman" dönemi temsilcilerinden ozan Murat Mönkeoğlu şöyle demektedir:

Jalğanşı fani zamanda,

Asırap, saktapösirgen

Topraktan jatartkan

Bir jasağanKudayım

Oısı bir jürgen adamdı

On segizmingalamdı (OFЖ,235)

Şairin bu manzumesinde Kazakların dini görüşleri Tengir inancı ile İslam dini kaideleri karmaşık kullanılmaktadır. Bu şekilde insanoğlu ile on sekiz bin kâinatın yaradılışı hakkında bilgi verilmektedir.

Eski Türk toplumu dünya görüşünde ölüme inanır ve ölüm kaçınılmazdır: *Öd tenri jasar, kisi oyli qop ölgeli törimis*. «Zamanı Tengri sınırlar, insanoğlu ölmeye mahkumdur» KTy. 50 (Айд.І, 182). Bu hayatın geçici olduğu ve Allah tealanın kudreti hakkında aşığıdaki şiirde şöyle demektedir: Ölümnenkutulmassın kaşsan dağı,

Atadan arıştan tuıp assan dağı,

Allahtan şınımenenjarlık kese,

Julduz da jergetuseraspandağı (OFЖ, 167).

Ozan Şal şiirinde söylediği gibi Kazak dünya tanımında ölüm kaçınılmazdır ve herkesin sonuçta öleceği kesindir. İnsanoğlu dünya tanımı tabii ve sosyal toplumsal gelişmesinin kendine has özellik taşıması halkın, ulusun ortaya çıkışına sebep olur. Bütün halkın yaşayış tarzı, kültürel manevi değerlerinin doğuşu ile oluşumu ve kendine has kültür sahibi olmasına ve gelişip uygarlık derecesine ulaşmasına ulusun dünya görüşü ile dil medeniyeti neden olur. Ulusal görüş, ulusun dil kültürü ile manevi gücü geleceğe yönelik amaçların tam yerine getirilmesi ile geleceğini oluşturmada en gerekli unsurlardır.

Yazıtlarda dikkat çeken önemli unsurlardan biri de Türklerin siyasi, sosyal hayatının sağlanmasında Kağanların rolü ve onlara koyulan şartlar. Örneğin: *İnisi ečisinteg qılınmaduq erinč. Oyli qaňynteg qılınmaduq erinč. Biligsiz qayan olurmıs erinč. Jablag qayan olurmıs erinč* «Kardeşi ağabeyi kadar olamadı. Oğulları babası gibi olamadı. Bilgisiz kağanlar yönetime geçmişti. Zayıf kağanlar yönetime geçmişti» (KTy). Bu metinde ulusu yönetmesi gereken yöneticilerin iyi derecede eğitime tabi tutulmadığı takdirde ulusu yok edeceğini, yönetemeyeceğini ve yöneticilerin halka karşı sorumluluklarının yüksek olduğunu söylemektedir. Yönetici bekler ile beylere koyulan talepler, XIX yy Kazak edebiyatında çok geniş işlenmektedir. Örneğin: Halk yönetiminde adaletsiz davranan beyler ile onların sorumsuzluğu neticesinde ağır hale düşen halka acıyan ozan DulatBabatayoğlu (1802-1871):

Biy men bektin sanijok,

Tun uykısıntortbolip,

Elin korğay almasa, ...

Tolğaulınayzakolğa alıp,



Istığınakuymese,  
Suiğınatonbasa;  
Batırlıktınsanijok,

Sarı sadak aşınıp,  
Ulınkorıpjauınan,  
Tutamdap ok jonbasa (OFЖ, 175),

şeklindeşiirleridne dönemin sosyal halinden bahsetmektedir.

Murat Mönkeoğlu (1843-1906) Rus çarlarının baskıcılık politikası neticesinde ana yurdundan göç etmek zorunda kalan milletin acı kaderini şu şekilde söylemektedir:

Beskaruın belge ursa,  
At üstindekün korse,  
Arıp aşıp şöl körse

Temir kazık jastanıp,  
Karındasüşin kan jutsa –  
Ol er jigitkejarasar (OFЖ, 236)

Şiirin ana fikri yazıtların işlediği konuyla aynı anlamdadır.

Bir birlerine destek olmak, hayırlı işler yapmak Türk halklarına ait özelliklerin biridir: *türük bodun üçün tün udımadım, küntüz olurmadiм* «түрік халқы үшін түн ұйықтамадым, күндіз отырмадым» КТү. 26,27 (Айд.I,176); *qızıl qanım tökti, qara terim жүгүрти, içig-kuçig bertik* «қызыл қанымды төктім, қара терімді ағыздым, күш-қуатымды да бердім» Тон. 51, 52. (Айд.II,113).

Türk kağanları, onların yardımcıları ile askeri yöneticileri toplum karşısında sorumluluğu üstlenmekte ve bu yazıtlara yansımıştır. Örneğin:*Bir kisi jañılsar oyuşı budunı biçükiñe tegi qıdmaz ermis* «Bir kişi yanlışlık yaparsa kabile, toplum ve ulusun yok olmasına neden olur» (Айд.169).

Akıncı bir millet olarak tanılan Türkler hayatında büyük zaferlerin yanında büyük kayıplar da yaşanmış ve milletin düştüğü ve param parça dağıldığı dönemler de olmuştur. Türkler yaşanan kadersizlikleri de yılmadan taş a yazılı olarak bırakmıştır. Örneğin:*Tabyaç bodunqa beglik urı oylın qul qıltı. Silik qız oylın küñ qıltı. Türük begler türük atın [itti]. Tabyaç[iy] begler tabyaç [atıntutupan. Tabyaç qayanqa kürmis.* «Tabgaç halkının beylerini köle etti.Güzel kızlarını cariye etti.Türk beyleri namını kaybetti. Tabgaçları kollayan beyler onlara tabi oldu» (Саптқ.,193-198). Bu cümlelerde her ne kadar Türkler üzüntü ve kadersizliklerinden yakınıyor olsa bile esas anlatmak istedikleri fikir gelecek neslin bu yanlışlıklara düşmemelerin sağlamaktır. Bu konuda söylenen sözler ile fikirleri Alpamış destanında Tayşık hanın rüyasını açıkladığı kısımda germekteyiz:

Bir arıştan özime  
Şabatüğün köründü...

Alatuğun körindi,  
Aydarlımdı kul kıldı,

Koynumda jatkan jarımdı.

Tulımdımdı tul kıldı (AB,40)

VI-IX yy Türki yazıtları ile Kazak destanlarında, sözlü edebiyatında bu tür ortaklıklar ile benzerlikler Eski Türki toplumu ile Kazakların dünya görüşünde yaratıcı güç, hayat, ölüm, ulus karşısında sorumluluk, insanlık, düşman, mağlubiyet gibi kavramlarının karşılanması Türklerin objektif olarak tarihi olayları anlatılmaktadır. İnsanoğlu iletişim kuralı olarak dil (yazılı ve sözlü) bir toplumun varlığını ortaya koyarken toplum bireylerinin kitlesel ilişkilerini sağlar ve nesiller arası geleneksel kültür bağlantısını kurar. Eski Türk yazıtları ile Kazak destanları ve sözlü edebiyat ürünlerinde yer alan toplumun dünya görüşü dil vasıtasıyla net olarak görülebilmektedir.

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### ***Functional potential of speech etiquette figures of an English-speaking postmodern character in the synergy of British fictional text and discourse***

**Abstract:** This article is devoted to the functional potential of speech etiquette figures. The publication focuses on key functions of address terms, greeting and farewell etiquette expressions which are revealed through the analysis of verbal behavior of an English-speaking postmodern character in the synergy of British fictional text and discourse.

**Keywords:** speech etiquette, speech etiquette figures, text, discourse, function, address terms, greeting etiquette expressions, farewell etiquette expressions.

At the current stage of linguistic science development the investigation of text in reference to its lexical semantic, syntactical stylistic, communicative and pragmatic peculiarities as well as functional potential remains one of the primary tendencies of linguistic research. Fictional discourse functions as a continuous process where various types and forms of speech establish value-marked paradigms based on social and professional situations of communication [1:111]. The process of creating fictional discourse is implemented in its product, i.e. fictional text. Speech etiquette figures represent a complex phenomenon, functioning as the means of syntactic and compositional arrangement of the text, and as semantic projection of text segment in the speech activity. It is only in the synergy of fictional text and discourse that the functional palette of speech etiquette figures can be vividly displayed in accordance with particular speech situation parameters. As a functional microsystem of language units, speech etiquette performs inherent fundamental functions of any language, i.e. communicative function and the function of expressing an opinion, which give rise to specific functions of speech etiquette figures, in particular address forms, greeting and farewell etiquette expressions, arising from their content and nature and occupying a special place in the hierarchy of language functions [2].

Functioning as a linguistic attractor from a synergetic perspective, the address is aimed at organizing and maintaining all stages of social interaction to provide for the communicative success. It is intended to attract and actualize attention, since under spontaneous speech with no attention focused the message can be only partially perceived or fail to be perceived altogether. The address is considered to be a multifunctional linguistic attractor of a diverse and dynamic functional nature, manifested in the performance of the following functions. *Vocative function or the function of reference/appeal* provides direct reference to a particular participant of the communicative event and enables to focus position and status of the communicants. When in the initial position, the address is meant to attract attention, distinguish the desired addressee among others, set and check his availability in certain situations, whereas being placed at the end of the utterance, the address serves the identification of the addressee, establishing contact and demonstrating the attitude. *Contact-regulating function* is manifested at all stages of establishing, maintaining and breaking contact. Thus, at the initial stage of communication the address provides indication of the relations between the communicants; at the intermediate stage it maintains contact through facilitating the process of receiving feedback signals from the addressee with his involvement into the communicative interaction; at the final stage it may smooth termination of the contact, being used in leave-taking etiquette expressions. *Function of social regulation* is determined by the social roles of communicants and their social status. Thus, addressers of a lower social status usually apply courteous and polite terms of address towards those of a higher status. In the British postcolonial text subordination is often revealed through the use of the address terms of respect such as *maharaja*, a Sanskrit title for a 'great ruler' or 'high king', *sahib*, a name of Arabic origin meaning 'holder, master or owner', or *begum* and *sahiba* (to a married woman) which entered English word-stock as loanwords, associated with the British rule in India and functioning as courteous terms similarly to 'Mr.' and 'Mrs.', e.g.: *Oh, maharaja! Sahib! Can't you see that we are in need? What is a few lakh takas to a man like you?* [3:377]. As a form of social deixis and the marker of sociolinguistic competence, the address carries information about the hierarchy of communicants, indicates the relationship between them in terms of social and psychological distance determining the degree of solidarity or relations of power. Its informational content depends on the ability to single out pragmatic information signaling a close or distant relationship of communicants and their status.

*Emotive function* of the address is meant to express the emotional state of an addresser, produce a desired emotional effect on the addressee or trigger a desired emotional response from him. It is aimed at reflecting emotive attitude of the speech subject to the external world elements or internal world of the individual in its linguistic manifestation. The address possesses broad expressive and emotional possibilities that reveal its rich pragmatic potential. Expressiveness in English terms of address is often achieved by using affectionate diminutive forms of names with suffixes *-y*, *-ie-* [4], e.g. *Archie*, *Harry*. It can be enhanced by multiple repetition of somebody's name or by adding lexemes of endearment such as *dear*, *darling*, *janum* etc. to determine interpersonal relationships between the communicants. In the framework of emotive function, it seems feasible to single out *function of characterization* which is primarily aimed at creating the image of a fictional character through revealing his facial or character peculiarities, e.g. *'But how old are you really, Taiji?'* (*Doctor Aziz, adult, redbearded, slanting towards the future, remembers the day he asked the unaskable question*). *For an instant, silence, noisier than a waterfall. 'How old? You ask how old, little wet-head, you nosey...'* *Tai, forecasting the fisherman on my wall, pointed at the mountains. 'So old, nakkoo!'* *Aadam, the nakkoo, the nosey one, followed his pointing finger. 'I have watched the mountains being born; I have seen Emperors die. Listen. Listen, nakkoo...'* – *the brandy bottle again, followed by brandy-voice, and words more intoxicating than booze* [5:15-16]. The lexeme *nakkoo* denoting a person with an outsized nose or curiosity, a nosey-parker, is used as the address term to demonstrate both physiological peculiarity of a character and his curious nature, seeking to learn the unknown, complemented by the characteristic *'nosey'* to intensify character portrayal. In the same contextual fragment we come across a deviant address term *wet-head*, which is not recorded as an independent unit in lexicographic sources, but appears to be formed on the basis of the idiomatic phrase *to wet baby's head* which indicates the celebration of the baby's birth. It is used to emphasize the difference in age and experience between the communicants, thus also performing function of social regulation.

Viewed as linguistic attractors operating in the synergy of fictional text and discourse, greeting etiquette expressions are aimed at organizing the initial stage of social interaction, as friendly signs of welcome and recognition, which, apart from its basic *cooperative function*, perform *attention-getting function*, enabling the communicants to establish a shared field of interaction, and *acknowledgement function*

(*identifying / public recognition function*) enabling the communicants to recognize the presence of each other in the shared perceptual field. Greetings are the response to finding oneself within someone's visual and auditory range – if such a person is the candidate for recognition [6:69]. Acknowledgements express perfunctorily if not genuinely, certain feelings toward the hearer, which are appropriate to particular sorts of occasions. Such definition assumes that greetings have propositional content, i.e. pleasure at seeing or meeting someone. Performing *affective function* greeting etiquette expressions contribute to establishing non-threatening contact, rapport and friendly tonality of interaction and displaying an approving reaction at meeting the interlocutor, e.g. *Welcome!* Once the attention is attracted and the communicants are reciprocally recognized, the so-called interactive greetings enable to initiate the conversation on the topic to be further discussed with the help of *topic-initiating function*, emphasizing the significance of the issue in question for the addresser and the importance of the addressee's opinion and judgement. *Function of establishing spacio-temporal parameters* provides for the conceptualization of space and time zones in which the interaction takes place. *Symmetrical exchange function* relies on sequential nature of greetings by means of establishing an adjacency pair, by which greetings are reciprocated, as is the case with mirrored greetings. Greetings should not be analyzed as isolated acts but as a series of pairs, i.e., adjacency pairs whereby the uttering of the first part by one party calls for and at the same time defines the range of a possible 'next turn' by a second party [7]. Greetings also function as culturally marked units which identify the communicants as belonging to the same culture with shared interests, values, religious beliefs, thus establishing the relations of solidarity and performing *culture-identifying function*. All cultural groups have formulae for greeting. In this sense, patterns of greeting are universal, but they vary with the cultures as their rituals. In the postcolonial fictional text culture-identifying function is manifested through the use of nationally marked, or culture-specific, greetings '*Salaam Ale-Koum*' and the typical response '*Walaikum Asalaam*', e.g.: *Once, after a double shift, Chanu came home in the afternoon while Karim was using the computer. 'Salaam Ale-Koum', said Karim. He yawned and rubbed his eyes. After a long spell at the screen. 'Walaikum – asalaam'. Chanu put his keys down on top of the showcase* [3:373]. In the above-mentioned contextualized fragment culture-identifying function is combined together with that of acknowledgement, symmetrical exchange and the social function: the interlocutors

recognize each other's presence, identify one another as having identical cultural and national roots, and follow the etiquette rules of social subordination, as it is the younger interlocutor who is the first to greet the older one, notwithstanding the fact that greeting is normally initiated by the communicant entering space zone of interaction.

Farewell etiquette expressions are meant to organize the final stage of social interaction and indicate the intention to terminate contact, often being accompanied by speech etiquette formulae of gratitude for the time spent together, well-wishing and further contact arrangement. In the process of British postmodern text and discourse analysis, we have singled out the following functions of farewell etiquette expressions: *topic-terminating function* – with regard to topic termination, the pre-closing statement is initiated by the participant wishing to close the conversation, which secures the addressor's position from infringing the addressee's rights to initiate further talk and shows that he does not intend to continue talking about the current topic or raise a different one; *content-summarizing function*, when the interlocutors give a brief statement of the interaction they have had, especially if the goal of communication has been reached and the expectations met; *contact-termination justifying function*, manifested through stating the reasons for termination of the contact at this particular point; *pleasure-expressing function* with regard to expressions indicating satisfaction derived from interaction; *continuity-indicating function*, performed through planning, specifically or vaguely, of a future contact; *well-wishing function*, expressing the desire for the interlocutor's happiness or success in the future; *function of reaffirmation of acquaintance* as the basic function of the leave-taking phase enabling compensation for possible negative effects on human relations, which may be caused by breaking contact. In most cases the functions of leave-taking overlap and are manifested in tandem. Let us consider the following example: *At half past nine Dr Azad said, 'Well, Chanu. I thank you and you wife for a most pleasant evening and a delicious meal'. Chanu protested that it was still early. The doctor was adamant. 'I always retire at ten thirty and I always read for half an hour in bed before that'. 'We intellectuals must stick together', said Chanu as he walked his guest to the door [3:35-36].* Several functions of farewell etiquette expressions are at work here, namely, topic termination, reaffirmation of acquaintance, content-summarizing, pleasure – expressing and contact-ending justifying ones. The end of the contact is initiated by the guest who reaffirms



acquaintance addressing the host by his proper name '*Chanu*' accompanied by '*well*' as a marker of dispreference, intended to avoid impolite interpretation of one's words for the sake of preserving positive face. Then, by applying the tactic of expressing gratitude with the help of *thank-you* etiquette formula, the addresser also summarizes the content of spending '*the evening*' and having '*a meal*' and expresses pleasure at the interaction by describing them in terms of vocabulary of appreciation as '*pleasant*' and '*delicious*', at the same time giving clear reasons for the contact termination. It is possible to infer from the context that the interaction is marked by distancing, typical of negative politeness, and the solidarity strategies are not applied as the guest does not resort to any speech etiquette expressions performing continuity-indicating or well-wishing functions, which might implicitly signal his desire to avoid future contact. However, it is the final utterance of another communicant which serves as the operator of further contact initiation implied by '*we*' personal pronoun to convey the meaning of collectiveness of the action and the modal verb '*must*' used as the predicate, in this way indicating strong advice which borders insistence. Another example looks as follows: '***Time for me to go***', said Razia. '***Some things to do before I collect the children***'. '*Kiss them for me. Give my salaam to the estate*'. '*OK. I do it*'. [3:149]. Three functions of leave-taking are manifested in the following dialogic interaction: implicit topic termination, stipulated by the necessity to stop interaction at this point, together with justification of such action, as well as request-making, expressed by the culturally marked etiquette formula '*give one's salaams*', transformed from the original English '*give one's regards to somebody*'. This hybrid formation performs additional culture-identifying function by establishing solidarity and marking the interlocutors as belonging to one ethnic group.

Thus, our research of speech etiquette in the synergy of British postmodern fictional text and discourse has revealed enormous and diverse functional potential of speech etiquette figures.

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## ***Legal analysis of general territorial jurisdiction rules in Japan***

**Abstract:** The article analyzes the legal general territorial jurisdiction rules of Japan. The author examines the provisions of the Civil Procedure Code of Japan, on issues of general territorial jurisdiction highlighting particularly its settlement.

**Keywords:** the jurisdiction, court, the competence, the general territorial jurisdiction, Japan, the plaintiff, the defendant.

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## ***Правовой анализ правил общей территориальной подсудности в Японии***

**Аннотация:** В статье проводится правовой анализ правил общей территориальной подсудности Японии. Автор статьи исследует положения гражданского процессуального кодекса Японии, посвященные вопросам общей территориальной подсудности выделяя особенности ее урегулирования.

**Ключевые слова:** подсудность, суд, компетенция, общая территориальная подсудность, Япония, истец, ответчик.

Система прав и обязанностей японского народа включает в себя положение Конституции Японии [1], устанавливающее, что «никто не может быть лишен права на обращение в суд» (ст. 32 Конституции Японии).

В свою очередь положения Конституции Российской Федерации [2] (далее Конституция РФ) устанавливают право на судебную защиту (ст. 46 Конституции РФ) и право на законный суд (ст. 47 Конституции РФ).

Общеизвестно, что положения Конституции РФ модифицируются в иных нормативных правовых актах, имея при этом более четкое регламентирование и механизм их реализации. И как правильно отмечено, особенность конституционных норм состоит в том, что они реализуются обычно в совокупности с другими нормами, в связи с чем возникает сложное переплетение конституционных и иных правоотношений [3].

Как справедливо отмечает Л.А. Грось, право на судебную защиту предполагает, прежде всего, право на обращение в суд с целью получить такую защиту [4]. Связанно это с тем, что право на судебную защиту может быть реализовано только путем обращения заинтересованным лицом в суд.

Содержание права на обращение в суд закреплено в ст. 3 Гражданского процессуального кодекса Российской Федерации (далее ГПК РФ) [5] и ст. 4 Арбитражного процессуального кодекса Российской Федерации (далее АПК РФ) [6], согласно которых заинтересованное лицо вправе в порядке, установленном законодательством обратиться в суд за защитой нарушенных либо оспариваемых прав, свобод или законных интересов.

А.Т. Боннер справедливо замечает, что соблюдение «порядка, установленного законодательством о гражданском судопроизводстве» обращения в суд заключается в выполнении заинтересованным лицом требований ГПК РФ, касающихся разграничения компетенции между отдельными звеньями судебной системы, формы и содержания заявления в суд, а также обращение в суд по надлежащей территориальной подсудности [7].

Поэтому, возможно допустить предположение, что система прав и свобод человека и гражданина согласно положений Конституции Японии и Конституции РФ, включает в себя право на законный суд, тем самым предполагая, что правила подсудности имеют высшую ценность и значимость, поскольку являются частью системы прав и свобод человека и гражданина.

Обусловлено, это тем что, «японская конституция основана на фундаментальном принципе конституционализма - разделении властей. Носители судебной власти - трибуналы (в том числе суды) - функционируют в системе конституционного контроля за законодательной и исполнительной властью. В

основе такой системы лежит необходимость предупредить злоупотребление властью, обеспечить соблюдение Конституции и в конечном счете гарантировать уважение основных прав граждан» [8].

Анализируя правила общей территориальной подсудности в Японии, хотелось бы обратить внимание на следующее.

Положения, регламентирующие правила общей территориальной подсудности в России закреплены в ст. 28 ГПК РФ, которая гласит: «иск предъявляется в суд по месту жительства ответчика. Иск к организации предъявляется в суд по месту нахождения организации». Отставшие положения ГПК РФ, регулирующие институт подсудности, конкретизируют правила альтернативной территориальной подсудности, исключительной подсудности и подсудности по связи дел.

Положения общей территориальной подсудности в Японии, регламентированы в Code of Civil Procedure Japan, а в частности в Chapter II Court Section 1 Jurisdiction (Jurisdiction by General Venue).

Итак, положение общей территориальной подсудности в Японии устанавливает следующее правило: «Article 4 (1) An action shall be subject to the jurisdiction of the court that has jurisdiction over the location of the general venue of the defendant». Данное правило территориальной подсудности, регламентированное ч. 1 ст. 4 ГПК Японии, определяет подачу иска под юрисдикцию суда, юрисдикция которого распространяется на место общей территориальной подсудности ответчика.

Кроме этого, указанная норма ГПК Японии имеет шесть частей, раскрывающие специфику ч. 1 ст. 4 ГПК Японии.

Вторая часть упомянутой статьи ГПК Японии устанавливает: «The general venue of a person shall be determined by his/her domicile, by his/her residence if he/she has no domicile in Japan or his/her domicile is unknown, or by his/her last domicile if he/she has no residence in Japan or his/her residence is unknown».

Анализируя положения процессуальной нормы, можно отметить следующее. Общая территориальная подсудность лица определяется его постоянным местом жительства, местом пребывания, если оно не имеет постоянного места жительства в Японии, или постоянное место жительства неизвестно, или последним постоянным местом жительства, если оно не пребывает в данный момент в Японии или место настоящего пребывания неизвестно.

В свою очередь ч. 4 ст. 4 ГПК Японии урегулировала общую территориальную подсудность в отношении юридических лиц, в частности: «The general venue of a juridical person or any other association or foundation shall be determined by its principal office or business office, or by the domicile of its representative or any other principal person in charge of its business if it has no business office or other office». Таким образом, общая территориальная подсудность юридического лица или любого другого объединения или организации (фонда) определяется местонахождением его головного офиса или служебного подразделения, или постоянным местом жительства его представителя или любого другого лица, занимающего руководящий пост и ответственного за данный бизнес, если у юридического лица нет служебного подразделения или другого офиса.

Кроме этого ч. 5 ст. 4 ГПК Японии, урегулировала общую территориальную подсудность иностранного объединения или организации (фонда). Место общей территориальной подсудности иностранного объединения или организации (фонда), невзирая на положение ч. 4 ст. 4 ГПК Японии, определяется местоположением его головного офиса или служебного подразделения в Японии или постоянным местом жительства его представителя или любого другого лица, занимающего руководящий пост и ответственного за данный бизнес, приписанный/зарегистрированный в Японии, если в Японии нет служебного подразделения или другого офиса.

Далее, правила общей территориальной подсудности по нормам ГПК Японии (ч. 3 ст. 4) раскрывают территориальную подсудность в отношении граждан Японии находящихся в иностранном государстве: «If an ambassador, minister or any other Japanese national in a foreign state who enjoys immunity from the jurisdiction of that state has no general venue pursuant to the provision of the preceding paragraph, his/her general venue shall be deemed to be located in the place specified by the Rules of the Supreme Court». Итак, если посол, министр или любой другой гражданин Японии, находящийся в иностранном государстве, который обладает иммунитетом в отношении юрисдикции данного государства, не имеет места общей территориальной подсудности согласно положению ч. 2 ст. 4 ГПК Японии, его место общей территориальной подсудности будет считаться расположенным на территории, определенной нормами Верховного Суда.

Далее, ч. 6 ст. 4 ГПК Японии устанавливает правило общей территориальной подсудности в отношении государства: «The general venue of a state shall be determined by the location of a government agency that represents the state in a suit». Указанное правило означает, что место общей территориальной подсудности государства определяется местоположением правительственного учреждения, которое представляет данное государство в судебном процессе.

Следовательно, проводя правовой анализ правил общей территориальной подсудности, можно предположить, что указанные выше положения ГПК Японии схожи с правилами альтернативной территориальной подсудности, закрепленные в ГПК РФ. Поскольку ст. 29 ГПК РФ определяет возможность подачи иска, по выбору истца, в случае если место жительства ответчика неизвестно или не имеет места жительства в РФ, может быть предъявлен в суд по месту нахождения его имущества или по его последнему известному месту жительства в РФ. Также иск к организации, вытекающий из деятельности ее филиала или представительства, может быть предъявлен также в суд по месту нахождения ее филиала или представительства.

Из указанных норм, можно допустить предположение, что нормы ГПК РФ дают значительную возможность, реализовать принцип доступности правосудия, указывая то, что иск может быть подан «по месту нахождения имущества ответчика». При этом положения ГПК Японии раскрывают сущность и значение «место пребывания». В отличие от ГПК РФ, данные положения закреплены в иных нормативных правовых актах Российской Федерации. Анализируя общую территориальную подсудность юридического лица можно отметить, что нормы ГПК Японии представляют наиболее значимую возможность истца обратиться в суд, в случае если ответчиком выступает юридическое лицо, поскольку данный иск, возможно, подать также по постоянному месту жительства представителя или любого другого лица, занимающего руководящий пост и ответственного за данный бизнес, если у юридического лица нет служебного подразделения или другого офиса.

Таким образом, правовой анализ общей территориальной подсудности Японии позволяет сказать о более четкой регламентации ее правил, применении для лиц, не имеющих специальных познаний в области права, а также об оптимизированном процессуальном законодательстве, регламентиру-



ющем правила общей территориальный подсудности Японии в отличие от процессуального законодательства РФ.

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### ***The theoretical problems of phonetic stylistics***

**Abstract:** Though in Azerbaijani linguistics phonetic stylistics is dealt with the different purposes, the categories of this sphere haven't been paid attention to. Emotionality, expressiveness, alliteration, intonation, modality etc. are included into the phonetic stylistic categories. They don't exist in an isolated form, but they exist interrelating one - another.

**Keywords:** phonetic stylistics, categories, reiteration, emotionality, modality, alliteration, sound symbolism, intonation.

Category being a philosophical notion has a wide area of use. Linguistic categories are applied in the different language spheres both in the wide and narrow meanings. There are both general language and certain categories concerned certain language phenomena. Any category embraces the generalized content, regularities of similar phenomena. Stylistics as one of the linguistics spheres has its special categories and there are different ideas about them in linguistics.

Stylistic categories are connected with the spheres of stylistics and boundaries of these spheres. But there isn't unity of views in this sphere. Academician V.V. Vinogradov marked out three different spheres of research with their special problems, criteria and categories:

1. Structural stylistics that is a system of systems; 2. Peculiarities of the different semantic and expressive genres of oral and written speech stylistics; 3. Stylistics of belles-lettres that studies the style of all the elements of artistic work and writer's individual style (1:5).

Each of this tasks has its special categories. Such main concepts and categories of stylistics as style, stylistic meaning, stylistic colour, stylistic means, extralinguistic factors forming style etc. haven't been completely studied yet. For the first time in linguistics R.G. Piotrovski gave the information about stylistic categories

or rather determined them. The scientist considered “stylistic colour”, “additional stylistic nuance” and “emotional-appraisal meaning” stylistics categories (2: 55-68).

When touching upon this subject M.N. Kodjina wrote: “Style, stylistic meaning, stylistic colour, stylistic means, extralinguistic style factors etc are still urgent in explanation of the main concepts and categories of stylistics. Thus these concepts and categories haven’t been determined monosemantically yet. The reasons that cause style, stylistic meaning, stylistic nuance, stylistic means and extralinguistic factors are complexly connected...” (3: 3-13).

When studying stylistics of the Azerbaijani language K. Aliyev wrote that there are special categories in stylistics, it is very disputable to determine the stylistic categories that manifest themselves in the unity of interdependent linguistic facts. K. Aliyev thinks, that emotionality and expression are often used together and give expressiveness to speech.

Considering system of figurative tropes, synonymy and phraseology the stylistic categories K. Aliyev doesn’t refer emotionality and expressiveness to stylistic categories (4: 23).

Expressiveness being the category of stylistics, linguistics, literary criticism, art, aesthetics, logic, psychology, genetics embraces homogeneous and heterogeneous connections of formal, semantic, functional and categorial units, expresses speaker’s logical, purposeful, subjective, emotional and aesthetic attitude to interlocutor and subject. It has influence function and carries out reinforcement, actualization during the process of contact.

Superficial expressiveness is a form of subjective, emotional or aesthetic relation that is realized by the graphic, phonetic-phonological, lexical, phraseological means of the different language levels. This category forms complicated connected circumference with such categories used as emotionality, imagery, connotation, aesthetics. When explaining these categories as synonyms it is very important and expedient to distinguish them.

T. Efendiyeva who studied the stylistics of the Azerbaijani language thinks that emotionality and expressiveness are stylistic categories and they are formed by phonetic stylistic means together with the other lexical and syntactic means (5: 61). E.M. Galkina-Fedoruk emphasized the stylistic role of phonetic means of language in formation of emotionality and expressiveness (6: 103-123).

K. Aliyev distinguishes three stylistic categories: 1) synonymy; 2) imagery; 3) phraseology (4: 5-21).

In general linguistics including Azerbaijani linguistics phonetic-stylistic categories haven't been determined yet, and this problem is to be studied.

In Azerbaijani linguistics lexical, syntactic and morphological stylistic categories have been determined and there are enough scientific works dealt with it. But unfortunately there is no serious scientific research in the sphere of phonetic stylistics.

In Azerbaijani linguistics professor A. Demirchizadeh researched phonetic stylistics as a special part of stylistics (7). G. Mustafayeva who has studied phonetics recently continues A. Demirchizadeh's scientific direction and analyses the phonetic stylistic means (8).

It's known that one of the facts adopted in linguistics are categories of the different levels.

Phonetic-stylistic categories are such ones. As these categories manifest themselves on the different levels and texts they are also named textual categories. As phonetic layer of the language is determined in connection with the other spheres these connecting categories can be considered phonetic-stylistic ones. Such categories of textual ones as emotionality, expressiveness, alliteration, modality, reiteration, symmetry can be related to them.

In Azerbaijani linguistics syntax, morphology, vocabulary have been studied in the stylistic aspect, and all their categories have been determined. Though there are some scientific works on phonetic stylistics, its phonetic-stylistic means, the phonetic stylistic categories haven't been determined yet. Professor T. Efendiyeva considering emotionality and expressiveness stylistic categories and emphasizing the role of grammatical and phonetic factors, intonation in their formation wrote: "It is very important to determine the role of grammatical-morphological, grammatical-semantic and phonetic categories in manifestation of emotional and expressive shades of meaning" (9: 23).

In 1961 V.G. Admoni wrote about multi- aspects and interconnection of language categories (10: 13-15). It can be explained by integrative principle of realization of language signs. Integration is the linguistic expression of interconnection of the whole and its elements. The different degrees of realization of meaning of the language sign on the basis of integration principle manifest themselves in language functionality. This principle in the theoretical model of language functionality was

worked out by N.A. Kobrina (11:30-44). The explanation of all facts of language functionality forms the basis of this conception. So N.A. Kobrina determines maximum generalized functions reveals the qualitative features of language forms and their functionality on the phonological, morfological, lexical and syntactic levels. For the first time the notion "different levels categories" was brought in the linguistics by A.V. Bondarko and L.M. Bulanin.

They noted out that a functional-semantic category has both content and expression (12: 5). In these categories content is a complete sphere that embraces both grammatical and lexical meanings. Though they differs a certain common notion unites them. The content of this category manifests itself in mutual relations and complicated connection of some semantic elements. The expression of this category embraces morphological, syntactic, word-formative, lexical connecting means of text. Functional semantic category reveals itself in the intercommunication of its expressive means. This intercommunication being embraced by language structure is realized by mutual influence of its levels, completely actualized and revealed in speech.

When studying different levels categories V.N. Migirin includes grammatical forms, word-formative suffixes, lexical forms, word-formative suffixes, lexical determinants and substitutes in them (13: 129).

The problem of modality takes a special place among the multi-level categories in linguistics. R.G. Sibagatov wrote: "If multi-level categories are a scientific fact, modality is to be referred to these categories in the expressive plan" (14: 23).

For the first time in Azerbaijani linguistics K. Aliyev studied stylistic modality in his research and emphasized its influence on lexical, phraseological, morphological, syntactic units, reiteration etc (15). N.Y. Shvedova researched objective and subjective modality as expressive means in reiteration (216: 352). G.V. Kolshansky accepted modality as unity of content and expression and considered it both semantic and grammatical prosodic category. He wrote that in Indo-European languages modal content is realized by grammatical (morphological), lexical (modal words, modal verbs) and phonetic (intonation) means (17: 94-98).

N. Safarova thinks that the other prosodic means besides intonation plays an important role in formation of modality. These means unite tone, rhythm, intensity, timbre etc. The author notes that these prosodic means enter intercommunication with the units of other language levels and form both the same and different semantic

connections with them (18: 120-124). It should be noted, that these prosodic signs are components of intonation and there is no necessity to separate them.

Intercommunication of language categories can be characterized as an integrative principle of realization of language sign. The fundamental nature of this principle is that integration isn't totality of the different meanings, it is complicated intercommunication as a result of which these meanings can change completely or partly or be modified. When researching modus categories in the language N.N. Bol-direv came to the following conclusion: there are modus categories besides lexical and grammatical ones. Modus and appraisal categories provide the conceptual content and form of subjective ideas. He attributes negation, approximation and evidentiality to such categories, and modus concepts form their basis (19: 31-46). The specific character of formation and structure of modus concepts is that they unite certain language means on the basis of their common conceptual function. Thus the idea that phonology doesn't have communicative character is dubious.

Phonological categories can be auxiliary means in linguistic geography, ethno-linguistics and other spheres. Phonological units can acquire and express dialectal, stylistic and other meanings.

Thus language categories as a form of language thought lead to three main categories: lexical, grammatical, modus or appraisal ones. Modus categories depend on other conceptual essences, have relative character and show different principles in their structure. Stylistic categories can be attributed to such categories, too. Phonological means play a special role among such categories, for example: pronunciation of words in the different dialectal variants distinguish both meanings and dialects. Modus i.e. modal categories are attributed to phonological ones.

Alliteration and reiteration can be attributed to different-level categories. Researching alliteration in the Azerbaijani language M. Adilov wrote: "...alliteration can't be considered only a stylistical category. It is known that alliteration isn't widespread in the European languages manifests itself in the artistic language, especially in poetry, so it is naturally to consider this phenomenon stylistic position for these languages. In the Turkic languages alliteration is a general category that should be researched both in stylistical, lexical and grammatical (morphological) aspects... However pair words united by alliteration aren't connected only with style and emotionality, they also pursue a communicative aim" (20: 228).

Functionality of alliteration that is one of the stylistic means manifests itself in the text. Reiterations are realized in phonetic, morphological, lexical and syntactic form.

Textual categories are closely connected with one another. Such universal abstract categories as integration, informational content, cohesion, continuum, division etc. are on the highest layer of the hierarchical row. There are more complicated facultative categories besides universal ones that are on the lowest layer of hierarchy: modality, implication, score. They are closely connected with the categories that are on the highest stage of hierarchy. Thus there are some textual categories that are characteristic for certain types of text.

Reiteration is directly connected with categories that submit to it. Direct subordination is between reiteration and cohesion, division, integration. Continuum has a direct character.

Symmetry that is characteristic sound structure can be attributed to phonetic stylistic categories. When emphasizing the role of rhythm in creation of symmetry one can conclude that one of the peculiarities of sound reiteration is the formation of rule and order.

Synharmony formed by rhythm forms the structure of analogical stylistic means.

Paronymy can be attributed to phonetic stylistic categories. In paronymy that is researched as a lexical-semantic category are studied words similar to another in sound; the partial coincidence in outward form occurs simply by chance and isn't conditioned by semantic or word-formation processes.

The difference between the sounds is the main condition and reason that causes these functions in paronyms which carry out different stylistic functions in fiction and poetry. That is to say stylistic facts are realized by phonetic means.

I.A. Baudouin de Courtenay distinguishing linguistic and language categories wrote: "Language categories by their nature are linguistic categories, but they are based on the sensitiveness of people's language" (21: 60). Thus linguistic categories are the essential models of language categories. I.A. Baudouin de Courtenay's thesis refers to paronyms, too. On the one hand it is a language category, on the other hand it is a linguistic category. Like the names of other linguistic categories the term "paronymy" is also bisemic. On the one hand it expresses sound similarity and



language categories between words, on the other hand it expresses the similar theory.

Thus, modality, emotionality, expressiveness, alliteration, sound reiteration, symmetry and paronymy can be attributed to phonetic stylistic categories.

When considering theoretical problems of phonetic stylistics it is necessary to emphasize its connection with phonosemantics. Connection between phonosemantics and phonostylistics has been emphasized in many linguistic works. Though phonosemantics means both onomatopoeia and sound symbolism, it is clear that these two phenomena mustn't be mixed theoretically. Thus each of these two different phenomena of sound description has its specifics and requires a special research method. Phonostylistics has two research directions: the first approach expresses sounding speech, pronouncing norms and their violation, pronouncing peculiarities, extralinguistic factors. In the second sense phonostylistics is textual phonostylistics and its material source is written bookish speech and folklore.

For the first time in Azerbaijani linguistics phonetic stylistics was researched by professor A. Demirchizadeh who distinguished common phonetic stylistic means of expression and special phonetic-stylistic ones. Common phonetic-stylistic means of expression are used both in writing and in speech and are divided into onomatopoeia and interjections. The scientist wrote: "Such phonetic units i.e. sounds, syllables and words are used during description of events, processes, senses, ways of action (quickly, slowly, strongly, sluggishly, hard, easily, weakly, rudely, heavily etc.) , feeling and emotion (sad, joyful, drunk, merry, plaintive, hapless, disappointed, sick: terrible, frightful, awful etc.)" (7: 45).

These ideas brought up by professor A. Demirchizadeh in Azerbaijani linguistics in 1962 were continued by Russian linguists (22), the book dealt with this problem has been published (23). Having generalized centuries – old traditions and semiotic, psychological, linguistic phonosemantic essence of language in the problem of sound symbolism A.B. Mikhalev came to the following conclusion: sound description isn't a special event in the language structure, it is a law that determines formation, development and functionality of language (24).

The problems of sound symbolism has been the vast object of research in Turkology recently. Brief review of these researches was given in G. Issayeva's article (25).

Universal category of sound description hasn't been researched in the language system in the whole and in languages separately. Phonosemantics is a new integrative sphere of linguistics that applies sound description. It is on the bounds of phonetics, semantics and lexicology.

Category of sound description has universal status and both common, invariant language and special peculiarities. This category is connected with the other universal language category – expressiveness – by the expressiveness of figurative type. Research of sound description in the text is realized from the standpoint of phonosemantics and phonostylistics.

In S.V. Voronin's scientific works phonosemantic aspect of sound description is based on the principles and methods of phonosemantics (26).

He united in the researched material quantitative and qualitative analyses of onomatopoeia and sound symbolism vocabulary. Phonostylistic analysis means study of sound structure of text from the functional position of researched style. Sound symbolism like onomatopoeia is a language sign of sound description.

The first line of synharmony (sound complexes) is formed together with the rhythmical intonation by artistic idea, character. Simultaneous formation of both levels of synharmony - phonetics and intonation - demonstrates their interconnection.

Connection between alliteration, assonance and stress concretizes the idea about rhythmical - intonation notion of their meaning. Thus precisely stress is the highest point of rhythmical-intonation action. Sound reiteration emphasizes stress and increases the role of dynamic structure of intonation. Connection between sound reiteration and stress determines their connection with rhythm. Sound reiteration one way or another is connected with all specific intonation structures: the dynamics, rate, timbre and melody. This connection especially shows harmonious order of sounds and makes it an element of expressive intonation. Intonation of semantic complex of expression emphasizes symbolism of sounds and creates the emotional background of speech.

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### ***The categorization of taxis semantics in construction "modus verbal noun + noun denoting subject"***

**Abstract:** The article is devoted to the analyses of different temporal relations, categorized by verbal nouns. It gives the definition of modus verbal noun and clarifies its specifics. The combinations of modus verbal nouns with nouns denoting subjects are under consideration. The analysis suggests the following conclusions: the temporal semantics of any sentence with verbal nouns becomes complicated, the temporal relations are predicted by the semantics of modus verbal noun.

**Keywords:** taxis semantics, temporal organization of the sentence, undifferentiated taxis, modus, dictum, verbal nouns, modus verbal noun.

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### ***Особенности категоризации таксисной семантики в конструкции «модусное отглагольное имя + конкретное имя»***

**Аннотация:** В статье впервые вводится понятие модусного отглагольного имени и уточняется его специфика. Исследуются особенности категоризации таксисных отношений в сочетании модусного имени и конкретного имени, анализируются различные типы темпоральных отношений, преддетерминированных семантикой модусного имени.

**Ключевые слова:** таксисная семантика, темпоральная организация предложения, недифференцированный таксис, модус, диктум, отглагольные имена, модусное отглагольное имя.

Изучение актуализированного в речи предложения-высказывания как единства двух его составляющих – диктума и модуса, предложенное еще Ш. Балли, до сих пор находится в центре внимания лингвистов. Обзор теоретической литературы позволяет утверждать, что понятие модуса в современной лингвистике неоднозначно. В лингвистической интерпретации модус понимают как конечный результат логического полагания, то есть собственно умозаключение [1], как субъективное начало в значении предложения, как «я» говорящего в знании [2], считая, что главное предназначение модуса – «воплотить отношение субъекта к диктуму, придать ему необходимую эпистемическую определенность» [3]. Другими словами, модус существует как специализированное понятие, связанное с работой сознания вообще, так и с грамматической модальностью.

Экспликация модуса всегда обусловлена конкретными задачами коммуникации, другими словами, говорящий представляет свою когнитивную позицию так, как ему нужно, привлекая для этого определенные языковые средства. Следовательно, предложение представляет собой некий синтез ментального и коммуникативного планов.

Учитывая тот факт, что слово, обладая номинативной функцией, способно аккумулировать и «сжимать» информацию уже на логико-содержательном уровне, и «за словом стоят знания о его включении в синтаксическую конструкцию и/или способах его линейного развертывания» [4], представляется актуальным исследование, направленное на изучение модально-предикативной структуры предложения, осложненной сочетанием отглагольных имен.

Наблюдения над семантическими и синтаксическими отношениями между отглагольными именами показывают, что в них сохраняется отношение управляющего глагола и зависимого члена. Отглагольные имена, подобно глаголу, являются центром управления другими членами предложения, и, подобно имени существительному, управляются со стороны глагольной и отглагольной словоформы. Интерес для анализа в этой связи представляют сочетания: «модусное отглагольное имя + конкретное имя».

Для определения «модусного отглагольного имени» обратимся к понятию модусного предиката. В основу выделения модусных глаголов (глаголов пропозиционального отношения) в отдельную группу легла мысль о своеобраз-

разии ментальных актов и, следовательно, о семантической специфике глаголов, обозначающих «внутреннюю» деятельность человека.

Семантическую неоднородность данной группы глаголов отмечали многие лингвисты. К ней относятся глаголы говорения и сообщения, суждения и мышления, памяти и знания, глаголы эмоциональных переживаний, глаголы оценочного суждения, волеизъявления и побуждения, глаголы «создающие мир», глаголы слухового восприятия и другие [5]. С позиций современной лингвистики размытость границ всех семантических групп свидетельствует лишь о сложном процессе речевой деятельности и их неодинаковом положении по отношению друг к другу, что не мешает, скажем, предикатам восприятия входить в ряд модусных предикатов, если хоть некоторые их признаки совпадают с признаками пропозициональных глаголов [6].

Структурной особенностью модусных глаголов является их способность «присоединять предикатные актанты, то есть элементы, обозначающие целую пропозицию» [7]. Следовательно, высказывания с модусными предикатами всегда имеют сложную смысловую структуру. Содержание таких предложений складывается из двух компонентов: диктумного, который обусловлен онтологией, и модусного, который берет свое начало от человека.

Исходя из понятия модусного предиката, мы определяем *модусное отглагольное имя как отглагольное имя с семантикой чувственного, эмоционального восприятия, умственной, психической, вербальной и интеллектуальной деятельности, выражающее отношение субъекта психического состояния «к значимости, к истинности или к самому факту возникновения ситуации», обозначенной в диктуме*. Как видно из определения, семантика модусных имен ориентирована не на вербализацию реалий окружающего мира, а на их оценку или интерпретацию говорящим субъектом в языке. Модусные имена относятся именно к тем средствам, с помощью которых человек выражает индивидуальный опыт концептуализации и категоризации мира.

Различные типы модусов мы называем по модусу предиката: модус перцепции, модус знания, модус желания и т.д. В результате в фокус нашего внимания попадают отглагольные имена, категоризирующие состояние сознания субъекта и включающие целую гамму речемыслительной семантики.



Соотношение модуса и диктума в высказывании указывает, по наблюдениям А.В. Бондарко, на недифференцированную передачу таксисных отношений. Целостность периода времени представляет собой своего рода «общую рамку», внутри которой осуществляется разграничение одновременности/разновременности. При отношениях недифференцированного таксиса «общая рамка» выдвигается на передний план, становясь основным содержанием таксиса [8].

Анализ языкового материала показал, что во многих случаях диктум может быть представлен предметным именем или именем собственным. Сочетание модусных отглагольных имен с именами, взявшими на себя функцию обозначать ситуацию, могут категоризовать различные типы сопряженных действий. В конструкциях «модусное отглагольное имя + предметное/собственное имя» диктумное имя подвергается операции «заключения в ментальную оболочку». Будучи заключенными в ментальную оболочку, такие имена приобретают свойства самой «ментальной оболочки», т.е. *параметр истинности, вероятности, рациональной оценки* и т.д. В этом случае тип пропозитивного значения, есть ничто иное, «как эффект воздействия, оказываемого на подчиненную пропозицию подчиняющим предикатом, в семантику которого входит ментальный компонент» [9].

В частности, предметное имя *money*, употребленное после отглагольного имени *hope*, является знаком целой пропозиции, а модус волеизлияния однозначно категоризирует отношения следования. Попадая в поле модусного отглагольного имени, любая лексическая единица должна получить событийное прочтение. Для восстановления пропозиции, необходимо заполнить семантическую лакуну, создаваемую привычным эллипсом, как например, в следующем высказывании:

(1) Because for the vast majority of lawyers who don't have clients they can bill by the hour forever, *the only hope of serious money* is representing people who've been hurt or killed [Grisham, p. 32].

Как отмечает Н.Д. Арутюнова, «недостающая информация обычно выводится из предтекста или ситуации. Иногда семантический предикат либо имплицуруется именем, либо содержится в определении существительного» [5], например:

(2) I walked towards the door *in the hope of a cup of tea* [BNC].

В сочетании отглагольных имен *the hope of a cup of tea* отглагольное имя *the hope* является носителем модуса, предопределяющего наличие гипотетического события, и однозначно определяет события, категоризованные предметным именем *a cup of tea*, как отношения следования. Но говорящий свернул свою речь, не эксплицируя само действие, а слушатель, опираясь на пресуппозиции, легко восстанавливает имплицитный предикат *have / drink a cup of tea*.

Доказано, что отглагольные имена с модусом страха обладают модальным значением, оценивая утверждение в позиции объекта как возможность [10]. В предложениях модусное имя *fear* является средством эксплицитного выражения субъективного отношения к содержанию диктума. В приведенном ниже примере прогнозируется возможность наступления нежелательного для субъекта модуса события:

(3) And *the fear of her husband's anger* made her reluctant to breathe a word of Trendle's suggestion to him or to anybody about him [Hardy, 1998].

Данное высказывание следует понимать как: *She feared that her husband might get angry with her and that's why she had to breathe a word of Trendle's suggestion to him or to anybody about him.*

В следующем предложении за модусным именем *fear* следует местоимение *him*, тем не менее, и в этом случае модус эксплицирует нежелательность диктума, однако нельзя утверждать временные параметры явления, которое проблематично.

(4) *A deadly fear of him* shook me. I did my best to hide the outward betrayal of it. By look and word, I showed him, as firmly as I could, that I resented the liberty he had taken with me [Collins, p.136].

Проанализируем еще несколько предложений, в которых диктум вербализован неотглагольным именем:

(5) Then there was more concertina playing, and another *demand for a song* [Maugham, 2005];

(6) Only *the threat of a storm* prevented *them* doubling back and returning to camp [Mosse, p. 236];

(7) The last two games show that Yusupov still has to overcome *his fear of Karpov* [BNC];

(8) The arch of the sky bore down on *her* like a chain, and *the sounds of the camp* returned, *the shouts and jokes of the Englishmen*, *the ceaseless crash of the axe* for wood and more wood to build [BNC].

В приведенных высказываниях отглагольные имена *demand* и *threat* однозначно предерминируют будущие события, независимо от способа вербализации диктума (*a song, a storm*). А модус восприятия (*the sounds*) категоризует отношения одновременности восприятия и воспринимаемых событий. В предложении с модусом страха (*his fear of Karpov*) временные отношения недифференцированы.

Сравнение данных конструкций с теми случаями, когда модусное имя вводит диктум, вербализованный другим отглагольным именем, позволяет сделать вывод о том, что «ментальная оболочка» слова остается с ним всегда. Благодаря этому у говорящего всегда есть возможность свернуть достаточно большой объем информации, не боясь при этом быть непонятым.

Поскольку определенные имена обладают способностью приклеивать (task) наши предложения к реальности [11; 5; 12], то в некоторых случаях категоризация событий возможна и неотглагольными именами, данная возможность обеспечивается структурами знаний, которые «стоят» за каждым словом, и структурой самого предложения, например:

(9) I'm sure my opponents at Trent & Brent are still sleeping, and will arise to a lovely *breakfast*, then *the Sunday paper* on the patio with their wives, perhaps *church* for a couple of them, then a nice *lunch* and a *round of golf* [Grisham, p. 98].

Не возникает сомнения, что имена существительные *breakfast, lunch* имплицитно предикат *eat*, а *the Sunday paper* – предикат *read* или *look through*, а *a round of golf* – *play*. Вся ситуация категоризует отношения следования.

Следовательно, как мы видим, предложения с модусными отглагольными именами имеют сложную темпоральную организацию. Изучение таксисной семантики с точки зрения влияния модуса отглагольного имени на сочетание отглагольных имен позволило выявить различные типы темпоральных отношений, категоризованных в английском предложении. Тип категоризуемых таксисных отношений в сочетаниях «модусное имя + конкретное имя»

предетерминируется семантикой модусного имени (валентностный таксис). Экспликация отношений одновременности/разновременности во многих случаях становится возможной только при опоре на контекст и логические пресуппозиции. Анализ показал, что диктум может быть вербализован очень экономным способом – конкретным именем. В этих случаях модусное имя, сохраняя свою «ментальную оболочку», способно предетерминировать таксисные отношения, так как диктум получает событийную интерпретацию.

Все вышесказанное позволяет по-новому взглянуть на категоризацию событийной семантики и сложение смыслов на синтаксическом уровне и открывает дальнейшую перспективу изучения функционирования глагольного слова в предложении в непосредственной связи со смыслом предложения-высказывания.

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### ***"Spirituality" as a pedagogical category***

**Abstract:** This paper examines the category of "spirituality" in teaching science. The authors suggest ways of spirituality education in educational organization.

**Keywords:** value, spirituality, personality, spiritual development.

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### ***«Духовность» как педагогическая категория***

**Аннотация:** В статье рассматривается категория «духовность» в педагогической науке. Авторами предложены пути воспитания духовности обучающихся в образовательных организациях.

**Ключевые слова:** ценность, духовность, личность, духовное развитие.

Современная ситуация в России диктует необходимость переоценки приоритетов в образовании, в усилении его духовного потенциала. Проблема становления духовной личности сегодня является чрезвычайно важной во всем мире. Это вызвано, прежде всего, духовно-нравственной деградацией общества, отчуждением от собственного внутреннего мира и духовных потребностей, для которого не существует ни идеалов, ни норм поведения. Человек переживает небывалый кризис именно из-за приостановки своего духовного развития, из-за утери своих духовных ценностей.

Как свидетельствует практика, за последние десятилетия произошла утрата традиционных ценностей, в процессе которой у большинства молодежи произошла подмена высших ценностей преходящими, и, как следствие, снизился духовный потенциал личности, общества, нации.

Вообще, духовность – одна из наиболее часто упоминающихся ценностей российской культуры. Обычно понимается как превосходство духовных ценностей над материальными: не хлебом единым жив человек. В ряде исследований понятие духовности отождествляется с понятием нравственности, другие исследователи духовность связывают с религиозностью.

Духовность как целостное качество основано на самосознании, т.е. способности человека производить мыслительные операции по отношению и к самому себе, и к своему мышлению. Именно в данном «пространстве» человека и возникают особенности восприятия, что само по себе является признаком свободы человека от своего создателя. В то же время, духовность как качество личности включает ориентацию человека на высшие общечеловеческие ценности. Общечеловеческие ценности не имеют национальной окраски, поскольку являются объективными смысловыми значимостями, объединяющими всех людей и делающими их жизнь осмысленной на земле. Смысл выступает в форме ценностей. Высшие общечеловеческие ценности определяются учеными, как: Истина, Добро, Красота, Свобода, Творчество, Любовь.

Духовность - это способ человеческого существования. Духовное развитие человека является основополагающим в его становлении как субъекта, как личности и даже как биологического индивида. Духовное развитие должно пронизывать все стороны личности и воздействовать на нее, но в первую очередь - на ценностно-смысловую и эмоционально-чувствительную сферу и вызывать стремление к деятельности, к активному, осознанному, творчески созидательному самовыражению, переживанию неудовлетворенности собой, преодолению противоречий, борьбу между эгоистичными и бескорыстными побуждениями. Результатом духовного развития является обретение смысла человеческой жизни.

Основной путь духовного развития состоит в системно-содержательной трансформации общечеловеческих ценностей в педагогическую деятельность. Это связано с тем, что духовное развитие, обусловленное нравственными



нормами и ценностями личности, требует для своего становления соответствующего содержания.

Духовность (в педагогическом контексте!) – это деятельность сознания растущего человека, связанная с поиском смысла жизни и своего места в ней, определением критериев добра и зла, оценки по ним людей и событий, формированием мотивов поведения в согласии или противоречии с общечеловеческими принципами нравственности [1].

Как помочь воспитаннику раскрыть духовную вертикаль своего развития? Решение этой задачи видится, прежде всего, в единстве образования и духовного развития школьника, его самостановления. Эмоционально-образное восприятие содержания образования должно превалировать над интеллектуальным.

Духовному развитию учащихся будет способствовать, во-первых, интегрированное знание о мире и месте человека в нем, которое будет усложняться по степени взросления школьника («я и мир, меня окружающий», «Земля - Вселенная и я», «Душевность - духовность - мой духовный мир». Это позволит проблеме духовного становления личности решать с учетом социокультурной среды, готовить школьников к осмысленной деятельности в условиях цивилизации XXI века [2].

Во-вторых, духовно-личностная направленность учебных предметов. Решение проблемы, таким образом, позволит создать духовно-нравственный и гражданский фундамент личности.

Это требует приобщения школьников к духовному опыту своего народа, его мудрости, их ориентации к осмыслению материального и духовного мира (социального бытия, социального жития, жизни духовной). Воспитание ответственности, добрых чувств и любви к Родине, людям, миру - основа духовного становления личности как на уроке, так и вне его через приобщение к истории и культуре родного края, города, деревни, где родился и вырос.

И, наконец, третьим фактором, способствующим духовному становлению личности, является учитель, духовно совершенствующийся, для которого ученик есть высшая ценность. Только такому учителю подвластно сегодня научить науке жизни, увлечь вечным поиском смысла и самосозидания.

Таким образом, именно в системе образования можно найти новые возможности по возрождению духовного, образованного человека, на основе общей национальной идеи гуманизма как интегрального качества личности, способной к гуманному отношению через делание добра к детям, старикам, другим людям, окружающей среде. В образовательном процессе необходимо формировать чувство собственного достоинства, способность личности к духовному резонансу на общественные явления, способность к саморазвитию. Для реализации задачи воспитания духовности в человеке знания должны выступать как средства достижения цели.

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***The study of economics students motivational preferences  
in order to introduce and promote the ideas  
of the youth moral education***

**Abstract:** This article is devoted to the analysis of economics student's motivational preferences. The dynamics of the key indicators was analyzed and the matrix of student's involvement in public activities aimed at the formation of moral values was completed on the basis of group motivation profile.

**Keywords:** motivational preferences, moral education, students, the youth.

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***Исследование мотивационных предпочтений  
студентов экономических специальностей в целях  
внедрения и популяризации идей духовно-  
нравственного воспитания молодежи***

**Аннотация:** Данная статья посвящена анализу мотивационных потребностей студентов старших курсов экономических специальностей. На основе группового мотивационного профиля была проанализирована динамика ключевых показателей, составлена матрица вовлеченности студентов в общественные мероприятия, направленные на формирование духовно-нравственных ценностей.

**Ключевые слова:** мотивационные предпочтения, духовно-нравственное воспитание, студенты, молодежь.

В наше время перед любым педагогом или воспитателем встаёт ряд проблем, касающихся процесса воспитания. Падение нравственности, которое можно наблюдать в наши дни, означает смену ценностных ориентаций людей под влиянием различных обстоятельств, в том числе и экономической неустроенности. Изменения, произошедшие за последние несколько лет, делают настоятельно необходимым пересмотр системы ценностей. Вот почему нравственное воспитание студентов обретает сегодня не меньшую значимость, чем знания, умения и навыки. Для дальнейшей жизни человек должен в совершенстве владеть законами нравственности, поэтому изучение мотивации и ценностных ориентаций участников педагогического процесса является первым и необходимым шагом обновления воспитательной работы учебного заведения.

Нравственное воспитание молодёжи является неоспоримой и важнейшей целью всякого общества, в связи с чем ведущую функцию в нравственном воспитании подрастающего поколения может выполнять педагог высшей школы. Одной из существенных педагогических функций является систематическое и всестороннее изучение обучающихся, особенностей их характера, поведения и моральных ценностей в целом. С этим тесно связана и проблема мотивационных потребностей выпускников российских вузов на фоне отсутствия государственных рычагов стимулирования профессиональной адаптации и низкой производительности труда молодых специалистов, которая на сегодняшний день является довольно актуальной. В связи с этим большое значение приобретает поиск эффективных методов, способов и направлений работы с молодыми специалистами в процессе их поиска своего места в жизни [1, 2].

Целью данного педагогического исследования является анализ мотивационных предпочтений студентов старших курсов экономических специальностей и возможности внедрения и популяризации идей духовно-нравственного воспитания молодежи.

Данное исследование, объектом которого является система мотивационных предпочтений выпускников Дальневосточного федерального университета, проводилось дважды (в 2014 и 2015 гг.). Всего было опрошено 183 студента старших курсов экономических специальностей Школы экономики и менеджмента Дальневосточного федерального университета (ШЭМ ДВФУ). Методоло-

гической базой исследования является тест в формате электронной анкеты, разработанный специалистами по подготовке персонала Шэйлой Ричи и Питером Мартином [3], который позволяет количественно оценить относительную значимость потребностей для конкретного человека и графически представить его мотивационный профиль.

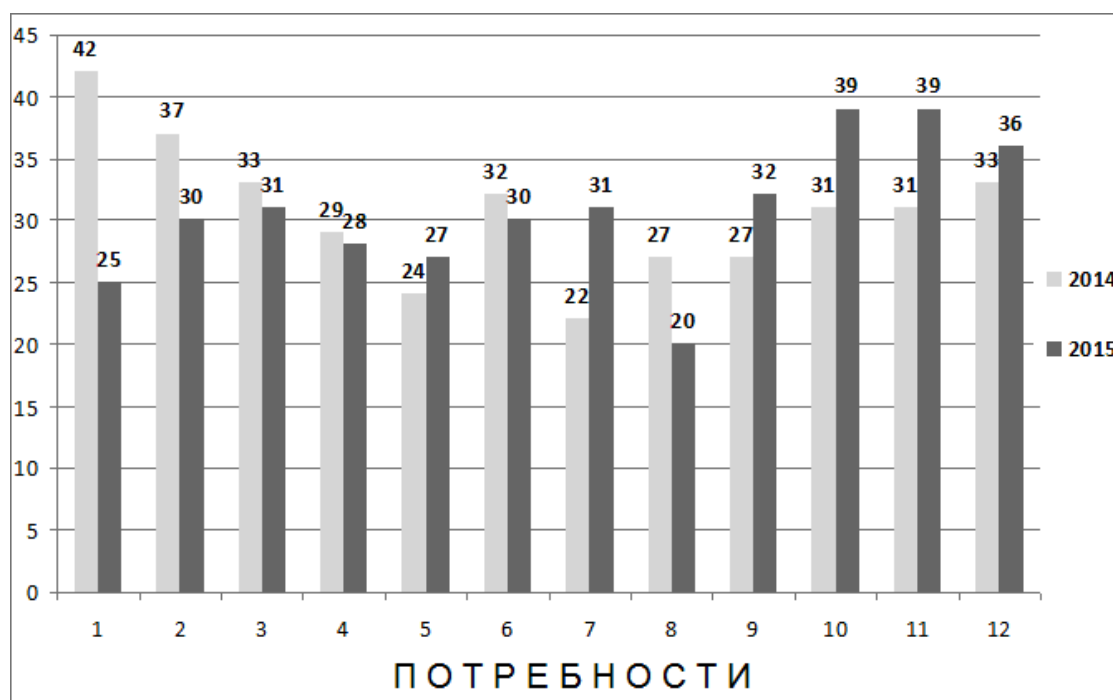
Для сравнительного анализа в описании каждой индивидуальной потребности (мотивационного фактора) приводится среднее значение (медиана) и диапазон – минимальное и максимальное значения. Эти данные дают возможность оценить, насколько высока значимость той или иной потребности в целом в социуме, а также значимость каждой потребности для конкретного человека, сравнивая данные его мотивационного профиля со средним значением (медианой). Данные опроса представлены на рисунке 1 и в таблице 1.

**Таблица 1. Анализ мотивационных потребностей по методике  
Ш. Ричи - П. Мартина**

№	Наименование	2014	2015	Мин.	Макс.	Медиана
1	Потребность в высокой заработной плате и материальном вознаграждении, желание иметь работу с хорошим набором льгот и надбавок	42	25	12	76	33,5
2	Потребность в хороших условиях работы и комфортной обстановке	37	30	15	62	33,5
3	Потребность в чётком структурировании работы, наличии обратной связи и информации, позволяющей судить о результатах работы. Потребность в снижении неопределённости	33	31	14	48	32,0
4	Потребность в социальных контактах: общение с широким кругом людей, легкая степень доверительности, тесная связь с коллегами	29	28	17	39	28,5
5	Потребность формировать и поддерживать долгосрочные стабильные взаимоотношения, малое число коллег по работе, значительная степень близости взаимоотношений, доверительности	24	27	6	36	25,5
6	Потребность в завоевании признания со стороны других людей, в том чтобы окружающие ценили заслуги, достижения и успехи индивидуума	32	30	24	42	31,0

7	Потребность ставить для себя дерзновенно сложные цели и достигать их; это показатель потребности следовать поставленным целям и быть самомотивированным	22	31	12	54	26,5
8	Потребности во влиятельности и власти, стремление руководить другими; настойчивое стремление к конкуренции и влиятельности	27	20	0	33	23,5
9	Потребность в разнообразии, переменах, стимулировании; стремление избегать рутины и скуки	27	32	20	46	29,5
10	Потребность быть креативным, анализирующим, думающим работником, открытым для новых идей	31	39	21	59	35,0
11	Потребность в совершенствовании, росте и развитии как личности	31	39	20	64	35,0
12	Потребность в ощущении востребованности в интересной общественно полезной работе	33	33	28	57	33,0

Из рисунка видно, что в 2014 году для студентов наиболее актуальной была потребность в высокой заработной плате и материальном вознаграждении, желание иметь работу с хорошим набором льгот и надбавок (42%), на втором месте – потребность в хороших условиях работы и комфортной обстановке (37%), на третьем месте – потребность в ощущении востребованности в интересной и общественно полезной работе (33%) [2].



**Рисунок 1. Групповой мотивационный профиль студентов ШЭМ ДВФУ (2014-2015)**

Таким образом, кроме достойной заработной платы решающими факторами при выборе будущего места работы молодые специалисты обращают внимание и на такие нематериальные факторы, как комфортные условия труда и ощущение востребованности и полезности своего дела. Возможность работы по специальности также не является главным мотивирующим фактором.

В 2015 г. было проведено аналогичное исследование среди студентов Школы экономики и менеджмента. Самыми актуальными оказались потребность быть креативным, анализирующим, думающим работником, открытым для новых идей (39%) и потребность в совершенствовании, росте и развитии как личности (39%). Довольно много выпускников хочет иметь интересную и общественно полезную работу (36%). При этом значительно снизилась потребность в высокой заработной плате: если в 2014 г. она была ведущей (42%), то сегодня она оказалась лишь на 11 месте (25%). Также наблюдается снижение потребности во влиятельности и власти, стремления руководить другими (27% в 2014 г. и 20% в 2015 г.). Видимо, современный экономический кризис заставляет молодежь по-другому взглянуть на систему материальных и нематериальных установок, расставив приоритеты в пользу общечеловеческих ценностей.

На основе анализа мотивационных потребностей была составлена матрица вовлеченности студентов в общественно-полезные мероприятия и проекты, реализуемые в Дальневосточном федеральном университете (рисунок 2). В нашем вузе проводится планомерная работа по созданию благоприятных условий для развития профессиональной ориентации воспитания и нравственных ценностей будущих выпускников. Реализуются мероприятия и проекты, направленные на развитие профессиональных компетенций и морально-нравственных ценностей, действуют специально созданные структурные подразделения, среди которых:

- 1). Центр подготовки волонтеров (ЦПВ ДВФУ) – молодежное студенческое общественное объединение, которое оказывает добровольное содействие при организации и проведении мероприятий различного уровня и направленности [4].

- 2). Центр развития студенческих инициатив (ЦРСИ ДВФУ) - уникальная площадка для реализации идей молодёжи. Миссия центра: помочь молодежи превратить их идеи в полноценные социальные проекты и реализовать их. В



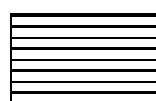
Центре инициативу поддержат на любом уровне, предоставив ресурсы, контакты, помогут найти спонсоров [5].

**Таблица 2. Матрица вовлеченности студентов в общественно полезные и творческие мероприятия университета**

Ведущие потребности	Участие в ЦПВ	Участие в ЦРСИ	Участие в благотворительных акциях	Участие в студенческом самоуправлении	Участие в «Дне скворца»
Высокая заработная плата и мат. вознаграждение					
Хорошие условия и комфорт					
Четкая структура, наличие обратной связи					
Социальные контакты и общение					
Долгосрочные стабильные взаимоотношения, доверительность					
Завоевание признания со стороны других					
Постановка сложных целей и их достижение					
Влиятельность и власть, стремление руководить					
Разнообразие, перемены, избегание рутины и скуки					
Креативность и открытость для новых идей					
Совершенствование, рост и развитии личности					
Ощущение востребованности в интересной общественно полезной работе					



Соответствует потребностям мотивации в полной степени



Соответствует потребностям мотивации не в полной степени

3). Участие в творческих и благотворительных мероприятиях. Уже традиционным стало для Дальневосточного проведение «Дня скворца» -

своеобразного праздник весны, креативности и добра. На территории кампуса разворачиваются творческие площадки, конкурсы, концерты, работает Campus Market, на котором работает «красная зона» для сбора пожертвований на благотворительные цели. В 2014 году ребята из добровольческого движения «Мы вместе» продавали футболки с рисунками детей, больных онкологическими заболеваниями, печенье, сделанное детьми-аутистами, и календарики с эмблемой движения. Деньги, вырученные от продаж, пошли на организацию летнего лагеря для детей-аутистов и их родителей [6]. В нынешнем году к этой акции активно присоединились и иностранные студенты.

В ноябре 2014 г. студенты и сотрудники Школы биомедицины организовали и провели благотворительное чаепитие при поддержке фонда «Подари жизнь!». Все вырученные средства от продажи угощений, изготовленных на кафедре технологий продукции и организации общественного питания, были направлены на оказание помощи детям с гематологическими и онкологическими заболеваниями [7].

Итак, сегодня среди студентов экономических специальностей ДВФУ можно наблюдать смену жизненных ориентаций и мотивационных потребностей, при этом наблюдается формирование приоритетов общечеловеческих ценностей. Выявление мотивационных потребностей учащихся может помочь педагогу сформировать и откорректировать план учебно-воспитательных мероприятий с учетом индивидуальных запросов.

Таким образом, в современном университете важно не только выявлять и формировать адекватные мотивационные установки у самих студентов, но и уделять большое внимание морально-нравственному воспитанию будущих специалистов, своевременно приводить в соответствие систему жизненных приоритетов к ключевым компетенциям выпускников, что в совокупности позволит современным студентам быть вовлеченными во все сферы современной жизни и иметь активную жизненную позицию.

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### ***Key principles of formation the concept of proletarian culture (20s XX century)***

**Abstract:** In the article define the key principles of formation the concept of proletarian culture by studying theoretical approaches, attitudes, ideas, statesman's ideas of proletculture – cultural – enlightenmental and literary – artistical organization of proletarian independent action, which had the purpose of broad and comprehensive development of proletarian culture by the proletariat.

**Keywords:** culture, Proletculture, art, education, ideology, worldview, values.

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### ***Ключові засади становлення концепції пролетарської культури (20-ті рр. XX ст.)***

**Анотація:** У статті визначенні ключові засади становлення концепції пролетарської культури на основі вивчення теоретичних підходів, поглядів, ідей діячів Пролеткульту – культурно-просвітницької і літературно-художньої організації пролетарської самодіяльності, яка мала за мету широкий і всебічний розвиток пролетарської культури самим пролетаріатом.

**Ключові слова:** культура, Пролеткульт, мистецтво, освіта, ідеологія, світогляд, цінності.

Револьюційні перетворення на території України у постімперську епоху поставили на порядок денний питання творення «нової культури». Термін «пролетарської культури» виник ще до 1917 р. і став прерогативою і необхід-

ністю творення соціалістичного майбутнього. Творення нової культури стало об'єктивною потребою у тій культурі, яка відповідала б інтересам пролетаріату в умовах революції. Відтак, пролетаріат відчув себе суб'єктом історії, відповідно зажадав відчувати себе суб'єктом творення культури, яка б відображала його відчуття, давала можливість осмислити перспективи творення нового життя.

Погоджуємося з думкою небагатьох вчених [1], що з приходом до влади партія більшовиків використала положення «пролетарської культури», розроблену О. Богдановим та А. Луначарським, ще з 1900 р. В цілому втілення ідей «пролетарської культури» проходили у рамках культурної революції, автором якої прийнято вважати В. Леніна. Вперше цей термін він використав у статті «Про кооперацію» (1923). Хоча у теоретичних поглядах і практичній діяльності В. Леніна відсутній концептуальний аналіз теми культурного будівництва. Проте з перших днів радянської влади почалася активна ідеологічна робота, хоча у партії напередодні революції ще не було чіткої, детальної програми у сфері ідеологічної та культурної політики держави [1, с. 55]. Очевидним стало прийняття концепції «пролетарської культури» О. Богданова та А. Луначарського «за основу» культурної революції, доповнюючи її заходами загальноосвітнього характеру.

У цей час відбулося організаційне оформлення Пролеткульту – культурно-просвітницької і літературно-художньої організації пролетарської самодіяльності при Наркомосі, яка мала за мету широкий і всебічний розвиток пролетарської культури самим пролетаріатом.

Одним з ключових питань теоретичних основ ідеологів Пролеткульту постала проблема використання культурної спадщини минулого у формуванні пролетарської культури – культури майбутнього. У цьому напрямі пріоритетного значення набув підхід критичного осмислення культурного досвіду попередніх епох задля диференціації позитивних аспектів з метою перебудови світоглядних цінностей людства та усвідомленого сприйняття та активної участі у культурному будівництві на нових методологічних засадах.

Вивчаючи теоретичні погляди, думки, ідеї пролеткультівських діячів нами виокремлено провідні засади пролетарської культури.

*Принцип самоорганізації* (теорія О. Богданова) передбачає стихійного прагнення пролетаріату як обраного класу до самоорганізації засобами

мистецтва, що сприяє об'єднанню окремого класу. Звідси робиться послідовний висновок: для об'єднання пролетаріату йому необхідне власне мистецтво, нове соціалістичне мистецтво, яке повинне вести пролетаріат до боротьби, а також залучати до «пролетарської товаришкості» все нові і нові сили. Мистецтво є взагалі виховний засіб – засіб соціальної організації людей [2, с. 118]. Воно і засіб спілкування, і засіб збирання, систематизації людського досвіду. Мистецтво – «це наука життя в образах». Головна відмінність мистецтва від інших засобів впливу, у його здатності «організувати не лише уяву людей, а й також їх почуття, їх настрій» [4, с. 17].

Ідеологи Пролеткульту в основу концепції «пролетарської культури» вкладали завдання формування нової людини в нових суспільних перетвореннях. Зародження соціалістичного суспільства вимагало критичного переосмислення виховних теорій минулого, виокремлення у них позитивних і негативних тенденцій, як результат – обґрунтування з позицій марксизму новий виховний ідеал – людину – борця за соціалістичне майбутнє. Пролеткультівці вважали, що сформуванню такої людини можна лише за допомогою цілеспрямованого впливу з метою розвитку творчості і в процесі творчої діяльності. Товаришський зв'язок робочого класу, його свідомо організованість у праці і в соціальній боротьбі становить основу нового суспільного устрою – соціалізму. У цьому контексті образом нової людини є робітник – борець за соціалізм, який бере активну участь у справі будівництва «нового життя» [3, с. 96]. Ідеологи Пролеткульту наголошували, що «ми повинні виховати людей з новими поглядами усього життя..., які відчують красу нового життя і віддадуться творчості з глибокою самовіддачею» [9, с. 40]. Процес становлення нової людини передбачав не стільки просвітницької роботи, стільки виховання у робітників самодіяльності, щоб «через посередництво цієї самодіяльності пролетаріат міг з'ясувати свою духовну сутність, яка стане сутністю соціалістичної культури» [9, с. 40]. Відтак вони ставили завдання виховати нову людину, з позицій пролетарської культури – нового робітника, який повинен володіти наступними якостями: загартованість, відданість справі, стійкість і готовність до боротьби, діловитість, достатня наукова підготовка. Це завдання покладалося на Пролеткульту [12, с. 33].

Основний принцип пролетарської культури – колективізм мистецтва. Власне провідним методом творчої роботи визначалося колективна критика,

колективне обговорення та колективна оцінка того чи іншого твору чи іншого результату творчої праці.

Пролетарська культура, в першу чергу культура колективна, яка твориться в колективі і задля колективу. Поряд із колективом важливе значення має «природне середовище» для пролетаріату, в якому твориться ця культура – середовище індустриального виробництва, яке надихає, «очищує», є першоджерелом процесів культуротворення: «На фабриках, на заводах, на підприємствах, у залізничних майстернях, у шахтах, там, де кується загальна воля пролетаріату, там, звідки пролетаріат виступає на арену життя, як колектив, там, де формується його комуністичний світогляд, там же створюються його пісні, там втілюються його образи, там створюється пролетарська культура. Вона пролетарська не на словах, не тим, що вона співає і говорить тільки про пролетарське – вона пролетарська тим, що індивідуалістичному, приватному вона надає перевагу загально всьому класу пролетаріату – колективістичному. Особистість у цій культурі постає лише як втілення боротьби у житті класу [7].

Дійсно саме фабрика, завод, станок виступали першоджерелами пролетарської ідеології, саме від них лише, на думку пролеткультівців, бере початок все мистецтво, всі нові паростки нового комуністичного світогляду. Разом з тим розглядали все мистецтво, будь-яку ідеологію, як могутній засіб, що сприяє перемозі пролетаріату над індивідуалістичним устроєм [5].

Творення пролетарської культури було пронизане новизною ідей, процесу, тематики, результатів творення у вигляді нової літератури, нового театру, нової музики, нового живопису у переломний момент суспільного життя. Досить влучно це акцентували сучасні дослідники Г. Романенко та В. Шейко: «Творчість більшості об'єднань пронизана маніфестацією новизни: митці змушували суспільство формувати нові погляди на мистецтво, літературу, культуру життєвого середовища й речового оточення. Космічні, урбаністичні, техніцистські мотиви творів засвідчували характерні ознаки новітньої історичної доби; експресивно-реалістичні й конструктивістські форми передавали ритміку, емоційну напруженість поступу «залізного ренесансу». Дзвінкоголоса поезія, ошатні стінописи в громадських закладах, веселі розписи агітпотягів і агітпароплавів, оптимістичні сюжети станкових полотен, новаторська сценографія,

святкове оформлення масових заходів і міського середовища, що лунали урочистим гімном «новому життю» і «новій людині» [13, с. 115].

*Творча самодіяльність пролетаріату* полягає у створенні умов для прояву творчих сил пролетаріату в самій творчості, що передбачало організацію цілісної мережі робітничих клубів, студій.

У зміст поняття і концепції «пролетарської культури» вкладався комплекс взаємопов'язаних явищ, це, безпосередньо, *трансформація, перероблення світогляду, психології, побуту та ін. робітників як суб'єкта суспільно-політичних і соціокультурних перетворень*. Створення пролетарської культури передбачалося не лише на побутовому, творчому, філософському, а й на психологічному: «Саме таке завдання – не роздумувати тільки про пролетарську культуру, не лише свідомістю визначати її шляхи і свідомо накреслювати її віхи, але виявляти її, не створювати її, але творчою уявою визивати із небуття до буття думки, образів, почуття, що є не вказівкою, а самою плоттю, самою кров'ю соціалістичної культури – саме таке завдання і поставив собі Пролеткульт» [10].

Марксистська ідеологія визначала *працю рушійною силою розвитку людства, розглядала працю як процес розвитку і вдосконалення способу використання сил і предметів природи*. Цей процес передбачав три складові: праця, засоби праці і предмет праці. Саме питання організації праці стала одним із теоретичних розробок пролеткультівців. На їхню думку, організація праці є завданням провідного прогресивного класу пролетаріатів і лише ним вона може бути вирішена в повному обсязі. Відтак, вирішувалося питання «єдності процесу праці», тобто створення у робочих масах свідомого і творчого відношення до виконаної роботи [11, с. 78]. Розроблялися підходи, умови при яких процес праці міг протікати найбільш раціонально, відповідно можливостям і здібностям робітника і мету цього процесу.

Наука про використання і застосування сил і законів природи з метою отримання корисних для людства засобів існування вважалася актуальною, з огляду на те, що давала б можливість збільшення виробничих сил, збереження людської енергії, автоматизації робочого процесу.

Водночас, вкрай необхідне у напрямі виховання робітників – *тісний зв'язок мистецтва з суспільним виробництвом*. Адже саме індустріальний пролетаріат є реальним носієм і творцем нової пролетарської культури.



Пролетарське мистецтво прагнуло стати масовим, пролеткультівці висували щось подібне до гасла «мистецтво на вулицю». На відміну від буржуазного суспільства, в якому мистецтво розглядалося як дозвілля, як «додаток до ділового життя», В. Коряк – теоретик вітчизняного пролеткультівського руху, у статті «Матеріалізація мистецтва» наголошував, що в пролетарському суспільстві робітники самі перетворюють життя і сам процес праці в суспільний твір мистецтва: «Робітниче життя є процес продукції матеріальних цінностей. Отже, для робітника справжнє, життєве мистецтво є в самому процесі виробництва... Пролетарське, отже, організація мистецтва є просто частиною єдиної проблеми: організація життя, поскільки ж робітниче життя є праця – організація праці» [8].

Пролеткульт лише одна із організаційних форм для визначеної культурно-творчої роботи пролетаріату, що підсумовує його практичний досвід, його творчі досягнення під гаслом пролетарської культури. Саме *розвиток пролетарської культури у процесі соціалістичного будівництва* залишався життєво важливим завданням пролетаріату. Комуністична ідеологія і творчість у процесі революції соціалістичних форм життя, одночасно з руйнацією старих, становить реальний зміст поняття пролетарська культура; творчість революції і є творчість нової культури, як і матеріальної, так і духовної у тісному взаємозв'язку [6, с. 75].

Пролеткультом висунута теза «пролетаризації науки» як узагальнена формула, що вказує робочому класу шлях соціалістичного будівництва. Наука як система повинна стати засобом будівництва пролетарської культури, ідеологічним засобом боротьби робочого класу у будівництві соціалізму. Відповідно наука повинна бути пристосована до цих цілей.

Проблема пролетарської культури є проблема організації форм соціалістичного побуту, соціалістичних виробничих відносин, поряд із політичними і ідеологічними складовими.

Власне, відбувалася переосмислення цінностей щодо *демократизації мистецтва* у напрямі доступності, відкритості широким масам. Демократизація мистецтва у тому вигляді, як вона проводиться, має позитивний вплив – служити освітнім цілям, познайомити маси з естетичними проявами попередніх поколінь. Істинне ж «мистецтво всім» повинно полягати зовсім не у перетворення всіх людей у глядачів, а навпаки – у засвоєнні усіма тих якостей і тих умінь будувати і

організовувати «сирий матеріал», що властиве було фахівцям мистецтва. До того ж, це забезпечувало залучення усієї маси в цей процес «творення», що в попередню епоху був доступний лише окремим [14, с. 117].

«Мистецтво всім! Цей лозунг повинен означати вищу міру майстерної гнучкості людини у всіх його практичних діях – чи говорить він, стругає, точить, переконує аудиторію, командує армією, йде по вулиці, шиє плаття. Радість перетворення сирого матеріалу у деяку громадсько-корисну форму, що супроводжується умінням і посиленням пошуком найбільш доцільної форми – ось, чим повинно стати це «мистецтво всім» [14, с. 116].

Таким чином, концепція пролетарської культури як феномен суспільних перетворень 20-х рр. XX ст. базувалася на ключових підвалинах: принцип самоорганізації (за О. Богдановим); виховання «нової людини»; колективізм мистецтва; новизна як основа та результат пролетарської культури; творча самодіяльність пролетаріату; трансформація, перероблення світогляду, психології, побуту та ін. робітників як суб'єкта суспільно-політичних і соціокультурних перетворень; наукові засади трудових процесів; тісний взаємозв'язок творчої діяльності з виробництвом; принцип дотримання комуністичних ідей та завдань соціалістичного будівництва; демократизація мистецтва.

Разом з тим, ідея пролетарської культури не стала консолідуючою, оскільки ні в Росії, ні, тим більше, в Україні, пролетаріат не був переважаючим класом. Уже починаючи з 30-х років XX ст. в основу культурного розвитку закладається думка про побудову безкласового суспільства й позакласової культури. Нова ситуація у культурному процесі була пов'язана з проголошенням Сталіним курсу на ліквідацію класів і прискорений перехід до позакласового суспільства.

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***The interaction of the gendarmerie and police general in the fight against political terrorism in the Russian Empire in the second half of the XIX century***

**Abstract:** The article analyses the work of the Police of the Russian Empire during the second half of the XIX century in fighting political terrorism.

**Keywords:** police, terrorism, political spying, operatively-search activity.

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***Взаимодействие жандармских управлений и органов общей полиции в сфере борьбы с политическим терроризмом в Российской империи во второй половине XIX века***

**Аннотация:** В статье анализируются работа полиции Российской империи во второй половине XIX века по борьбе с политическим терроризмом.

**Ключевые слова:** полиция, терроризм, политический сыск, оперативно-разыскная деятельность.

Первым учреждением в России, получившим право политического сыска, считается созданный в 1650 году царем Алексеем Михайловичем приказ Тайных дел [1].

Петр I расследование о политических преступлениях передал в Преображенский приказ, выросший из Преображенской потешной избы и выполнял роль царской канцелярии [2].

В последствии Преображенский приказ был переименован в Преображенскую канцелярию, которая была ликвидирована в 1729 году и возрождена в 1731 году под названием Канцелярии тайных разыскных дел.

При Петре III, 21 февраля 1762 года, Канцелярия была уничтожена, а дела переданы в Сенат, при котором была учреждена Тайная экспедиция [3], которая была уничтожена 2 апреля 1801 года.

С 8 сентября 1802 года эта работа возложена на «Вторую экспедицию» (политический сыск, цензура) Министерства внутренних дел. Кроме этого, делами политического сыска в царствовании Александра I занимался Комитет рассмотрения дел «клонящихся» к нарушению общественного спокойствия и просуществовал он до 1829 года.

Восстание «декабристов» привело к образованию III отделения Собственной Его Императорского Величества Канцелярии, как высшего учреждения империи, ведающего делами о политических преступлениях [4].

Наиболее эффективным способом борьбы с терроризмом, является оперативно–разыскная деятельность, значительный опыт которой был накоплен в Российской империи.

Органы политического розыска на всем протяжении развития отечественного государства и права неоднократно трансформировались. Менялась их наименование, структура, численность, но оставалась неизменной главная задача – обеспечение внутренней стабильности государства.

Развитие цивилизации и техники вносили свои поправки в методы получения информации, но их суть сохранялась [5].

Для обозначения этой деятельности в словаре русского языка существовало два термина «розыск» и «сыск» [6].

Так, например, слово «розыск» объясняется как допрос с применением пыток (такое понятие использовалось до XIX века) или как следственные и оперативные действия, производимые для обнаружения преступников, похищенного имущества и т. д. «Сыск» трактуется как выслеживание и розыск преступников, деятелей революционных движений в дореволюционной России.

Получается, по сути, эти термины равнозначны. Сейчас понятие «сыск» употребляется чаще в разговорной речи, это проявляется в их производных «сыскари» и «разыскники», то есть люди, выполняющие эту работу.

На начальном этапе противодействия революционному движению основной сбор информации осуществлялся сотрудниками губернских жандармских управлений. И тут обращают на себя внимание два факта: первый – сбор информации осуществлялся лично самими сотрудниками жандармских управлений; второй – отсутствовало четкое нормативное регулирование «наблюдательной деятельности».

В Циркуляре шефа жандармов от 14 февраля 1875 года читаем: «Несмотря ...на особенную важность наблюдательных обязанностей, нет возможности, по их характеру, указать какую-либо инструкцию на все явления, требующие надзора» [7]. В первую очередь это говорит о том, что до образования Департамента полиции основной массой агентурной работы занимались жандармские управления.

Оперативно-разыскная работа, в тот период, была слабым местом корпуса жандармов. Причина заключалась в том, что корпус жандармов был воинским подразделением и комплектовался офицерами, переводившимися из других воинских частей.

Например, в армии общение офицера с агентом – доносчиком по законам офицерской чести считалось делом предосудительным. Офицер, которого могли заподозрить в доносите́льстве или общении с доносчиком, изгоняли из полка.

Особенности общения в армии среди офицеров отложило свой отпечаток и в работе полиции с агентурой. Так, в должностных инструкциях указывалось, что запрещалось вербовать в качестве секретных агентов потомственных дворян и офицеров. Кроме того, жандармам запрещалось переодеваться в гражданское платье, что затрудняло выполнение оперативно-разыскной работы.

Начальник личной охраны императора генерал Спиридович, ранее бывший начальник Киевского жандармского управления, в своих мемуарах писал о том, что «... жандармские унтер-офицеры, отправляясь на задание по наружному наблюдению, одевали поверх военной формы гражданское пальто, из-под которого были видны сапоги со шпорами и сабля. Учитывая неспособность жандармов к розыскной работе, по инициативе снизу стали создаваться новые, независимые от жандармерии, розыскные органы» [8].

В ходе судебной реформы 1864 года Александр II утвердил постановление, по которому разрешалось «порочных людей» наказывать без суда и

следствия в административном порядке. Их вина могла быть доказана при помощи свидетельств секретных агентов, путем перлюстрации писем и других средств. По представлению шефа жандармов они отправлялись в ссылку [9].

Так, например, А.П. Зайончковский за 1880 год приводил следующие цифры: в 1880 году под надзором полиции находилось 31152 человека, из них за политические взгляды 6790 человек, политических ссыльных в Восточной Сибири числилось 308 человек [10].

В Российской империи в 1878 году проходило заседание Особого совещания, которое было создано «... ввиду усилившегося социально-революционного движения». Основной задачей являлось разработка мероприятий по нормализации внутривнутриполитического положения в российской империи. Шеф жандармов Н.В. Мезенцева тогда заявил, «... что никакое наблюдение в обществе не мыслимо без частной агентуры» [11].

На местах «охранительно-разыскную» работу вели губернские жандармские управления (ГЖУ и ОЖУ), жандармско-полицейское управление железных дорог (ЖПУ ж.д.), разыскные пункты, охранные отделения, районные охранные отделения (в период с 1907 по 1914 гг.).

Все они находились в двойном подчинении. В одном случае при осуществлении оперативно-разыскной и наблюдательной деятельности подчинялись Департаменту полиции, в другом случае Отдельному корпусу жандармов в рамках строевой, хозяйственной, инспекторской деятельности.

25 сентября 1880 года А.А. Козлов направил директору Департамента государственной полиции доклад, в котором анализировалось состояние политического розыска в Москве и высказывались предложения по организации нового ведомственного органа. В данном документе выделялись основные направления его работы, а именно: производство дознаний на основании закона от 19 мая 1871 г. и розыски по ним; секретный и гласный надзор за всеми неблагонадежными лицами содержание под стражей граждан, арестованных по политическим делам; сбор сведений негласным путем о благонадежности населения и по всем вопросам политического характера через полицию и секретную агентуру; рассмотрение дел о раскольниках; пересылка политических арестантов и высылка лиц административным путем и представление ведомостей о поднадзорных и сведений по политическим делам.



Секретно-разыскное отделение должно было подчиняться московскому обер-полицмейстеру, которому предоставлялось право принимать решения на производство дознаний и розысков, распоряжаться расходами на секретную агентуру, регламентировать ее деятельность, от его имени велась вся важная переписка. Для производства одновременных обысков он мог привлекать офицеров и нижних чинов из московского жандармского дивизиона [12].

В октябре месяце 1880 года Лорис-Меликов в своём докладе Александру II признал необходимость образования сыскного отделения в Санкт-Петербурге.

Вследствие этого 1 ноября 1880 год по распоряжению министра внутренних дел Лорис-Меликова было создано «Секретно–разыскное отделение при канцелярии Московского обер-полицмейстера».

Опыт работы этого и созданного ранее, в 1866 году в Петербурге, отделений предполагалось продолжить при создании в 1882 году секретной полиции.

Первый год был трудным испытанием для нового органа политического розыска. «Народная воля» продолжала действовать. Правда, уже к началу 1881 года политический розыск смог доложить о ряде успешных операций.

Были арестованы члены Исполнительного комитета тайной организации Александр Михайлов, Андрей Пресняков, Александр Баранников, Арон Зунделевич, Николай Морозов. Дали откровенные показания два активных террориста: Григорий Гольденберг и Иван Окладский. Последний через пару месяцев после ареста стал постоянным тайным агентом и оставался им до самого 1917 года.

27 февраля 1881 года в меблированных комнатах на Невском проспекте полиция задержала Михаила Григони и Андрея Желябова.

Утром 1 марта 1881 года петербургский градоначальник генерал Федоров, собрав полицмейстеров и участковых приставов, объявил им, что для окончания борьбы с крамолой остается задержать еще двух-трех человек. Но в 13 часов того же дня на набережной Екатерининского канала бомбой Игнатия Гриневицкого был смертельно ранен Александр II.

Александр III некоторое время не предпринимал глобальных изменений в политике Российской империи. Что же касается полиции, то 3 декабря 1882 года в Гатчине Александр III утверждает Положение «Об устройстве секретной полиции в империи» [13].



Таким образом, с утверждением этого Положения в Российской империи начинается осуществляться целенаправленная работа по налаживанию осведомительной сети в революционных кругах и применению иных средств оперативно-разыскных методов и средств борьбы с политической преступностью.

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### ***The dynamics of the relationship of the principles of "pleasure" and "reality" in the personal development of the subject***

**Abstract:** The article presents psihodinamichessky aspect of the functioning of the principles of "fun" and "reality". In the publication discusses the features of their relations in the personal development of the subject.

**Keywords:** principles of "pleasure" and "reality", personality, dynamic principles, psychology, structure of the psyche, preconscious.

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### ***Динамика взаимосвязей принципов «удовольствия» и «реальности» в процессе личностного развития субъекта***

**Аннотация:** В статье представлен психодинамический аспект функционирования принципов «удовольствия» и «реальности». В публикации рассматриваются особенности их взаимосвязей в процессе личностного развития субъекта.

**Ключевые слова:** принципы «удовольствия» и «реальности», личность, динамика психики, психология, структура психики, предсознательное.

Реалии современного мира ставят перед психологической наукой задачи исследовательского направления касательно эффективности адаптации, оптимизации саморазвития, а также профессионального роста личности. Академик В.Я. Вернадский утверждает что «живое вещество есть пластичным, изменя-

ется, приспосабливаться к изменениям среды, но имеет и свой процесс эволюции, проявляющийся в изменении с ходом геологического времени вне зависимости от среды» [10]. В качестве главенствующих глубинных детерминант эволюции психики человека в статье представлены принципы «удовольствия» и «реальности». Динамика взаимосвязей последних в процессе личностного развития субъекта и раскрыты в данной статье.

В контексте рассматриваемой темы остановимся на понятии «развитие». Ф. Гегель описывает развитие как «форму движения от простого к сложному на основании разрешения противоречий» соответственно диалектической природе развития в качестве перехода количественных изменений в качественные и обратно. С точки зрения В.Г. Асеева, понятие развитие личности рассматривается как «процесс с постепенным расширением интеллектуальных, волевых, моральных возможностей саморегулирования поведения и соответственно постепенного увеличения ответственности личности за собственные поступки, потребности, цели, идеалы и мотивационную направленность, качества» [2; с.135].

Философия и социология понятие «личность» определяет через призму системы социально значимых черт, которые характеризуют индивида, в качестве продукта общественного развития и включения в систему общественных отношений путем деятельности и общения.

В работах Е. Фрома, Б.Г. Ананьева понимание понятия «личность» рассматривается не просто социальным продуктом, но и объектом и субъектом исторического процесса.

А.Н. Леонтьев определяет «личность как психологическое образование, регулятивную систему, которая констатируется функциями выделения себя с окружающего мира, презентацией, структурированием собственных отношений с действительностью и подчинение собственной жизнедеятельности стойкости структуры этих отношений в противовес быстротечным импульсам и внешним стимулам, где личностная регуляция жизнедеятельности субъекта проявляется в части управления его активностью, особенностях осмысления им действительности и построения на этом основании индивидуальной картины мира [6; с.18]. Процесс развития личности имеет определенные психологические условия: овладение собственным поведением, формирование системы внутренней регуляции деятельности, способной обеспечить постановку, преследование и реализация субъектом целей, которые соответствуют не только актуальным,

быстротечным потребностям, но и перспективной направленностью жизни субъекта, а также интересам сохранения и развития социального целого, автономной частью которого есть субъект [ 6; с.16 ].

Таким образом, остановимся на значимости психических процессов в становлении личности, которые презентуют принцип «реальности» и раскрывают личность в качестве «высшего уровня интеграции системы психических процессов» (Л.М. Веккер). Известно, что в становлении личности естественное (природное, биологическое) и социальное есть обуславливающими факторами, с которых субъект берет новую информацию, способную влиять на психику с одной стороны, посредством интроекции, переходить в личностное значение, а с другой - противостоять естественности субъекта [11; с.156].

В процессе развития ребенок долго пребывает в системе стойких непосредственных связей с взрослым и главное – много из общей жизни в этом симбиозе направлено на обновление перерванных связей или на рождение новых обеспечивая новую форму единения. Параллельно с этим процессом идет процесс дистанцирования и идентификации (в процессе дистанцирования отношения трансформируются в общение, что есть фундаментальным основанием становления индивидуальности, процесс отождествления – обновление и формирование связей что присовокупляют к общечеловеческим формам культуры). Единство и противоречие обозначенных процессов есть постоянным противоречием человеческого бытия, что задает и направляет ход становления и развития человеческой субъективности [11].

Сначала инстинктивно, а потом посредством получения информации и способности к общению субъект учиться реагировать, получать информацию о путях и способах достижения целей реализации желаемого, но и в общении формировать личностный способ их реализации. Схематически (по П.В. Симонову) этот процесс выглядит следующим образом: потребность познания – информация – удовлетворение потребностей.

Удовлетворение потребности зависит не только от величины потребности, но и от вероятности ее реализации что усложняет конкуренцию соответствующих мотивов. В результате этого поведение переориентируется на легко достижимую цель. Постоянная угроза такого переориентирования сформировал специальный и мозговой аппарат – «рефлекс воли» (по И.П. Пав-

лову – это «потребность преодоления препятствий, что встретились на пути реализации») [10; с.83].

Стимулы, которые приходят из внешнего окружения становятся значимыми в зависимости от того насколько они касаются потребностей субъекта. Через эмоциональные проявления делаем вывод о значимости для субъекта ситуации или другого человека.

В концепции детерминизма С.Л. Рубинштейна внешние причины действуют через внутренние условия, раскрыты пути психического развития личности [9; с.243]. Внешняя обусловленность такого развития закономерно сочетается с его «спонтанностью». «Все в личности, что формируется внешне обусловлено, но ничто в ее развитии непосредственно не выводится из внешних влияний», при этом ученый делает вывод о том что «законы внешне обусловленного развития личности – это внутренние законы » [9; с.251].

Таким образом, в контексте сказанного, привлекают внимание особенности функциональных, структурных и энергетических аспектов психики что изначально в качестве базовой основы формируются под влиянием социологизирующих акцентов воспитания в семье, которые взрослеющая личность способна изменять в зависимости от актуальности собственных потребностей и их соотношения с действительностью.

Таким образом, личность представляется нам продуктом динамического взаимодействия между врожденными потребностями и социокультурным влияниями.

Способность удовлетворить потребность в каждом субъекте имеет как социологизирующий эффект, диктуемый принципом «реальности» так и личностную возможность, обусловленную принципом «удовольствия».

Психоаналитическая интерпретация принципа «удовольствия» рассматривает его с позиции стремления психики получить удовольствие независимо от ситуации, желания другого человека. Данный принцип в психоанализе обусловлен реализацией влечений, как «источника внутреннего напряжения и признака нарушения гомеостазиса» [13; с.340]. Другая их сторона в процессе реализации желаний, которым свойственна врожденность доминирования, нейтрализует в психике субъекта инстинктивное напряжение [15]. Противоречивость выше сказанного обуславливается не только влечениями мортидо и либидо, но и фиксированными в психике ограничениями социализации, начиная

с формирования Эдипальной зависимости от родителей. Именно родительское влияние имеет двойственный эффект на психику растущего субъекта: с одной стороны адаптировать к реальности, научить нормам, ценностям, а с другой ограничить принцип «удовольствия» редуцируя индивидуальность и спонтанность проявления личности, блокируя либидную энергию творчества и самореализации.

Особую роль здесь играет значимость первичных либидных объектов сила значимости, которых способна направить либидо ребенка к отказу от реализации собственных желаний ради любви родителей.

Ортодоксальное видение взаимодействий принципа «удовольствия» и «реальности» в психоанализе обращает внимание на противоречивость их взаимодействия. Объяснение последнего психоанализом видится в разнонаправленности векторов деятельности психических оснований обозначенных принципов (бессознательного – принцип «удовольствия», сознательного – принцип «реальности»). Динамика изменений данных принципов в том что принцип «удовольствия» господствует свободно на ранних этапах развития субъекта, а во взрослом возрасте доминирует принцип «реальности», который направляет поиск реализации желаемого, опосредствованно, с учетом условий, пользы и надежности удовольствия с помощью психических процессов помогающих прогнозировать, дифференцировать и учесть требования объективной реальности [7; с.127].

Социализация происходит под главенством принципа реальности, переводя свободную энергию в связанную. При этом эмотивные компоненты принципа удовольствия остаются ведущими, правда, на латентном, скрытом уровне.

В наше исследовательское поле попадает предсознание, которое путем вытеснений получило социальный опыт вытесненных желаний. Многолетние исследования в практической психологии открыли понимание того что в предсознательном находятся энергетические очаги, спрятанные под фиксациями и блоками сопротивлений. Предсознательное формируется в синтезе просоциального знания полученного путем неудачных попыток выхода и реализации энергии принципа удовольствия находящихся в структуре Ид. Таким образом, инстанция психики Его «отсекается» от предсознательного где остается представленным Супер - Его и Ид. Именно Ид имеет доступ к

предсознательному через вербальную осведомленность и энергетическое «спонсирование» последнего. Противоестественно было бы, если б Ид смирилось с любой ущемленностью своих импульсов. Угнетение или ограничение Ид собирает в себе поток энергии, которые стремятся проявиться, не смотря на сдерживание. В процессе социализации принцип удовольствия «причесывается» принципом «реальности». Важно такую подчиненность воспитывать у подрастающего поколения иначе оно будет постоянно пребывать в ожидании того что другой человек должен подчиняться его желаниям, как оно само подчиняется им. У психики нет нерешенных проблем. Поэтому если эта проблема не решается конструктивно, найдется выход ее решить деструктивно. Тогда человек пребывает в плену у парадоксального удовольствия саморазрушения, самобичевания, удовольствия от изживания чувства вины. Универсальным механизмом динамики принципов «удовольствия» и «реальности» есть способность психики находить баланс через парадоксальные удовольствия. Возникновение неврозов в ортодоксальном психоанализе связано с тем что социализация развивает отходы от реальности через ограничения, табу и формирует формы неестественного удовольствия (иллюзии, мазохизм и садизм).

Отображение действительности включает внешнюю обусловленность поведения средой и внутреннюю обусловленность его специфическим переосмыслением. Именно эта внутренняя смысловая деятельность и составляет психологическую специфику человека. В психологическом плане жизнь человека – это сфера его реальных взаимоотношений с действительностью [2].

К. Левин делает акцент на том, что незавершенное намерение (действие, желание) потенциально сохраняет потребность и создает остаточный эффект в качестве поля напряжения. Таким образом, энергия не исчезает, вытесняясь, сохраняется в бессознательном создает доминантность (вектор) направленности психики. Удовлетворение влечений согласуется с принципом удовольствия и приводит к расслаблению, тогда как неудовлетворенность сохраняет энергетический потенциал побуждения к активности и тенденцию к повторению действий. В физиологическом ракурсе объяснение причин последнего феномена находим в работах А.П. Анохина в его «акцепторе действия»: следовые эффекты прожитого опыта формируют готовность к будущему действию через сопоставление прошлого и ситуации «здесь и теперь». Таким



образом, через удовольствие происходит снижение напряжения, а неудовольствие создает его повышение и, соответственно действие.

Пройдя опыт социализации через контакт с реальностью принцип «удовольствия» приобретает латентные формы функционирования. Принцип «реальности» с помощью психических процессов и формированием морали в сознании есть главным благодаря цели самореализации и адаптации к социуму. В бессознательном царит принцип «удовольствия», который и есть энергетической основой психики благодаря не только врожденной природе, но и вытесненной энергии нереализованных желаний. Выше сказанное есть причиной энергетического противоречия и конкуренции в сознательном и бессознательном, а обобщенно между «хочу» (принцип «удовольствия») и «нужно» (принцип «реальности»). «Функциональным аспектам психического свойственна направленность на равновесие между конкурирующими тенденциями даже ценой отступов от реальности» - акцентирует внимание академик Т. С. Яценко [16]. Эту миссию обеспечивают психические защиты через процесс субъективной интеграции психики. Их роль двусмысленна: с одной стороны они помогают в реализации инфантильных интересов субъекта, а с другой стороны обеспечивают достоинство социального идеализированного Я, поскольку это и есть путь реализации глубинных интересов бессознательного по критерию их адаптивности к социуму. Еще одной особенностью защитной системы есть то, что они энергетически нераздельно единятся с «драмами» детства, нерешенностью эдипального периода жизни субъекта и их методы и способы гармонизации Я в процессе социальных достижений направлены на выражение потребностей детства. Таким образом, по своей направленности они маскируют ориентировку на первичные либидные объекты эдипальной зависимости, которые отягощены социальной окраской инцеста и табу.

Таким образом, благодаря социализации принцип удовольствия приобретает окраску парадоксальности собственных проявлений. Приобретая опыт ограничений, проявления Ид маскируются в просоциальных мотивах и целях. Субъект учиться получать удовольствие от того что самостоятельно угнетает импульсы Ид чувствуя при этом силу, ощущение независимости, свободы безопасности и самодостаточности. Динамика принципов «удовольствия» и «реальности» проходит путь от простой сиюминутной реализации желаемого в детстве к способности саморегуляции, прогностичность, способности направ-



лять энергию в русло саморазвития и совершенствования переводя энергию с свободной в связанную посредством психических процессов субъекта.

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### ***The antireligious policy of the Soviet power in Ukraine during the Khrushchev "Thaw" (1953 – 1964)***

**Abstract:** The scientific study of dedicated antireligious struggle the Soviet power in Ukraine during Khrushchev's "Thaw" 1953 – 1964's. In article discusses different forms, means and methods of anti-church policy of the government in the country.

**Keywords:** thaw, atheistic propaganda, antireligious policy, the Soviet authorities.

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### ***Антирелігійна політика радянської влади в Україні в період Хрущовської «Відлиги» (1953 – 1964 рр.)***

**Анотація:** Наукова розвідка присвячена антирелігійній боротьбі радянської влади в Україні в період хрущовської «відлиги» 1953 – 1964 рр. У статті розглядаються різні форми, засоби і методи антицерковної політики влади в республіці.

**Ключові слова:** відлига, атеїстична пропаганда, антирелігійна політика, радянська влада.

Серед багатьох тем радянського періоду, що викликають науковий інтерес, вирізняється проблема боротьби радянської влади з релігією та церквою в добу «хрущовської відлиги» (1953 – 1964 рр.). Цікавість зазначеної наукової розвідки полягає в неоднозначності та суперечливості цієї епохи, а також далекосяжності наслідків тогочасної антирелігійної політики.

Значний внесок у дослідження цієї проблеми зробили такі науковці, як О. Бажан, В. Баран, В. Войналович, Ю. Данилюк, В. Єленський В. Пащенко та інші. Авторами докладно проаналізовано ідеологічні, політичні та правові засади державної антирелігійної політики, чинники, що її визначали та особливості втілення в життя [1; 2; 3; 4].

Масштабний наступ М.С. Хрущова на церкву, що протягом багатьох віків виконувала роль домінуючого інституту суспільства, супроводжувався грубим порушенням прав і свобод українських громадян пануючою комуністичною партією. Жорстокі за змістом та трагічні за наслідками атеїстичні експерименти, що мали на меті закріпити монопольне положення комуністичної світоглядної системи, упроваджувалися за допомогою найрізноманітніших методів і засобів боротьби.

Серед основних форм і методів антирелігійної боротьби слід назвати такі:

- існування спеціалізованого апарату, що займався розробкою законодавчої бази в сфері релігії, моніторингом та контролем релігійних процесів в республіці;
- широке залучення до антирелігійної діяльності громадськості та засобів масової інформації, науково-природнича пропаганда та атеїстичне виховання методами ідеологічного впливу;
- економічний тиск на монастирі, церкви та релігійні громади;
- політика ліквідації культових установ та пам'яток культового призначення;
- боротьба з паломництвом і релігійними «святинями»;
- зняття з реєстрації релігійних громад та переслідування прибічників церкви;
- послаблення інституту служителів культу та гальмування системи церковної освіти;

- витіснення релігійних традицій і впровадження нових обрядів;
- обмеження та порушення громадянських прав віруючих, усілякі утиски церковного управління та відверті репресивні заходи у відношенні церковно-служителів і віруючих.

Основною структурою, яка опікувалася питаннями релігії і реалізовувала політику влади та партії у цій сфері, був апарат уповноваженого Ради в справах Руської православної церкви (РСРПЦ) при Раді Міністрів СРСР в Україні та його представники в областях, під контролем яких перебували всі православні інституції республіки. Для спостереження за іншими релігійними конфесіями й церквами функціонувала Рада у справах релігійних культів (РСРК). Серед основних завдань, що мали вирішувати РСРПЦ та РСРК, були: здійснення посередницьких функцій між державою та церковними інституціями й віруючими; вивчення стану й тенденцій у релігійному житті; проведення аналітичної роботи та інформування партійних і радянських органів; атеїстична пропаганда. Завдяки діяльності цих структур радянська влада реалізовувала свою антирелігійну кампанію, що часто виходила за межі законності.

Протягом 1953 – 1958 рр. перевага надавалася поміркованим методам боротьби з релігією переважно силами ідеологічного впливу, яким держава намагалася охопити всі групи й верстви населення, як за віком, так і за соціальним статусом. За мету ставилося з наукової точки зору критикувати релігію та діяльність її служителів, довести шкідливість релігійних традицій і сформувати негативний образ віруючого. Активну участь у цьому процесі брали преса, телебачення, радіо, культурно-освітні заклади (бібліотеки, музеї, клуби) тощо. Удосконалювалися й поширювалися такі масові форми роботи з людьми, як лекції, тематичні вечори запитань і відповідей, усні журнали, голосні читання, клуби атеїста, трансляція радіопередач, показ кінофільмів, поширення літератури атеїстичного та антицерковного характеру та ін. У сукупності все це конструювало «образ ворога» й «правопорушника» в особі священнослужителів та церкви.

Із 1958 року в умовах згортання процесів деєталінізації й утвердження політичного та ідеологічного волюнтаризму, керівництво перейшло до більш рішучих антирелігійних заходів. Урядові постанови 1958 – 1959 рр. скасовували переважну більшість державних «пільг», які були надані монастирям у повоєнні роки, підривали економічний стан і матеріальну базу релігійних інституцій,

ставили їх на межу виживання. Але найрадикальнішим заходом було скорочення самої кількості існуючих в Україні монастирів і скитів, із якими були пов'язані багатовікові духовні й культурні традиції українського народу. Протягом 1959 – 1962 рр. у республіці було ліквідовано 31 монастир із 40 існуючих. Свою діяльність у цей час припинили Києво-Печерська лавра, чоловічий скит Почаївської лаври на Тернопільщині, Глинська Пустинь у Сумській області та ін. [5, арк. 5, 37]. Паралельно знищували культові місця, каплиці, ліквідовували криниці та святі джерела, руйнували унікальні пам'ятки історії та культури. Так, не інакше як акт вандалізму слід розглядати руйнацію колодязів Антонія і Феодосія на території Києво-Печерської лаври, що були повністю засипані.

Активно практикувалася політика вилучення церковних пам'яток, які на думку партійних і державних органів відігравали важливу роль у збереженні та популяризації релігійної традиції й культури. Згідно проведених реєстрації та паспортизації пам'яток культури та архітектури протягом 1961 – 1963 рр. на території УРСР список цих пам'яток був необґрунтовано скорочений на 740 об'єктів, причому переважно культового походження, серед яких було багато унікальних, цінних у художньому та історичному аспектах пам'яток. Так, новий реєстр не включав такі культові споруди, як костюл в с. Зіньків Хмельницької області (1450 р.), монастир Бригідок у Луцьку (1624 р.), Миколаївська церква в смт Локачі на Волині (1609 р.) та ін. [3, с.120]. У багатьох випадках території таких пам'яток розорювалися, засаджувалися агрокультурами або загромождалися випадковими господарськими забудовами, що призводило до їх руйнації та зникнення. Наприклад, у Києві на місці таких споруд, як Трьохсвятительська церква XIII ст., церква Пирогощі XII ст., що уособлювали історію й культуру українського народу, були розбиті малесенькі міські сквери.

Антирелігійна кампанія 1950 – 1960-х рр. також призвела до зменшення загальної кількості православних громад у республіці майже на 4 тис. (приблизно вдвічі). Особливо гострого спрямування набрала боротьба з іншими конфесіями, які були занесені в розряд сект (п'ятидесятники, адвентисти-реформісти, чисті баптисти, євангельські християни, Свідки Єгови, суботствуючі п'ятидесятники).

Невід'ємною складовою антирелігійної боротьби стало скорочення інституту служителів культу, що здійснювалося декількома шляхами: зняття їх з

реєстрації через «порушення» законодавства про культи; застосування щодо них адміністративного тиску; протидія вступним кампаніям у духовних навчальних закладах та різке скорочення планів набору, а також закриття самих духовних семінарій. У результаті скорочення мережі духовних навчальних закладів станом на 1960 р. в Україні діяла єдина православна семінарія в Одесі. Протягом 1960 – 1964 рр. число священиків зменшилося на 1428 осіб. Це, у свою чергу, спричинило відчутний дефіцит кадрів духовенства та зменшило кількість богослужінь у церквах. Парафії, позбавлені можливості постійного обслуговування, зараховувалися в категорію «недіючих» і підлягали негайній ліквідації.

Протягом 1962 – 1964 рр. увага органів влади була зосереджена на боротьбі з релігійними обрядами й традиціями, що користувалися великою популярністю серед населення та охоплювали участю в них значну кількість громадян. Вирішити цю проблему намагалися через впровадження в радянське повсякденне життя нових, яскравих громадських обрядів, свят і ритуалів із комуністичним змістом для задоволення естетичних і емоційних потреб віруючих та всіх інших громадян [2, с.90]. Так, хрестини намагалися замінити звіздами; обряд вінчання – комсомольсько-молодіжним, срібним і золотим весіллями; поминальні дні – днями пам'яті померлих тощо.

Разом із впровадженням у побут радянських громадян нових обрядів реалізовувалися й інші методи щодо викорінення релігійних звичаїв. Відчутним ударом по церкві було введення владою влітку 1962 р. жорсткого контролю над здійсненням треб. Відтепер хрестини, вінчання чи поховання заборонялося здійснювати поза межами храмів, молитовних будинків, на квартирах і в будинках віруючих. Всі таїнства повинні були здійснюватися тільки через документування (належне оформлення фінансових документів, фіксація відповідних актів у спеціальних книгах із зазначенням прізвищ і паспортних даних учасників та ін.).

У результаті розгорнутої кампанії по витісненню релігійних свят і традицій офіційні кількісні показники хрещень і поховань дещо знизилися, особливих успіхів було досягнуто щодо скорочення чисельності вінчань. Разом з тим, значних масштабів набрало поширення неофіційного та навіть таємного здійснення релігійних обрядів, що унеможлиблює наведення реальних даних.

Отже, незважаючи на загальну лібералізацію радянської тоталітарної системи в 1953 – 1964 рр., антирелігійна боротьба не припинялася та мала цілеспрямований характер. Влада ніколи повністю не відмовлялася від узятості з самого початку курсу на повне викорінення релігії зі свідомості й побуту радянських громадян. Для досягнення цього вона застосовувала найрізноманітніші засоби, не цураючись ні насильства, ні лицемірства. Разом із тим, окреслена кампанія звелася до ліквідації матеріальних носіїв релігії та досягнення кількісних показників. Викорінити релігію зі свідомості й побуту населення повністю так і не вдалося.

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## ***Verbal Actualization of Communicative Tactics of Joy and Happiness in a Pragmatic Situation of Smile***

**Abstract:** This article is devoted to the study of the phenomenon of a Smile in the German language on a pragmatic level, using the methods of component analysis and interpretive analysis. Linguistic expressions of a smile are identified, with the help of which the communicative tactics of joy and happiness are described. Smiling as the communicative tactics is aimed at emotional impact in pragmatic situations.

**Keywords:** the phenomenon of smile, linguistics, pragmatics, pragmatic situation, interpersonal interaction, communicative tactics, the language units, concept.

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## ***Вербализация коммуникативных тактик радости и счастья в прагматической ситуации улыбки***

**Аннотация:** Статья посвящена лингвистическому описанию феномена улыбки в немецком языке на прагматическом уровне с использованием методов компонентного анализа и интерпретативного анализа. Выявлены языковые средства выражения улыбки, с помощью которых приводится описание коммуникативных тактик, в частности тактик выражения радости, счастья и одобрения, реализуемые улыбкой с целью эмоционального воздействия, изменения психологического состояния, эмоционального фона у слушающего в прагматических ситуациях улыбки.



**Ключевые слова:** феномен улыбки, семантика, прагматика, языковые средства, прагматическая ситуация, межличностное взаимодействие, коммуникативная тактика, концепт.

В статье лингвистическому анализу подвергается уникальный и многогранный феномен улыбки, который вследствие своей сложности и полифункциональности является предметом анализа в нескольких областях научного познания: в рамках психофизиологии [Horstmann, 1937; Izard, 1977; Экман, 2000; Нэпп, 2006; Bischof, 2009 и др.], социологии, лингвокультурологии [Bänninger-Huber, 1996; Трамбл, 2007; Токарева, 2007; Bernstein, 2008 и др.], что не включает всестороннего описания его онтологии как семиотического (семантического и прагматического) знака. Целью статьи является лингвистическое описание феномена улыбки в прагмакоммуникативной ситуации. Выбор объекта исследования объясняется значительным варьированием в понимании и идентификации концептуального многообразия самой улыбки вследствие ее культурно-специфического характера в ценностной картине мира носителей немецкого языка и прагматического потенциала в межличностном взаимодействии.

Использование прагматического жеста улыбки в межличностной интеракции позволяет выявить глубинный, пропозициональный уровень высказываний, и характер их поверхностной структуры, так как теоретические положения коммуникативной интеракции коррелируют с основными вопросами семантики и прагматики языкового общения, теории коммуникации; и в современной лингвистике находят связь, прежде всего, в «изучении, хранении и передаче информации разными путями: явно и неявно, имплицитно и эксплицитно, вербально и невербально, дискурсивно и недискурсивно, прямо и косвенно, по сходству и по смежности» [1].

Исследование феномена улыбки способствует познанию специфики межличностной коммуникативной интеракции в различных прагматических ситуациях, обусловленных присущей говорящему субъективностью интерпретации окружающей действительности.

В любой коммуникативной ситуации вербальным и (или) невербальным способом реализуется определенная прагматическая цель (личная интенция

говорящего, обусловленная его внутренним состоянием, его отношением к партнеру по коммуникации, к действительности, к высказыванию), успешное достижение которой требует корректного выбора и оценки основных коммуникативных стратегий и тактик. В широком понимании стратегия есть «план, коммуникативный ход, совокупность речевых действий, направленных на решение коммуникативной задачи говорящего», а речевая тактика есть «одно или несколько речевых действий, способствующих реализации определенной стратегии» [2].

Основу прагматической ситуации улыбки составляет стратегия эмоционального воздействия. Если под коммуникативным воздействием понимается спланированное воздействие на знания (когнитивный уровень), отношения (аффективный уровень) и намерения (конативный уровень) адресата в нужном для адресанта направлении [3], то эмоциональное воздействие уточняет конкретный характер и способ воздействия на сознание через эмоциональную сферу с помощью вербальных и (или) невербальных средств. Цель эмоционального воздействия заключается в стремлении говорящего изменить психологическое состояние, эмоциональный фон у слушающего, либо вызвать у него определенные чувства при помощи коммуникативных тактик, направленных на формирование определенного эмоционального настроения у слушающего.

Реализацию стратегии эмоционального воздействия можно наблюдать в прагматической ситуации улыбки в следующих символических импликациях:

- Wenn ich lächele, dann bin ich wirklich froh / (dich zu grüßen, zu treffen, zu sehen) → выражение радости, счастья;

- Wenn ich lächele, dann bin ich mit dir einverstanden → выражение согласия, одобрения.

Представленные символические импликации указывают на то, что акциональная символизация улыбки, подобно вербальным знакам, обладает полисемией. Точный смысл символа можно распознать через комплексный анализ прагматической ситуации улыбки (анализ стратегии, вербальных и невербальных тактик, речевых актов, языковых единиц и др.), что способствует выявлению определенной прагматической направленности ситуации.

Коммуникативные тактики радости, счастья связаны с понятием дистанции между коммуникантами, что представляет собой «континуум, включающий

разные по степени близости отношения (симпатию, любовь, равнодушие, враждебность)» [2]. Подобная апелляция к чувствам адресата достигается за счет выражения оценки (положительной/отрицательной, эмоциональной/рациональной) и актуализации разных в определении функционального значения улыбки в коммуникации когнитивных признаков концепта LÄCHELN [4].

Коммуникативные тактики, способствующие реализации стратегии эмоционального воздействия в прагматической ситуации улыбки, в свою очередь, могут эффективно осуществляться при помощи средств естественного языка (вербальных тактик) и иных семиотических систем и кодов (невербальных тактик) [3]. Каждый участник коммуникации, руководствуясь определенной прагматической целью, во избежание возможных коммуникативных неудач, выбирает и использует наиболее успешные, оптимально адекватные языковые средства, реализуемые говорящим в ходе речевого акта в тесной взаимосвязи с невербальными актами (эффективное использование просодики, мимики, жестов).

Эмоционально-экспрессивная тактика выражения радости, счастья (сюда же можно отнести выражение симпатии, влюбленности) в прагматической ситуации улыбки наблюдается в построении межличностных отношений как базирующихся на эмоциональной оценке и осуществляется через манифестацию позитивно-оценочных когнитивных признаков концепта LÄCHELN: Zuneigung, Liebe, Freundschaft, Zärtlichkeit, Vergnügen, Glück, gute Stimmung, Lebenslust, innere Freude, leise Heiterkeit [4]. Л.Я. Гозман считает, что в межличностных отношениях мы обращаемся одновременно к двум классам явлений. Во-первых, это собственно межличностные отношения; а во-вторых, оценка субъектом этих взаимодействий и контактов и, главное, участвующих в них партнеров. Такая оценка носит чаще всего ярко выраженный эмоциональный характер и ее называют эмоционально-оценочным компонентом межличностных отношений [5]. На экстралингвистическом уровне эмоционально-оценочный аспект межличностных отношений представляет собой мнение субъекта о ценности некоторого объекта, которое проявляется как его ощущение, чувство, эмоция.

Рассмотрим прагматическую ситуацию улыбки, в которой описывается коммуникативная тактика радости, реализуемая на разных уровнях коммуникации: вербальными и невербальными средствами.

«Pat», sagte ich, als sie fort war, und nahm sie fest in die Arme, «es ist wunderbar, nach Hause zu kommen und dich hier zu finden. <...> Wenn ich das letzte Stück der Treppe emporsteige und die Tür aufschließe, habe ich stets Herzklopfen, dass es nicht wahr sein konnte».

*Sie blickte mich lächelnd an. Sie antwortete fast nie, wenn ich ihr so etwas sagte. <...> Sie bekam nur strahlende, glückliche Augen, und damit sagte sie mehr als mit noch so vielen Worten [6].*

В описываемой прагматической ситуации улыбка реализует тактику выражения счастья, радости, что в составе с языковыми тактиками (выражение экспрессива) в целом репрезентирует эмоционально воздействующую стратегию. Говорящий посредством речевого акта экспрессива (*es ist wunderbar, nach Hause zu kommen und dich hier zu finden. Wenn ich das letzte Stück der Treppe emporsteige und die Tür aufschließe, habe ich stets Herzklopfen, dass es nicht wahr sein konnte*), в котором использует тактику восхищения и экспликации своего внутреннего эмоционального состояния радости, счастья, воздействует на эмоциональное состояние слушающего. Референтная ситуация радости имеет языковую актуализацию в речи говорящего: *'es ist wunderbar; ich habe stets Herzklopfen'*. Данный акт экспрессива относится к группе косвенных речевых актов, т.к. косвенно осуществляет иллокутивную цель декларатива. Говорящий заявляет о том, какую важную роль играет адресат в его жизни: *'es ist wunderbar, nach Hause zu kommen und dich hier zu finden. <...> Wenn ich das letzte Stück der Treppe emporsteige und die Tür aufschließe, habe ich stets Herzklopfen, dass es nicht wahr sein konnte'*.

Улыбка слушающего как ответная реакция, определена пропозицией <X lächelt>, выраженной, во-первых, через прямую актуализацию концепта LÄCHELN, объективированного посредством лексемы *lächelnd* в предложении: *Sie blickte mich lächelnd an*; во-вторых, посредством модальной оценки в субстантивной группе с эмоционально окрашенными прилагательными *strahlende, glückliche Augen*, и в предикативной группе *damit sagte sie mehr als mit noch so vielen Worten*, акцентируя при этом значимость невербального поведения в

создавшейся прагматической ситуации. Перлокутивный эффект на адресата речи, реализованный улыбкой в тактике выражения счастья, состоит в благоприятном изменении эмоционального фона адресата, что укрепляет установившиеся отношения между партнерами. Модально-оценочное значение улыбки в данной ситуации маркировано знаком «+» и, соответственно, усиливает признак «хорошо» в совершаемом невербальном экспрессивном акте, что определяет положительный характер эмоций, чувств, состояния – радости, счастья, влюбленности, тем самым, оказывая эмоционально положительное воздействие на говорящего.

В следующем примере эмоционально-настраивающая тактика улыбки тоже связана близкими отношениями любви, доверия между партнерами, что представлено манифестацией когнитивных признаков концепта LÄCHELN – Liebe, Zärtlichkeit, Glück, gute Stimmung, innere Freude. Позитивно-оценочная составляющая улыбки как семантический элемент включается как одна из тактик, имеющая стратегическую цель воздействия. Проанализируем пример:

Frau Herma aber ging leisen Schrittes und befreiten Herzens auf Konrad, ihren Gatten zu, der, von den Rauchwolken seiner Zigarre schier traumhaft umhüllt, in einer halbdunklen Zimmerecke sinnend saß. Wie hatte er sich, gebefroh, auf diesen Weihnachtsabend gefreut – den ersten ohne Gegenwartssorgen und ohne Bangen für die Zukunft! Und jetzt? Jetzt war ein Missklang in den Festjubiläum gekommen, hatte ein kühler Hauch den Glanz des Abends getrübt. Ein Missklang? Fragte er sich selbst und in seinem Herzen regte es sich warm und weich; abwehrend aber stellten sich trotzig Gedanken davor. Da kam Frau Herma und *lächelte ihn an*. Wie leichtes Gewölk im Sonnenbrande verschwanden nun jene glückfeindlichen Gedanken und sein Herz tat sich auf – *weit und froh und tief*. Aber er verhielt sich still, sah nur *das sonnige Lächeln*, das er so sehr kannte. Hatte es ihm doch früher so oft die Kraft gegeben, alles von sich abzuschütteln und rüstig weiterzuschreiten – *trotzmutig der ungewissen Zukunft entgegen* [7].

В примере описывается, как улыбка жены, объективирующая искреннее состояние внутреннего счастья, радости (что актуализировано оценочными предикатами *leicht, froh, tief, still, sonnig*) на протяжении многих лет подбадривала ее супруга Конрада, придавала ему душевные и физические силы, веру в себя (... *das sonnige Lächeln, das er so sehr kannte. Hatte es ihm doch früher so oft*

*die Kraft gegeben, alles von sich abzuschütteln und rüstig weiterzuschreiten – trotzmutig der ungewissen Zukunft entgegen*). Поэтому за всей этой ситуацией стоит символическая импликация – Wenn ich lächele, dann glaube ich an dich, что стратегически предполагает эмоциональное воздействие на адресата. В целях эмоционального воздействия используются эмоционально-настраивающие тактики восхищения, веры, подбадривания, которые на невербальном уровне имеют единую реализацию в акте улыбки. В рассматриваемой ситуации улыбка является тактически более значимой и, поэтому полностью заменяет речевые тактики.

Языковая реализация улыбки представлена разными частями речи: глаголом – *anlächeln*, существительным – *das Lächeln*, местоимением – *es*. Важно отметить значение конкретной адресной направленности префиксального деривата *anlächeln*. Обращенная супругу (Конраду) улыбка (*lächelte ihn an*) освободила его от неприятных мыслей. В данной ситуации значение направления характеризует отношения с позиции ценностного значения: отражает эмоционально гармоничные, счастливые семейные отношения. Содержательный характер смысловой взаимосвязи существительного *das Lächeln* и прилагательного *sonnig* обнаруживает взаимозависимость смыслов. В рамках минимального и достаточного контекста (словосочетание – *das sonnige Lächeln*) содержательный характер улыбки уточняется, модифицируется сочетающимся с *das Lächeln* прилагательным *sonnig*, который, являясь признаковым словом, придает позитивную эмоционально-оценочную смысловую окраску определяемому существительному.

Представленные языковые репрезентанты концепта LÄCHELN в данной ситуации актуализируют когнитивные признаки: Liebe, Glück, Zärtlichkeit. Из этого следует, что понимание улыбки нельзя сузить до простого означивания физиологического явления, улыбка имеет неоднородное свойство, неоднородность которого в ментальных процессах находится в неразрывной связи с носителем улыбки (говорящего/воспринимающего) и речевой ситуации в определенный момент. Мы наблюдаем синкретизм концепта (смысла) репрезентируемого этой языковой единицей.

Прагматическая функция улыбки в сложившейся ситуации, как ожидаемый перлокутивный эффект, может быть обозначена как волюнтативная:

улыбка, эмоционально положительно воздействуя на адресата (супруга), побуждала его к действию.

Проанализированные примеры позволяют утверждать, что улыбка как тактика выражения радости, счастья, симпатии, влюбленности является актуальной и адекватной в реализации стратегии эмоционального воздействия, так как эффективная реализация прагматических интенций невозможна без применения определенных коммуникативных тактик и техник, составляющих линию поведения говорящего. Эмоционально-экспрессивная тактика выражения радости и счастья в прагматической ситуации улыбки свидетельствует о положительном эмоциональном состоянии человека, которое может передаваться на эмоциональном уровне другому человеку, т.е. оказывать эмоциональное воздействие. Языковое описание характера улыбки делает невербальную тактику радости значимо действенной и усиливает оказываемое на аудиторию эмоциональное воздействие.

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## ***Tuvans in Educational Institutions of the USSR: Peculiarities of their Training in the 1920s and 1930s***

**Abstract:** 1921 saw the founding of the Communist University of the Toilers of the East in Moscow for dissemination of the ideas of communism throughout the countries of Asia. The techniques of teaching in the university were unique. Above all, they made it possible to provide appropriate training for students with different educational level.

**Keywords:** communist university, technique of teaching, Asia, foreign students.

It is not easy to study. This statement was true in past millennia and it is true in our days. At present, it is hard to imagine how young Tuvans, who had no idea of city life-style and who had a bad command of Russian, managed to complete a full course of studies in educational institutions of the USSR in the 1920s and 1930s. But first, let me begin with a short introduction to the subject.

The foundation of the Tuvan People's Republic (TPR) in 1921 and consequent development of its public structures brought about need in skilled personnel. It is only a large network of educational institutions that could provide Tuva with qualified managers, teachers, doctors, servicemen and jurists. At the beginning, the TPR had no inner reserves to solve this task. The lack of necessary conditions for training local cadres in Tuva led to the fact that the majority of specialists necessary for the republic were trained abroad.

Two groups of Tuvans went to study outside Tuva in 1925: 10 people went to Moscow to be trained in the Communist University of the Workers of the East (CUWE) and 17 people went to Ulaanbaatar to be trained in Party School. Thus, there were two lines of personnel training.

It was natural to send Tuvans for training in Mongolia because Mongolia was much closer to Tuva in cultural and religious respect. A small stratum of literate Tuvans were able to use Mongolian and Tibetan script and very few people could



write in Russian. In spite of this fact, only 35 Tuvans were trained in Ulaanbaatar while the major part of specialists were trained in educational institutions of the Soviet Union.

Focus on the USSR was not coincidental. From the first day of its independence, Tuva was under the patronage of Soviet Russia and these two countries were connected with each other by many commercial, financial, cultural, and political ties. Therefore, the fact that many young Tuvans were sent to be trained in the USSR was a logical process. Of no small importance for Tuva was the fact that all training costs were covered by the USSR.

Tuvans were trained in different cities of the Soviet Union: Moscow, Leningrad, Kazan, Tambov, Voronezh, Novosibirsk, Irkutsk, Gorno-Altai, Ulan-Ude, Omsk, Chita, and other cities. The main centers of training were the CUWE (Moscow), the Mongolian Workers' Faculty in the town of Verkhneudinsk (now Ulan-Ude), and the Tuvan Specialized Agricultural School in the town of Oirot-Tura (now Gorno-Altai).

The training of Tuvans in educational institutions of the USSR was distinguished with some developments occurred because of dramatic transformations in inner (spiritual) and outer (material) spheres in the life of the Tuvan society. Spiritual sphere being deeply rooted in centuries-old culture of Tuvan people could not be transformed for such a short historical period. This led to a rupture between material life of the Tuvans and their inner spiritual world.

Tuvan people somehow got accustomed to a new level of material culture. However, it was much more difficult for the Tuvans to get accustomed to transformations occurred in their spiritual life. It was a challenge for Tuvan people to make a rapid transition from their traditional intuitive world cognition to scientifically rational world cognition, from their traditional values to Russian and through them to West-European values.

### **Insufficient educational level of Tuvan students**

The level of preparation of all Tuvan students did not satisfy the requirements of educational institutions of the USSR, which was the most difficult thing in training Tuvan students. The major part of Tuvan students were previously prepared for higher education in the illiteracy liquidation centers or learned themselves how to read and write (some of them were illiterate). Such an 'ill-assorted' composition of

students, impossibility to use Russian in the training Tuvan students from the beginning of studies made the training process complicated.

This problem was solved in various ways: Tuvan students were trained in separate Tuvan courses and groups; they were provided with interpreters, or Tuvan-speaking teachers got involved in the training process; special teaching methods were used. The CUWE opened a preparatory course for minority nationalities (Tuvans, Mongolians and others). The students were trained with special methods and teaching aids, which made it possible to begin teaching in Russian at the forth year of studies.

A teacher should be careful and at the same time exigent with his students and they will make better progress. A clear introduction of new material, everyday help and encouragement, constant revision of material and frequent oral and written tests were highly important things for each teacher who trained Tuvan students. Gradual and consistent increase of requirements helped Tuvan students to make good progress. It was necessary for teachers to supervise and guide every student being under teacher's charge but it does not always work. What's more, the available classroom equipment and visual aids were not often properly used in training process for improvement of academic progress.

Lopsanchap, a teacher of the Tuvan Specialized Agricultural School, said at the teachers' meeting in 1938: "The students come to our school from out-of-the-way corners of provinces and much work should be done with them. They are not able to learn all material without teacher's help or to cope with all school activities themselves". [1] Good results were achieved in educational institutions in which much time was spend for individual work with each student.

### **'Overgrown' students**

The difficulties also arose from the fact that Tuvan students were 'overgrown'. For example, the age of Tuvan students sent to be trained in Specialized Agricultural School ranged from 15 to 30. This adversely affected the work of 2nd Degree Boarding-School in the town of Oirot-Tura (Gorno-Altai) in Oirot Oblast. The principal complained that the Tuvans aged over 20 sent to be trained in the boarding-school disorganized life in the boarding-school because being overage juveniles they needed a different approach to deal with in comparison with younger students and it

was much more difficult to reeducate and teach them. In such cases, they tried to group students according to their age.

### **Different climate and food influence**

Many problems emerged because of different climate and food. Tuvans are 'endemics' of their own territory. This can be explained by the fact that geographically Tuva is firmly closed from neighboring regions by mountain ranges and deserts. In addition, there existed a special law of Ch'ing Empire (Tuva was under Ch'ing Empire up until 1911) according to which nobody in Tuva was allowed to leave their own nomadic camps without permission of top officials even if they wanted to visit their relatives [2]. The breach of this law could entail punishment up to death penalty. Not surprisingly, Tuvans were born and lived without leaving the boundaries of their native nomadic camps. After the liberation of Tuvans from Chinese rule (1911) and the foundation of the Tuvan People's Republic (1921), Tuvans had freedom of movement, but the Tuvan students who came in the USSR had to face the consequences of long isolation for the outer world. During an inspection in the Oirot-Tura Specialized Agricultural School in 1935, the inspector of the People's Commissariat of Agriculture noted: "[They] eat scarcely any vegetables, [they] accept only potatoes and carrots. The quality of food is absolutely insufficient. In addition, they ate exclusively meat, milk, and butter in their homeland (they have never eaten bread before they came to the [Soviet] Union). A sudden change in food (decrease of meat, milk, fats) and a considerably different climate adversely affected the level of health of the majority of students. In such conditions, a slightest pulmonary disease could progress and pass into an active tuberculosis" [3].

All educational institutions of the USSR had to face similar difficulties when training Tuvans. In October, 1935, the scientific conference held by sanitary sector of the CUWE presented the results of medical observation over the group of Mongolian and Tuvan students. The observation of Mongolian and Tuvan students made by Central Tuberculosis Institute showed that the number of tuberculosis cases among these students was very high. The primary medical check-up of the students of this group showed that 45-50 % of students were infected with tuberculosis according to Mantoux test and up to 80-90 % according to Pirquet test [4]. 4 out of 128 observed Tuvan students died of tuberculosis. In addition to tuberculosis, Tuvan students had many other diseases. For instance, the medical check-up of students of Mongolian

Workers' Faculty showed that there were only 8 healthy Tuvans out of 36. Medical commission found out the following diseases: gastric catarrh, heart disease, rheumatism, syphilis, tuberculosis, bronchitis, neurosis, etc [5]. A high disease incidence among students was explained not only by difference of climate and food but also by social background of students: the majority of them came from the 'masses of poor peasants and herders'.

Medical and prophylactic measures (preliminary medical selection of students in Tuva and vaccination) helped reduce disease incidence among Tuvan students considerably. In addition, increase of meat, mineral salts and vitamin supplements in students' food as well as established everyday norm of milk equaling no less than half a liter contributed much for the improvement of the situation.

### **Insufficient learning and living conditions**

In spite of all the efforts made the USSR Commissariat of People's Education to provide appropriate living conditions for international students, it was not possible to do it at once due to difficulties in economic development of the USSR. In the period of establishment of educational institutions, especially in the 1920s, learning and living conditions were insufficient: poor meals and accommodation facilities, insufficient material supply. All this arose indignation and aggression of students. For example, in 1933, the Tuvan students of Oirot Pedagogical Vocational School complained about their poor living conditions saying that "if the authorities fail to provide them with better meals and uniform, they will not stop their disorderly conduct and stealing" [7]. The only one way out of such situations was to increase funding of the institutions. For example, after the unrest in Oirot Soviet Party School in January 1935, "it was resolved to ask the regional authorities to increase funding of the Tuvan group" [8].

### **Transition to scientifically rational world cognition**

The most difficult thing for Tuvans was to make the transition from traditional intuitive world cognition to scientifically rational world cognition, the transition to Russian and West-European cultural values. The familiarization of Tuvans trained in the USSR educational institutions to modern scientific knowledge was very rapid and it was difficult for them to get accustomed to intellectual work. That is what Stepan Saryg-ool, well-known Tuvan author, wrote about that time: "... it was not easy for me to be a student. I was used to carrying heavy things, plowing, sowing, pasturing cattle,

cleaning up, and cooking food. But all of those things were completely different from what I had to do as a student. Learning how to write seemed to be the most difficult thing in the world for me. I sighed, my face and back was dripping sweat, my fingers grew numb under strain, bent my head this way and that – no other work made me be so tired” [9]. Here’s a prominent example from a lesson of political economy in specialized agricultural school. The example shows a practical way of thinking of a Tuvan student. When asked what number is one fourth of hundred “the student was puzzled, but when the same question was asked in a practical way: what is one fourth of hundred rubles? – the student immediately answered: 25 rubles” [10].

Shaizada Babich, a Bashkir enlightener, expressed well the state of a person being trained in a high school or even in a university without going through previous schooling stages: “Thousands of thoughts. My head is spinning. I don’t know what to do” [11]. A large number of Tuvan students were expelled from the educational institutions. At the beginning, more than a half of Tuvans sent to the USSR for training came back home without completing the full course of studies. Of the first 10 students of the CUWE, only 2 completed the full course in 1919. In 1936, 11 out of 44 Tuvan students (the first group of Tuvans who entered Mongolian Workers’ Faculty) graduated from this Faculty. According to recollections of A. Kh. Aldyn-Kherel who were trained in the Leningrad Teachers’ Training Institute named in honor of Gertsen, only 15 out of more than 40 Tuvan students graduated from the institute. Only the most gifted, ambitious, and persistent people managed to finish the educational institution.

### **Different cultural environment**

One more difficult thing the Tuvan students had to face was a different cultural environment and unusual city life-style among foreign people. Tuvans were considered representatives of a ‘culturally backward nation’. In spite of internationalist slogans, it was impossible to avoid domestic nationalism. Here’s what students of the CUWE told about this. Student Lakhvazhap said: “The USSR, and the CUWE in particular, treat Tuvans and Mongolians badly, think little of us, don’t respect us, ..., why do they not respect us but respect other foreigners in the USSR? If this goes on this way, it will come to a bad result” [12]. Student Udara said: “In the USSR, they offend Mongolians and Tuvans all the time, call them “chinks” and always look askance at them” [13]. Of course, to bridge this cultural gap in a short time was

impossible. When Tuvans came to the USSR, they brought with them their own worldview and their own long-accustomed order of life. Those Tuvans who were not able to study well or to overcome their home-sickness responded to all the requirements with animosity and aggression.

### **Difficult political situation**

All the above problems were aggravated with a difficult political situation. Students could be easily expelled from any educational institution because of their doubtful social origin or a wrong class approach. Tuvan students trained in the USSR had different opinions about political situation in Tuva. For example, in 1935, the students of Oirot Soviet Party School made some 'counter-revolutionary' statements in the course of discussion on the resolutions of the 3rd Plenary Session of the Tuvan People's Revolutionary Party about the party split. Student Suruma said: "Trotsky, however, was right saying that it is impossible to build socialism in a peasant country; all the more, it can be applied to Tuva. We do not know yet whether or not Tuva will choose socialist way of development", and the student Lagpa said: We think that there will have to be an overturn in Tuva in 1937, breaking with the USSR and passage to patronage of Japan" [14]. In this connection the Specialized Agricultural School provided students with the following lectures: 1) Colonial policy of Japanese militarism; 2) Trotsky as a vanguard of counter-revolutionary bourgeoisie; 3) Zinoviev anti-soviet group and its bastards; 4) Leninist theory of non-capitalist way of development.

The political situation in Tuva changed dramatically in 1938, when a part of Tuva leadership headed by Sat Churmit-Dazhi, the Chairman of the Council of Ministers of the TPR, were shot. His son, Lagbuzhap Churmit-Dazi who was student of Specialized Agricultural School, and some other students, 'members of counter-revolutionary group' (Tangyt-ool, Chimsi, Sokka), were shortly afterwards expelled from the school. He was imprisoned upon his return to Tuva and died in prison. [15] The tense political situation resulted from oppressions adversely affected Tuvan students trained in the USSR.

### **Conclusion**

To conclude, the training of Tuvan students in educational institutions of the USSR was characterized by the following developments:

- The educational level of Tuvan students did not correspond to the requirements of the institutions they were sent to;
- Tuvan students were 'overgrown' for training;
- Different climate and food;
- Insufficient learning and living conditions, especially in the period of formation of educational institutions;
- Problem connected with transition from traditional intuitive world cognition to scientifically rational world cognition, familiarization of Tuvans with Russian cultural values and via Russian values and through them to West-European values;
- Different cultural environment for Tuvan students, unusual city life-style among foreign people;
- Difficult political situation in the USSR and in the TPR connected with the fight within the Party and political oppressions.

In spite of considerable difficulties in the 1920s and 1930s, the TPR with the help of the Soviet Union managed to create their own national cadres and to make the first and important steps towards social and cultural progress.

The Tuvans sent to be trained in the USSR did not all managed to finish their studies. Nevertheless, thanks to the appearance of a stratum of educated people in Tuva, intelligentsia was mentioned for the first time in the ranks of 'toilers' along with herders and workers in the article 1 of the 1941 Constitution of the TPR [16].

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## ***The grammatical description of the Kazakh language in the works of Russian turkologists***

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## ***Грамматическое описание казахского языка в трудах русских тюркологов***

**Аннотация:** В настоящей статье рассматриваются грамматические труды о казахском языкознании, написанные во второй половине XIX Н.И. Ильминским, М.А. Терентьевым, П.М. Мелиоранским, В.В. Катаринским, и их вкладе в формирование морфологии казахского языка и ее развитии с практической точки зрения.

**Ключевые слова:** казахский язык, грамматика, русские тюркологи, вторая половина XIX века.

В последнее десятилетие возросла потребность в изучении трудов русских тюркологов, имеющих непосредственное отношение к формированию казахского языкознания, что позволяет по-новому осмыслить и оценить их работы с позиций сегодняшнего дня в соответствии с динамикой языковых и социально-культурных процессов. Между тем такое научное наследие требует полного анализа и раскрытия значения ключевых работ русских тюркологов, представивших грамматическое описание казахского языка. Так, специальному исследованию подверглись фонетика и синтаксис казахского языка как

отдельная область исследования в трудах В.В. Радлова и П.М. Мелиоранского. В настоящей статье рассматриваются грамматические труды о казахском языкознании, написанные во второй половине XIX Н.И. Ильминским [1], М.А. Терентьевым [2], П.М. Мелиоранским [3], В.В. Катаринским [4], и их вкладе в формирование морфологии казахского языка и ее развитии с практической точки зрения.

Если рассматривать богатое научное наследие этих ученых-тюркологов как с позиции того времени, так и с позиции современности, то представляется несомненным, что именно они, хоть и на русском языке, заложили основу казахского языкознания, и тем самым внесли большой вклад в развитие казахского языкознания.

Научные предпосылки и выводы русских исследователей можно охарактеризовать следующим образом. Так, материалы, представившие собой основные формы морфологии, были образованы с помощью слов, служившими средством общения во время устной беседы с представителями казахской национальности, что позволяет говорить об особой бережливости и внимательности ученых к языку. На наш взгляд, ценность трудов русских ученых заключается именно в этом. Если бы ученые, не выходя из своего кабинета, по своему систематизировали отдельные области казахского языкознания, это бы не представилось внушительным и естественным, так как природа языка требует внимательного отношения к нему. Очевидно, что использование подобного метода необходимо и современным исследователям.

Известно, что до конца XIX века сформировалось понятие об этимологии как одном из разделов грамматики, объектом исследования которого было изучение основных правил фонетики и морфологии. В трудах ученых-авторов морфология по обозначенному понятию представлена была как «этимология» и в нее были включены и фонетика, и морфология. Одним из противоречивых и спорных моментов явилось то, что при делении слов на части речи исследователи взяли за основу образец классификации слов в русском языке, это деление слов на две большие группы – склоняемые и спрягаемые, т.е. именные и глагольные.

Все изменяемые слова были разделены на имя и глагол, напротив, неизменяемые – на частицу. При этом частицу, по подобию русского языка, рассматривают как несклоняемое слово и включает в нее наречие, послелог, союз, междометие.

В своих трудах и Н.И. Ильминский, и М.А. Терентьев, и П.М. Мелиоранский, и В.В. Катаринский части речи классифицируют по-разному. Например, таким образом классифицировали части речи Н.И. Ильминский (имя существительное, имя прилагательное, имя числительное, местоимение, глагол), М.А. Терентьев (имя, имя прилагательное, местоимение, числительное, союз, послелог, наречие, междометие, глагол), П.М. Мелиоранский (имя, местоимение, глагол, имя числительное наречие, союз, послелог, частица), В.В. Катаринский (имя существительное и имя прилагательное, имя числительное, местоимение, глагол, наречие, послелог, союз, междометие), проанализировав согласно своим соображениям. То, что аффиксы подразделяются на «окончание», «послелог», «частицу» позволяет предполагать, что эти ученые, будучи представителями другой национальности, не могли глубоко постичь природу исследуемого языка.

Как выяснилось, изучение морфологии как области казахского языкознания в исследованиях ученых берет свое начало с трудов их предшественников, заложивших основу грамматики тюркских языков, а именно, это «Общая грамматика турецко-татарского языка» М.А. Казембека [5], и «Грамматика алтайского языка» [5], это позволяет говорить о том, что исследователи обращали особое внимание на внутренние закономерности казахского языка.

Учеными были охвачены все категории глагола, который имеет сложную структуру среди других частей речи. Залог, по определению Н.И. Ильминского – это «тюркская формация», М.А. Терентьев характеризует его как «вид», в то время как П.М. Мелиоранский и В.В. Катаринский обозначили эту категорию термином «залог» и в современном казахском языке выделяются все 4 вида залога: понудительный, страдательный, возвратный, взаимный.

Наблюдается, что в трудах исследователей в описании категории наклонения нет определенной последовательности. Например, автор «первой грамматики» Н.И. Ильминский выделяет изъявительное, условное и повелительное наклонение, в то время как М.А. Терентьев – только повелительное и условное наклонение, и это не обозначается термином «наклонение». Между тем П.М. Мелиоранский и В.В. Катаринский эту категорию называют термином «наклонение» и во-первых, выделяют условное и повелительное наклонение, во-вторых, не только обозначают 7 видов наклонения, но и анализируют способы их образования.

В.В. Катаринский выдвигал предположения о тесной связи категории времени с категорией наклонения, особенно о том, что изъявительное наклонение не имеет грамматические формы, свойственные ему, и учитывая, что показатели времени могут служить его окончанием, рассматривает изъявительное наклонение вместе с категорией времени. Мы присоединяемся к мнению о том, что по сравнению с категорией наклонения категория времени имеет весьма широкий диапазон значений. Все действия, которые происходят в окружающей нас действительности, обязательно рассматриваются в тесной связи со временем. Если не будет показано время определенного действия, то мы потеряли бы пространство времени.

Все ученые, труды которых являются объектом нашего исследования, 2 лицо единственного числа повелительного наклонения относили к основному корню глагола. Ученые, исследующие тюркские языки, не исключают, что и в языке Орхоно-Енисейских надписей и в фактах кыпчакских памятников XIV века все корневые формы глагола понимались как формы II лица повелительного наклонения. И в труде М.А. Казембека [5], и в «Грамматике алтайского языка» [5] представлено такое описание.

В современном казахском языке принято следующее определение: «простая форма единственного числа повелительного наклонения – не конечная форма глагола, а нулевая форма. Корень глагола – это форма его корня в первозданном виде, простая форма 2 лица повелительного наклонения – форма в парадигме, оба представляют собой омоформу. В первом выражено значение корня, т.е. лексическое значение, во втором – грамматическое значение, выражающее повелительное значение».

В ходе исследования мы выявили некоторые сходства выражения форм наклонений в труде В.В. Катаринского с исследованиями А. Байтурсынова – ученым, заложившем основу казахского языкознания [7].

Например, то, что у В.В. Катаринского называется «уступительным наклонением», А. Байтурсынов обозначает как «наклонение, выражающее встревоженное состояние», или «предупредительная» форма сослагательного наклонения – «наклонение, выражающее уверенность», кроме того, в труде А. Байтурсынова выделяется особая форма сослагательного наклонения «наклонение, выражающее состояние обиды и огорчения», которому может соответствовать «наклонение, выражающее состояние терпеливости», сомни-

тельное наклонение у Байтурсынова представлено как «наклонение, выражающее какое-то противоречие», форма сослагательного наклонения как «наклонение, выражающее некоторое предположение».

Кроме того, некоторые особенности наблюдаются и в спряжении 2 лица повелительного наклонения. Например, в современном языке показатели вежливой формы 2 лица единственного числа *-сыз*, *-сіз* у исследователей представлены в спряжении наклонений во 2 лице множественного числа.

По П.М. Мелиоранскому отсутствие специальных показателей 1 лица повелительного наклонения и 2 лица сослагательного наклонения можно считать отличительной особенностью.

Впервые о вспомогательных глаголах в казахском языке написал Н.И. Ильминский. Затрагивая вопрос о спряжениях глаголов, он пишет о том, что глаголы делятся простые и составные и образуются с помощью вспомогательных глаголов, сочетающихся с причастиями и деепричастиями. «Собственно вспомогательными должно назвать, глагол существ., который имеет только следующие формы: *ды*, *едім*, *екен*, *емен*, *емес* и *болуу*, который имеет все формы и времена» и подтверждает свои мысли анализом вспомогательных глаголов. При этом автор отмечает, что «сложные идеи в глаголе, выражаемая у нас придаваемыми к глаголу предлогами, киргизском (т.е. казахском) языке выражаются сопоставлением нескольких глаголов. При этом глаголы удерживают свое лексическое значение. Но есть несколько глаголов, которые подобных в случаях теряют вовсе или почти вовсе свое отдельное значение и получают вместо того особенное значение. Такие глаголы мы признаем также вспомогательными. К этой категории отнесем следующие глаголы: *туруу*, *жатуу*, *отыруу*, *жұрұу*, *калуу*, *алуу*, *тастау*, *кетуу*». Далее он останавливается на том, что некоторые глаголы сохраняют свое лексическое значение, в то время как другие – теряют его, приобретая при этом другое, особое значение. Именно такие глаголы ученый называет вспомогательными и описывает их значения.

В трудах Н.И. Ильминского, П.М. Мелиоранского, В.В. Катаринского вспомогательные глаголы определяются по признаку сохранения полного и неполного значения, в зависимости от чего их подразделяют на два основных вида. К вспомогательным глаголам, не имеющим самостоятельное значение, относят: *ды*, *едім*, *екен*, *емен*, *емес* и *болуу*. Напротив, к вспомогательным

глаголам, сохранившим неполное значение, относят: *туруу, жатуу, отыруу, жўрўу, қалуу, алуу, тастау, кетўу*.

П.М. Мелиоранский определил, что глагол «быть» образуется от двух корней – от глаголов *е, бол, е: едім, едің, еді, едік, едіңіз, екен, емес* и от формы *емей*, редко употребляющейся в речи. Это означает, что исследователи могли раскрыть значения вспомогательных глаголов в структуре составных глаголов. Таким образом, это дало почву для исследования потенциальных возможностей вспомогательного глагола последователями ученого. Такие ученые, как Н. Со-зонтов [8], Г.В. Архангельский [9], К. Жубанов [10], Н. Сауранбаев [11] и др., опираясь на классификацию вспомогательных глаголов, представленных в трудах русских исследователей, в дальнейшем развили эту теорию.

В трудах Н.И. Ильминского и В.В. Катаринского изъявительное наклонение рассматривается в тесной связи с категорией времени, при этом не только показывается отношение происходящих действий и поступков к реальной жизни, но и разговорная речь связывается с прошедшим, настоящим и будущим временем и передается с помощью них. Несмотря на то, что М.А. Терентьев выделяет все 3 вида времени, создает путаницу при разделении их на группы с определенным внутренним значением. П.М. Мелиоранский не останавливается специально на категории времени, но при классификации глаголов опирался на их значения. Как выяснилось, внутренняя классификация категории времени была различной и у казахских ученых, исследовавших эту категорию позднее.

Причастие и деепричастие как особые формы глагола также находились в поле зрения ученых. Они имеют свои особенности в отличие от причастий и деепричастий в современном казахском языке. Например, и Н.И. Ильминский, и В.В. Катаринский формы современного сослагательного наклонения *-ғы, -гі+м+кел* дают как формы причастия: *жазғым келеді (хочу писать), жазғың келеді (хочешь писать), жазғысы келеді (хочет написать)*. Значит, это имеет научное основание. М. Кашгари в своем труде указывает два вида этой формы: во-первых, форма *-гу* объясняется как глагол, используемый вместо имени, во-вторых, показывает, как с помощью имен образуется изафет. Вместе с тем, рассматриваются и формы деепричастий *-п, -ып, -іп, -а, -е, -й, -ғалы, -гелі, -қалы, -келі*, раскрываются их значения и описываются способы их образования и отнесенность к категории времени. Следует сказать, что формы причастий и

деепричастий, представленные в труде В.В. Катаринского, взяты из «Грамматики алтайского языка».

В трудах исследователей казахского языка (за исключением Н.И. Ильминского) представлены и наречия, однако, по причине того, что они как часть речи сформировались значительно позже, отмечаются множество недостатков и пробелов в их описании учеными. Как показывают наши наблюдения, в трудах ученых наряду с наречными словами попеременно даются и местоимения (*қаншан? қанша? ешқайда, міне, мінекей – когда? сколько? никуда? вот это* и др.), и модальные слова (*жоқ, әрине – нет, конечно*), и имена прилагательные (*жақсы, биік, алыс – хороший, высокий, далекий*), и имена числительные (*бір рет, екі рет – один раз, два раза*), и союзы (*әлде, бірақ, ғой – или, но, если бы*), и глаголы (*болғаны, келді ғой – быть, пришел же*), и подражательные слова (*әкрең*). Наречия и, более того, смысловые группы слов между собой не разграничиваются. В связи с тем, что в этих трудах даны азы грамматики казахского языка и представлены первые попытки ее описания, недостатки подобного рода следует считать уместным.

Частицы М.А. Терентьев и В.В. Катаринский делят на союзы и послелого, в то время как П.М. Мелиоранский делит их на 3 смысловые группы: 1. союз, 2. послелог, 3. частица. Однако и здесь есть недочеты. Вспомогательные имена в современном казахском языке даны как вспомогательные слова. Такие недочеты встречаются и в казахском языкознании последующего периода (например, в трудах А. Байтурсынова [7], К. Жубанова [10], С. Аманжолова [11]).

Описание междометия как отдельной части речи в тюркских языках и его смысловые группы берет свое начало еще до грамматик А.Н. Кононова [12] и Н.А. Баскакова [13-14]. Так, термин «междометие» впервые встречается в труде М.А. Казембека (1846) и в «Грамматике алтайского языка» (1869), затрагивается в трудах М.А. Терентьева, П.М. Мелиоранского, В.В. Катаринского, затем – в труде Н. Созонтова, вышедшем в свет в 1912 году, и в лекциях 1927 года Кеменгерова, рассматривавшем междометие внутри синтаксиса.

Тот факт, что В.В. Катаринский рассматривал не только «междометие», но и отдельно внутри междометий разграничивал звукоподражательные слова, обозначая их специальным термином «звукоподражательное междометие», свидетельствует о том, что еще с тех пор природа современных звукоподражательных слов имела существенное отличие от междометий.



Таким образом, научные воззрения и предпосылки таких известных русских тюркологов, как Н.И. Ильминский, М.А. Терентьев, П.М. Мелиоранский, В.В. Катаринский, подтверждают, что они занимают особое место в истории казахского языкознания и внесли большой вклад в развитие морфологии казахского языка.

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## ***Value context of upbringing and development program content for preschool-age children***

**Abstract:** In this article there is considered a value approach to define the upbringing content for preschool-age children. On the basis of the revealed structure components for the value system of a person the author is offering a method of integration of various directions of preschool-age children upbringing into their development program.

**Keywords:** value, upbringing content, program, person, preschool-age child.

At the present time there is more and more actualized the search for a value foundation for upbringing and education of coming generation and for a substantive filling of it which has a paramount importance for preparation of children for worthy and successful life under the conditions of competitive society becoming more and more complicated. It is a common knowledge that the activity of children in their life, their successfulness, a completeness of their vital interests, satisfaction with the results of their doings are in many aspects depending thereon what value priorities shall be laid down in the basis of education content for the preschool-age children and how they shall be taken into account in the programs of their development which are to be elaborated.

For the revelation purposes concerning the value priorities for a preschool education this work contains an axiological analysis of the upbringing content for the preschool-age children. As a basis it has been taken the well-known program which is used in the preschool educational institutions and has been elaborated by a team of authors under the scientific editorship of M.A. Vasilyeva, V.V. Gerbova, T.S. Komarova [1].

This program is directed at an all-round development of psychical and physical qualities of children in the age range from the birth and up to 7 years by taking into account peculiarities of their age-related and individual development. The axiological analysis of upbringing priorities of the program conducted by us shows that in its main content it is directed at the following:

- upbringing of the sense of involvement in the life of a preschool institution, native city or settlement and the entire country [1, p.84]; careful attitude towards nature through a teaching for an aesthetic perception of it [1, p.85]; explanation about the importance of a peaceful coexistence with all nations of the world, respect for their cultures, traditions and customs [1, p.195];

- encouragement of an active participation of the preschool-age children in artistic-creative activities on their own free will [1, p.209]; performance of the role of host / hostess in playing activities [1, p.140]; stimulation of desire to get without any assistance the knowledge about the outside world, to be engaged in a self-education [1, p.222];

- formation of moral ideas concerning good and bad deeds [1, p.85], and among them on the basis of examples of literary characters [1, p.90]; mastering of table manners [1, p.89]; teaching to cultivate careful attitude towards animate beings [1, p.90];

- training of children to keep proper hours of day regimen [1, p.41]; observance of playing rules [1, p.42, 138], rules of the road [1, p.84], order in a group [1, p.89]; teaching to correctly build the phrases, pronounce words, use grammatical forms [1, p.44];

- development of moral properties (honesty, benevolence, responsiveness, empathy, and so on) [1, p.221];

- adoption of moral positions through the teaching to live in unity, including through joint playing activities [1, p.89]; formation of interest to read books [1, p.90]; development of curiosity [1, p.118]; upbringing on the way of benevolent character interrelations between the children, development of ability to take into account the interests of comrades [1, p.139], and the interests of their relatives [1, p.194]; formation of the skill to substantiate their aesthetic choice, to assess aesthetically the environment [1, p.209]; stimulation of the development of the aesthetic taste and the ability to understand pieces of art [1, p.221];

- formation of a positive attitude towards the labor of adults [1, p.76, 84]; development of interest concerning occupations of parents [1, p.194];
- acquisition of knowledge through the adoption of elders' experience, for instance, through the observance how the elders are looking after the plants and animals in a pet s' corner [1, p.85].

In the framework of analysis concerning the main directions of the preschool-age children upbringing which have been traditionally taken into account in the process of the upbringing activities in the preschool educational institutions we are finding a confirmation for a correctness of our point of view about the appropriateness of systematization of main upbringing priorities according to the following value groups: the values of freedom and independence; the values of life, which are manifested in a harmony and security; the values of development of positive qualities of a person; the values manifesting the common laws and rules of a person's behavior; the values of particular actions as ways of behavior of human being in specific life situations; stand in life as a value category; the values of occupational activity and professional competence of a specialist; translation of a vital and occupational experience as a value [2].

As can be seen from the above, the value groups singled out by us can be considered as elements of the value system of a person which are manifesting themselves as a certain sequence of new formations subjectively actualized on the corresponding stages of an age-related development. Herewith, the personal value system does have a dynamic structure and is to be modernized in the process of an ontogenetical development of the human being. As the striking illustrations hereof it can be considered the revaluations of the values occurring once and again on the various age-related stages. It must be also stressed that in each of the value groups revealed by us there are reflected the values manifesting different upbringing directions and allowing to integrate *the different directions of its content on an unified axiological basis* which is equally meaningful for many stages of historical development of society and its culture.

So, the *values of development of positive qualities of a person* of a preschool-age child are expressed in the following: formation of the interest concerning the knowledge of objective world, abilities to research and construction activities, punctuality, politeness, discipline, skills to self-service; development of social abilities,

skills to collective interaction with comrades; formation of patriotism as a love of Fatherland; upbringing on the way of a moral responsibility for realization of rights and duties of a team member, of a sense of conscience, justice, responsibility for own behavior; development of abilities to an aesthetic perception of natural phenomena, works of visual art and children's literature; development of artistic abilities concerning various arts of creative activity; one's own health promotion, development of main motional abilities (powers of endurance, flexibility, coordination of movements, rhythmicity, and so on).

As the *values of trust of a preschool-age child to the outside world, which are manifested in a harmony and security*, we consider the following: understanding of interrelations of the human being, society and nature, their integrity and unity of development; elucidation by the preschool-age child of the importance of a careful attitude towards nature as a condition for a preservation of a proper environment status, necessity to look permanently after order and cleanness at home, in the streets, in a group of a preschool educational institution; love for nature of native shore; well-wishing and respectful interrelations in a team of children, careful and tactful attitude towards a friendship; skills of sanitary and hygienic culture.

The *values of freedom and independence* are manifested in the following: need and ability of the preschool-age children to display initiative, cognitive and creative activity, originality in description and explanation of social realm phenomena; ability to arrange playing activities independently; responsible and diligent attitude towards learning, fulfillment of lessons, self-testing concerning observance of accuracy, completeness and exactness by their fulfillment; drive for a positive self-development; manifestation of a voluntary discipline and behavior culture; conscious attitude towards a civil duty; unity of words and deeds; ability to display independence.

To the *values manifesting the common laws and rules of behavior of the preschool-age child* are belonging the following ones: knowledge of rules of decorum and rules of community life; understanding of moral sense of a conscious discipline of human being, of responsibility and response to orders by the observance of rules of cultural behavior and communication, recognition of moral norms accepted in a family and society; understanding of the essence of friendship and unity of nations belonging to Russia, importance of humane interrelations in society; recognition of a moral and legal duty in relation to a natural environment, of responsibility for its status, of

concern about its protection against destruction and pollution; need to be guided by the aesthetic principles in the framework of playing activities and everyday life, by the contacts with nature; harmonization of the inside and outside cultures; sanitary and hygienic knowledge; need for observance of the regimen and order of the day.

The *values of particular actions as ways of behavior of the preschool-age child in specific life situations* can be presented in the following way: faithful fulfillment of the child's own duties and orders of teachers; desire to be honest, ability to admit own errors and to act in accordance with civil norms and requirements; respect for elders, love for parents and other members of the child's family, and for a native nature; active participation in collective forms of cognitive activities, responsible and diligent attitude to a learning, careful attitude to textbooks and training facilities, to state, private and personal property, to nature, to representatives of animal and vegetable world; manifestation of readiness to socially useful activities; providing compliance with moral norms and collectivism principle, manifestation of initiative and independence, readiness to create the atmosphere of a genuine comradeship and friendship in a group; manifestation of a humane attitude to animals and plants; ability to display resoluteness and to overcome the difficulties with a due persistence; observance of the behavior norms in everyday life and in public places, norms of communication (politeness and modesty, attentiveness and courtesy, tactfulness and delicacy, and so on), culture of speech and appearance; reasonable compliance with fashion; active and regular participation in physical culture and health-improving events.

The *stand in life of the preschool-age child as a value category* is manifested in the following: his/her creative activity by a mastering of knowledge, ability on the basis of a well-reasoned position to manifest a personal attitude towards events to be observed; compliance with moral principles in playing and in everyday life, conviction in preference of a healthy way of living; active stand in life, conscious attitude towards a civil duty; observance of rules of community life, respect for authorities and persons preserving peace and order in society, understanding of a moral sense of combat and labor traditions of our people, respect for the person's honor and dignity, drive to an ideal of a moral behavior and interrelations between people, well-wishing attitude towards people, understanding of necessity concerning respectful relations between boys and girls, irreconcilability concerning immorality, amoral acts, violations of norms

and rules of behavior in society and in the open country; responsible attitude towards execution of his/her duties, unity of words and deeds, respect for working men creating material and spiritual values, condemnatory attitude towards violation of discipline, irresponsibility and negligence, parasitism, plunderer and waste of natural resources; condemnatory attitude towards superstitious beliefs and narrow-mindedness; careful attitude towards cultural artefacts and folk art memorials; drive to a healthy way of living, a critical attitude towards underestimation of importance of physical exercises, sport, tourism, violations of norms of personal and public hygiene, towards the acts destructing the natural environment.

As the *values of occupational activity and professional competence* to be adopted in a preschool-age we can consider the following ones: drive to knowledge, expansion of ideas concerning occupations, perfection of brain work culture; recognition of public value of education for a preparation of a child for life and labor in interest of society, human being and state; understanding of importance of material production for development of society and interdependence of occupations, understanding of moral sense of labor traditions; aesthetic perception of labor activities of specialists to be observed in various production fields, understanding of necessity to improve the abilities and skills of occupational activity; rendering support to a teacher on the basis of a proper behavior and obedience for a fulfillment of teacher's occupational activities, observance of safety regulations as well as sanitary and hygiene standards.

*Translation of a vital and occupational experience as a value* is displayed in the understanding by the preschool-age children of the connection of science and practice under conditions of technological progress; their understanding of social role of learning activity for a preparation for life and labor; rendering of support concerning knowledge mastering; attentive attitude towards the experience of the elders.

As can be seen from the above we can state that the different upbringing directions do have united value content. For instance, in the group of values of development of positive qualities of a person there are present the content elements practically of all known directions: moral, aesthetic, physical, labor, ecological, patriotic upbringing, and so on. We can also predict an emergence of new upbringing directions which can be present in the future in connection with development of the society culture. It is quite difficult to predict the upbringing targets of a distant future

but in the framework of the system of personal values offered in this study the future upbringing targets are presented implicitly. Such an approach makes it possible to present the unity of upbringing directions targeted at the development of an integral personality of a preschool-age child.

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### ***Informative model of crime in modern Ukrainian criminology***

**Abstract:** This article is devoted to the development and explanation of the informative model of crime in the modern criminological science. Scientific researches which contain information about the development of the informative model of crime are analyzed. The author gives her definition of the informative model of crime and defines the quantity and quality indexes of crime.

**Keywords:** the notion of crime, the informative model, social phenomenon, modern criminology, criminal practice, “price” of crime.

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### ***Інформаційна модель злочинності у сучасній українській кримінології***

**Анотація:** Стаття присвячена дослідженню інформаційної моделі злочинності і визначенню її змісту у сучасній кримінологічній науці. Проаналізовано наукові праці, які містять відомості про розвиток інформаційної моделі злочинності. Автор наводить власне визначення поняття інформаційної моделі злочинності і визначає кількісні та якісні показники злочинності.

**Ключові слова:** поняття злочинності, інформаційна модель, соціальне явище, сучасна кримінологія, кримінальна практика, «ціна» злочинності.

Злочинність, її сутність і природа належать до предмета науки кримінології, є важливим об'єктом дослідження у вітчизняній правовій системі. Вивчення феномену злочинності відіграє сьогодні важливу роль у правовому житті суспільства, а тому посідає важливе місце у кримінологічній науці. Сьогодні, у XXI столітті, стало очевидним, що процес пізнання сутності злочинності не лише не отримав свого логічного завершення, а й переживає значну кризу. Виникає питання: що сьогодні змінюється? Що нині представляє собою реальну загрозу для суспільства? Дослідження і визначення інформаційної моделі злочинності у сучасній вітчизняній кримінології є невирішеним і складним питанням, як власне і сам феномен злочинності.

Дослідження історичного розвитку злочинності, що продемонструвало складні ідеолого-політичні та соціальні процеси, в яких формувалось поняття злочинності, аналіз можливих методологічних шляхів вивчення злочинності, визначення умовних меж і наукових підходів до поняття злочинності, класифікація злочинних проявів – все це робить можливим і має кінцевим результатом побудову і аналіз інформаційної моделі злочинності, яка представлена кількісними, якісними показниками, а також «ціною» злочинності.

Поняття та аналіз моделювання, методологічні підходи до моделювання злочинності і злочинної поведінки у кримінологічній науці і в юриспруденції розкриваються у роботах вчених Ю.М. Антоняна, Ю.Д. Блувштейна, С.Є. Віцина, О.О. Гаврилова, Ю.М. Гаврильця, К.К. Горяїнова, В.П. Казимирчука, Л.В. Кондратюка, Л.Л. Кругликова, В.О. Мінаєва, А.Я. Мініна, В.С. Овчинського, В.Д. Рудашевського, О.Є. Спиридонової, М.М. Тарасова, О.Ф. Черданцева та інших. Проблема дослідження і визначення кількісних і якісних показників злочинності знаходила своє вирішення у наукових працях таких вчених, як В.С. Батиргарєєва, А.М. Бойко, В.В. Голіна, Б.М. Головкін, І.М. Даньшин, В.М. Дрьомін, А.П. Закалюк, О.М. Ігнатов, О.Г. Кальман, О.Г. Кулик, В.М. Попович, І.П. Рущенко, В.І. Шакур, О.Ю. Шостко та багатьох інших. Кількісні та якісні показники злочинності стали предметом дослідження для таких російських вчених як Ю.М. Антонян, А.І. Долгова, С.М. Іншаков, Є.П. Іщенко, Л.О. Колпакова, Л.В. Кондратюк, В.М. Кудрявцев, В.Д. Ларичев, В.В. Лунєєв, В.С. Овчинський, Л.І. Романова, О.В. Старков, О.В. Тюменев, Д.А. Шестаков та інші.

Вважаємо, що сьогодні кримінологічна наука потребує визначення самої інформаційної моделі злочинності, з'ясування значення поняття модель у юридичній науці взагалі і кримінологічній зокрема. Інформаційна модель злочинності є складовою механізму загального інформаційного процесу та інформаційних відносин, що існують у суспільстві [1]. Термін «модель» походить від латинського слова «modulus», що означає «міра». Сам термін має багато значень і застосовується у різних сферах людської діяльності. У науковому значенні слід виходити з того, що моделювання – це метод наукового пізнання, а модель – форма, засіб наукового пізнання. Метод моделювання є цінним саме тому, що дозволяє отримати знання про досліджуваний об'єкт не шляхом безпосереднього вивчення, а шляхом вивчення його моделі. І та обставина, що між дослідником і об'єктом дослідження знаходиться проміжна ланка – модель – є специфічним для методу моделювання. Моделі соціальних явищ (а злочинність, безумовно, є соціальним явищем) можуть бути виражені у вигляді систем рівнянь і нерівностей, кореляційних і дисперсійних коефіцієнтів, інших узагальнюючих показників, статистичних групувань і т.д. Форма моделі визначається конкретною ціллю моделювання. А сам метод моделювання є універсальним у тому сенсі, що його можна застосовувати як на емпіричному, так і на теоретичному рівні дослідження. На емпіричному рівні цей метод має вимірювальну, описову функцію, а на теоретичному – інтерпретаційну, пояснювальну, прогностичну, критеріальну функції, а також функцію у мисленнєвому експерименті. Найбільш суттєвими і складними функціями моделей є ті з них, що виконуються на теоретичному рівні дослідження [2].

Метод моделювання належить до сучасних методів дослідження у науці і практиці. Багатозначність самого терміну «модель» вимагає тлумачення залежно від мети дослідження. У широкому розумінні модель визначають як будь-який пізнавальний образ емпіричного і теоретичного рівней пізнання. Теоретичне пізнання (у нашому випадку теоретичне пізнання злочинності) при цьому виступає як дискретне моделювання, в якому пізнавальні образи (поняття, судження, умовиводи) також розглядаються як своєрідні моделі. У юридичній науці термін «модель» застосовується відносно норм права і правовідносин як структурна модель дійсності. Але крім того, що модель є формою відображення дійсності, спрощеним образом досліджуваного об'єкту, до її характерних рис належать і

такі ознаки: 1) модель створюється у результаті процесу абстракції (при створенні моделі дослідник абстрагується від безмежної сукупності властивостей, ознак, відносин досліджуваних об'єктів, відволікається від окремих, часткових ознак, виділяючи лише ті ознаки, властивості, зв'язки і відносини, які мають бути предметом дослідження); 2) модель і досліджуваний об'єкт знаходяться між собою у відносинах відповідності. Модель є аналогом досліджуваного об'єкта. Проте вона не є тотожним повторенням того чи іншого процесу, явища, адже тоді б модель втратила свою специфіку; 3) модель є засобом відсторонення і вираження внутрішньої структури складного явища. Об'єкти, що досліджуються шляхом моделювання, повинні бути складними, мати систему, складатися з елементів. Слід також зазначити, що модель може і не мати дослідницького характеру, а виконувати спеціальну задачу опису, демонстрації. Так, В.О. Штофф розумів під модельною інтерпретацією випадки, коли за допомогою моделей надається тлумачення явищ, що спостерігаються, їх внутрішньої динамічної і статичної структури, бо модель є демонстрацією певної структури [3]. У рамках кримінологічного дослідження моделюванню підлягають насамперед типові соціальні явища і процеси, на які можливо і потрібно впливати силами правоохоронних органів [4].

Модель – це умовний образ, що відображує суттєві властивості досліджуваного об'єкту (або процесу) так, що його вивчення породжує нову інформацію про об'єкт, який моделюється. Сутність моделювання соціальних процесів, явищ полягає в умовному відтворенні досліджуваних об'єктів з наступним вирішенням задач за аналогією. Інформаційна модель – маломірне уявлення про багатомірний інформаційний простір. Інформаційна модель злочинності – портрет злочинності як сукупності злочинів. У процесі вирішення можливості і проблеми математичного моделювання злочинності дослідниками ставляться наступні завдання: виявлення тенденції динамічного ряду; прогнозування рівня злочинності у регіоні на підставі статистичних вимірювань; побудову функції, що характеризує розвиток процесу вчинення злочинів; типологізація (класифікація) кримінологічних об'єктів (людей) на підставі визначальних характеристик та інше. У науковій літературі зазначається, що поняття інформаційної і математичної моделей дуже близькі, оскільки вони є знаковими системами. У якості об'єктів моделювання у кримінологічних дослідженнях виступають взаємозв'язок різних соціальних явищ із станом, рівнем і динамікою

злочинності, структурно-динамічні коливання злочинності. Так, за методикою С.Є. Віцина матричні моделі злочинності дозволяють знаходити і кількісно виражати залежність між видами, групами злочинів і характеристиками контингенту злочинців. Він пропонував використовувати для опису злочинності або окремих груп злочинів узагальнений показник кількісної оцінки різних злочинів за ознакою їх суспільної небезпеки [4].

На думку Ю.М. Антоняна і Ю.Д. Блувштейна, математичні моделі у кримінології можуть бути класифіковані за принципом їх «роботи» наступним чином: 1) моделі розподілу; 2) моделі взаємозв'язку; 3) моделі імітаційні; 4) моделі розпізнавання образу. Найбільш перспективно використання цих моделей для прогностичного моделювання злочинності, особи злочинця і злочинної поведінки. Прикладом моделі взаємозв'язку (залежності) є дослідження рівня освіти засуджених і тяжкості вчинених ними злочинів. Емпіричний матеріал для побудови моделі – відомості про освітній рівень N=1000 засуджених (проста випадкова вибірка) і тяжкості вчинених ними злочинів, що були зареєстровані правоохоронними органами [4].

Інформаційна модель може створюватися за допомогою соціологічного інструментарію – анкет, матеріалів для інтерв'ю, формалізованих карток для контент-аналізу документів, за допомогою статистики і т.д. У сфері права параметри такої моделі частіше за все є кількісно-якісними, виникає соціально-правовий модельний опис оригіналу дослідження. При створенні інформаційної моделі можуть використовуватися готові моделі збору інформації. Кожна модель будується поетапно, дослідник проходить стадії постановки проблем, створення та дослідження моделі [5]. Так, в кримінології при моделюванні кримінологічно значущих зв'язків між конкретними формами злочинного насильства і соціальними феноменами можуть бути використані методи парного регресійно-кореляційного аналізу, дисперсійного аналізу і вирахування коефіцієнтів еластичності для лінійної функції [6].

В юридичних науках можуть застосовуватися як матеріальні (наприклад, кібернетичні), так і ідеальні (уявні) моделі [3]. Нас же більше цікавлять ідеальні моделі. Злочинність є ідеальною моделлю, що має власний матеріальний вираз, який ґрунтується на системі статистичних показників. Сам термін модель використовуємо у широкому значенні – як певний уявний образ, що має теоретичний та емпіричний рівні пізнання – і не обмежуємось поняттям моделі у

вузькому значенні, у якому вона використовується у спеціальних джерелах по моделюванню. Створюється ідеальний об'єкт (модель), якого у реальному житті немає. Якщо ж створювати модель злочинності, то слід відображувати її систему зв'язків, а саму злочинність представляти у вигляді складноорганізованої структури, що складається із взаємопов'язаних елементів, що є кількісними і якісними показниками злочинності. А уявлення про злочинність як юридичну конструкцію призведе до більш повного, зрозумілого і детального з'ясування її змісту. Юридична конструкція злочинності буде своєрідним каркасом, який формується за допомогою статистичних показників.

Поняття злочинності, як і будь-яке поняття, має зміст і обсяг. Пропонуємо таке визначення поняття злочинності: злочинність – це кримінальна практика людей, що проявляється як явище у виді множинності злочинів і осіб, які їх вчинили, у визначеному просторово-часовому проміжку і яка підлягає кількісно-якісному виміру.

Зміст же як оціночних, так і неоціночних понять, утворюють суттєві, загальні, у сукупності відмінні (відмітні) ознаки тих предметів, що вони відображують [7]. Інформаційна модель злочинності буде вираженням самого змісту і обсягу злочинності. Загальні принципи побудови такої моделі передбачають і роблять можливим використання інформаційних методів у кримінологічних дослідженнях та інформаційного аналізу кримінологічної інформації [4], використання інтелектуального аналізу даних (Data Mining) у кримінологічних дослідженнях [8]. На основі вивчення значних обсягів інформації відбувається вивчення не відомих досі, прихованих структур, автоматичний пошук закономірностей. Сфера застосування інтелектуального аналізу даних не обмежується лише кримінологією, а й посідає належне місце у логічному аналітичному процесі, що забезпечує синтез та інтерпретацію даних, прогнозування майбутніх подій з метою досягнення організаційних висновків. Кримінологія може використовувати ці засоби у своєму методологічному апараті. За допомогою методів інтелектуального аналізу даних (технології Data Mining) можна вирішити, зокрема, такі завдання: виявити підозрілі трансакції; типологізувати організовані злочинні групи; здійснити кримінологічну класифікацію територіальних одиниць; визначити чинники інтенсифікації процесу залучення населення у вживання наркотиків; опрацювати прогнози з розвитку криміногенної обстановки залежно від демографічної, економічної, політичної ситуацій. Пошук логічних закономір-

ностей є одним із найперспективніших напрямів багатомірного статистичного аналізу кримінологічної інформації [8]. В Україні мають бути розроблені відповідні автоматизовані інформаційні системи, а згодом і об'єднана Державна автоматизована система кримінологічної інформації (ДАСКІ) [9].

Підсумком аналізу кримінальної деструктивності сьогодення має стати зареєстрована і врахована злочинність (повна та актуальна злочинність). Досвід кримінологічного аналізу злочинності дозволяє представити її стан (під яким розуміється інтегрована оцінка) у вигляді інформаційної моделі – системної картини стану злочинності, що виражена статистичними оцінками елементів і властивостей злочинності [10]. До інформаційної моделі злочинності відносимо кількісні, якісні показники, показники, що мають змішаний кількісно-якісний характер і окремо виділяємо такий показник як «ціна» злочинності, що, на нашу думку, має самостійне кримінологічне значення у дослідженні злочинності. Головне призначення інформаційної моделі полягає у тому, що вона є виміром злочинності. За допомогою кількісно-якісних показників створюємо модель, певну інформаційну імітацію, що не повністю відповідає дійсності, бо існування латентної злочинності не дозволяє визначити дійсну картину злочинності у державі. Також постає питання про можливість визначення дійсного і реального стану злочинності.

Аналіз злочинності має бути побудований на виявленні її реальних якісних і кількісних характеристик у їх діалектичному взаємозв'язку. Зміст якості включає, по-перше, визначеність явища у певних межах, просторово-часових властивостях; по-друге, дослідження структури злочинності, взаємозв'язку різних злочинів і їх суб'єктів, вивчення стійкості та мінливості злочинності. Кримінальна статистика при цьому залишається важливим джерелом інформації і при її змістовному аналізі можна отримати навіть певні відомості про латентність злочинів. Кількість – це просторово-часова властивість явища (величина у просторі, тривалість існування, темпи приросту і т.п.). У процесі аналізу враховуються ті закономірності злочинності та її змін, котрі уже були виявлені кримінологами і відображені у літературі. Це дозволяє точніше оцінювати особливості злочинності у конкретних умовах, своєчасно відкривати нові тенденції і специфічне співвідношення різних її структурних елементів [11].

Кількісно-якісне вимірювання злочинності проводиться шляхом виявлення таких основних статистичних показників, як: стан, рівень злочинності, коефіцієн-



ти злочинності, структура злочинності, характер, динаміка злочинності, географія злочинності, відомості про латентність злочинності [12]. Кожен із цих названих показників вимагає окремого розгляду. Безперечно, наведений перелік показників потребує вдосконалення і сучасної кримінологічної інтерпретації.

Визначення та аналіз кількісних, якісних і кількісно-якісних показників злочинності відображає розвиток злочинності та її тенденцій, зображує глибинні процеси її зародження та надає достатні підстави для кримінологічного планування і прогнозування розвитку явища злочинності у сучасному українському суспільстві.

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## ***Traditions as resource of modernization of society***

**Abstract:** The article is devoted to the complicated phenomenon of tradition. The arguments of supporters and opponents of traditionalism are considered in a publication.

**Keywords:** tradition, succession, world view options, valued orientations, civilization, critical traditionalism.

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## ***Традиции как ресурс модернизации общества***

**Аннотация:** Статья посвящена неоднозначному феномену традиции. В публикации рассматриваются аргументы сторонников и противников традиционализма.

**Ключевые слова:** традиция, преемственность, мировоззренческие установки, ценностные ориентации, цивилизация, критический традиционализм.

Человечество - это динамичная, постоянно развивающаяся система, совокупность всех людей, разделенных на расы, народы (или этносы), социаль-

ные и культурные группы. Если отвлечься от некоторых уникальных, присущих каждому конкретному обществу черт, то можно утверждать, что и сегодня, как много веков назад, человечество представлено двумя основными типами цивилизаций, уходящими своими корнями в далекое прошлое. Речь идет о традиционных и нетрадиционных типах общества.

Остановимся на традиционном типе общества. Эта модель берет свое начало в древневосточной цивилизации, где земля, ирригационная система были собственностью общины. Каждая семья имела определенный участок земли, который давался ей во временное пользование. Господствовала экстенсивная технология, направленная главным образом на овладение внешними природными процессами.

«В традиционных обществах универсалии культуры: человек, природа, общество, космос и др. имеют близкое жизнесмысловое наполнение. Человек представляется как часть космоса, погружен, растворен в космосе. Он благоговеет перед природой, в своей деятельности ориентирован на сохранение естественных процессов, учет природных ритмов, резонанса человека и космоса и т.п. Человек согласовывал свою деятельность с ритмами природы, максимально приспосабливаясь к окружающей среде» [1, с.300]. Неслучайно, принцип «у-вэй» у древних китайцев требовал невмешательства в протекание природных процессов. И сегодня среди духовных ценностей традиционного общества одно из ведущих мест занимает установка на адаптацию к природным условиям, не поощряется стремление к их целенаправленному преобразованию. Человек вписан в социум, в определенные рамки конфессиональных, кастовых, родовых и др. отношений. Вектор активности человека направлен вовнутрь, на самоограничение, самовоспитание. В исканиях истины неременным условием считается единство познания и нравственности, нравственного пути человеческой жизни. Особое значение имеют традиции, обычаи, передаваемые от поколения к поколению. В целом ценностно-духовная сфера человеческого бытия ставится выше экономической.

Традиционно в каждом поколении воспроизводилось сознание сопричастности к вечному – в идеалах предков, их культе, заветах. В любом возрасте главная обязанность человека – усваивать традиции, ритуалы, символы, этические нормы, канонические тексты, непрерывно учиться. В отсутствии

представлений о Боге-творце (обожествлялись души предков) любовь к учению воплощала стремление человека к бесконечному совершенствованию (это фундамент дальневосточной цивилизации) проявляется в любой сфере человеческой деятельности. Учение приобретало значение высшей культурной и социальной ценности, характер культа. Воспринималось как свидетельство величия человека и неисчерпаемости его творческого потенциала, единственный и лучший способ утвердить человеческое в человеке, как самовысвобождение, придание своему существованию нового качества: перерастать себя, становиться дорогой к самому себе, «вытягиваться в вечно вьющуюся нить Великого Пути». Открытие собственного несовершенства – вот что являлось движущей силой учения, истоком всех нравственных усилий человека. Верность образцам мысли и поведения ценилась выше способности к созданию нового; созерцание-переживание, даваемое учением, ценилось выше приобретаемых знаний. Человек был растворен в социуме, который способствовал воспроизведению в его сознании и поведении традиционных надындивидуальных норм и ценностей. Жить достойно на этом свете означало жить в соответствии с принятыми предписаниями, в исполнении их испытывать моральное удовлетворение. Жесткость, авторитаризм социальных отношений проявлялись в почтительности к старшим. Педагогика поддерживала традиции, учитель воспринимался как власть-авторитет и как отец. Его функции обуславливались ценностями учения для развития человека. Помочь ученику ощутить ограниченность собственного опыта означало вызвать стремление к его расширению. Выявить индивидуальные качества ученика равно значило получить возможность ненасильственного влияния, развивая природные силы ученика, стимулируя стремление к саморазвитию и самосовершенствованию в сфере чувств, разума, деятельной воли. Отмеченные выше мировоззренческие установки и ценностные ориентации закреплялись в стереотипах и традициях, приобретали доминирующее значение в ходе цивилизационного развития.

Технократическое мышление считается порождением западного сознания и образа жизни. По мнению аналитиков, именно в этом причина кризиса всей современной цивилизации. Как отмечает К.Г. Юнг: «Западный человек не нуждается в большем господстве над природой, внешней и внутренней. Господство над обеими достигло у него чуть ли не дьявольского совершенства.

К сожалению, при этом отсутствует ясное понимание собственной неполноценности по отношению к природе вокруг себя и к своей внутренней природе. Он должен понять, что не может делать все, что ему заблагорассудится. Если он не дойдет до осознания этого, то будет сокрушен собственной природой. Он не ведает того, что против него самоубийственно восстает его собственная душа... Вот почему болен человек Запада, и он не успокоится, пока не заразит своей алчностью весь мир. Именно поэтому мудрость и мистика Востока должны значить столь многое, хотя они говорят на собственном языке, которому невозможно подражать» [2, с.62]. Поиск новых парадигм и ценностей ведет Запад, исчерпавший себя, на Восток, заставляет переосмысливать основы своей культуры, онтологии и антропологии.

Продолжая размышления о традиционной модели общества, заметим, что связь настоящего с прошлым составляет основу традиции. Все то, что доходит до нас из прошлого, что передается во взаимосвязанном, нарастающем историческом процессе, составляет наследие общества.

Традиции в узком смысле слова – есть совокупность объектов и идей, особое значение которых люди связывают с их происхождением в прошлом, сами являются субъектами изменения. Они модифицируются, выдвигаются на передний план или игнорируются, существуют в течение некоторого времени, а затем исчезают, забываются и вновь возрождаются. Так случилось со многими этническими, национальными традициями в странах Восточной Европы и в бывшем СССР: после длительного подавления в условиях тоталитаризма они обрели новую жизнь в изменившихся условиях.

Нам представляется, что традиции складываются двумя путями. Один идет «снизу», когда можно сказать, что традиция «возникает», «зарождается». Это спонтанный, стихийный процесс, в который вовлечены достаточно большие массы людей. Все начинается с того, что кто-то обращает особое внимание на определенные фрагменты исторического наследия. Затем интерес, уважение, пристрастие, почтение распространяется вширь, охватывая все более широкие слои населения, и принимают форму ритуалов, церемоний, побуждают к поискам и обновлению старых объектов, к новой интерпретации старых кредо. Индивидуальные предпочтения и действия становятся массовыми и превращаются в поистине социальный факт. Так рождается традиция. Парадоксальным

образом данный процесс очень сходен с распространением новаций, хотя в данном случае речь идет, скорее, об открытии того, что уже существовало в прошлом.

Второй путь формирования традиции начинается «сверху», действуя через механизм навязывания, когда традиция выделяется, отбирается и «спускается» теми, кто обладает реальной властью или влиянием. Это может быть монарх, вводящий для своих подданных традиции своей династии; диктатор, делающий упор на прошлой славе нации; полководец, напоминающий народу о великих исторических сражениях, или известный модельер, находящий вдохновение в прошлом и диктующий стиль «ретро».

Отметим, что эти два пути не определяют содержания традиций. Нельзя сказать, что один ведет к формированию истинной традиции, действительно уходящей своими корнями в прошлое, а другой – к изобретенной традиции, связь которой с прошлым придумана, вымышлена. Такая связь может диктоваться необходимостью, когда, например, кто-то наделяет образ прошлого привлекательными чертами с тем, чтобы увлечь своей идеей массы. Но все же чаще такого рода традиции создаются и внедряются с политической целью теми, кто стоит у власти.

Почему же существуют традиции, в чем их притягательность? По мнению Эдварда Шилза, «хотя люди зачастую не удовлетворены своими традициями, но без них они не могут выжить» [3]. Если это так, то каковы же те универсальные требования индивидуальной и общественной жизни, которые удовлетворяют традиции, в чем состоят функции традиции?

1. Прежде всего, в традиции сосредоточена вековая мудрость поколений, которые осуществили отбор бытовавших в прошлом, и заслуживающих теперь внимания норм, ценностей, идеалов, правил, сохранили созданные ранее объекты. Традиции – это своего рода кладезь идеальных и материальных ресурсов, используемых людьми в своих текущих делах, для возведения будущего на фундаменте прошлого. Общественную жизнь нельзя создать из ничего, на пустом месте. Традиции обеспечивают людей, формирующих свой мир, готовыми «строительными блоками».

2. Традиция – один из источников законности, подтверждающий легитимность чего-либо. Фразы «так было всегда» или «люди всегда так считали»

нередко используются для объяснения, оправдания сегодняшних поступков. Ту же цель преследуют ссылки на авторитеты или доктрины, бывшие популярными в прошлом, например, «Как сказано в Коране», «Как говорил Ленин», «Маркс был прав».

3. Традиция усиливает чувство общих корней, принадлежности нации, сообществу. Таковы национальные традиции с их гимнами, флагами, эмблемами, религией и публичными ритуалами. Они уходят корнями вглубь истории и используют прошлое для того, чтобы объединить людей в настоящем. Ту же функцию выполняют традиции регионов, городов, связывая их граждан внутри определенного пространства. Традиции профессий и фирм, символизированные в значках, лозунгах, придают чувства достоинства и гордости за причастность именно к этой профессии или фирме. Традиции университетов и школ, выражаемые в церемониях или одежде позволяют сохранить автономию в данной сфере социальной жизни.

4. Традиция помогает пережить разочарования, смягчает неудовлетворенность повседневным существованием. Традиция, истоки которой коренятся в счастливом прошлом, поддерживает общество в тяжелые периоды кризиса. Традиция, напоминающая о былой независимости, не дает нации погибнуть в период захватнических войн и порабощения. Традиция утерянной свободы, рано или поздно подрывает самую жестокую тиранию.

Отношение к традиции в современном мире неоднозначно, порой противоречиво. Сторонники традиционализма утверждают, что именно традиции «цементируют», укрепляют общество, традиции обеспечивают преемственность поколений и духовных ценностей социума. Противники (антитрадиционалисты) воспринимают традиции «как тормоз, оковы, путы», мешающие поступательному развитию общества, что это пережиток прошлого, от которого современное общество должно безжалостно избавляться. Эта двойственность, неоднозначность позволяет говорить о традиции как феномене функциональной амбивалентности.

При этом отметим, амбивалентность - это двойственное, противоречивое отношение субъекта к объекту, характеризующееся одновременной направленностью на один и тот же объект противоположных импульсов. Отметим, что это понятие было предложено швейцарским психиатром Э. Блейлером (начало XX века)

для обозначения одного из признаков шизофрении — склонности больного отвечать на внешние раздражители двоякой, антагонистической реакцией. Сегодня этот термин активно используется и обозначает внутреннюю двойственность и противоречивость явления, обусловленную наличием проти-воположных начал в его внутренней структуре.

Как и все созданное человеком, традиции несут в себе функциональную амбивалентность. Любая традиция, независимо от ее содержания, может сдерживать творчество, инновации, предлагая готовые рецепты для решения современных проблем. В этом проявляется консервативная сущность феномена традиции. Между тем попытки заменить поиск новых путей возвратом к старым, испытанным, надежным методам чаще всего влекут за собой стагнацию, застой в общественной жизни.

Характеристики отражающие амбивалентную сущность традиции:

- Приверженность старым традициям в изменившихся условиях – проявление инертности. Фетишизация традиций малопродуктивна, она парализует поиски «третьего пути».

- Некоторые традиции несут в себе деструктивный потенциал (например, сохранение правых традиций в Германии, пережитков сталинизма на пост-советском пространстве).

- Многие традиции поддерживаются в силу привычки и инерции, на уровне социального подсознания. Никто специально их не культивирует, просто они воспринимаются как атрибутивное свойство определенного образа жизни. Например, типичный ментальный синдром для бывших коммунистических стран характеризуется такими чертами, как безответственность, необязательность, инфантилизм, пассивность, апатия, небрежное отношение к работе, иждивенчество и др.

- Для многих это составляет привычный образ жизни. Возникает латентная, скрытая традиция ностальгии по прошлому, влияющая на массовое сознание. В изменившихся условиях такие укоренившиеся привычки и обычаи утратили свою адаптивную ценность и представляют значительные препятствия для поступательного развития общества.

Выводы: 1. Именно традиционные общества в эпоху глобализации сохранили свои ментальные ценности, ценностные ориентации личности,



направленные на укрепление семьи, нации, общества и государства. Ведь не зря исчерпавший себя Запад все чаще обращает свой взор на Восток?

2. Восточная модель общественного развития сберегла многие общечеловеческие ценности, утраченные западной цивилизацией. Достаточно отметить, что на фоне полной девальвации семейных ценностей в современном мире, Восток культивирует и укрепляет традиционные формы брака и семьи. И еще: в традиционных обществах остаются незыблемыми уважительное (почтительное) отношение к старшим и трогательная забота о детях.

3. В ответ на вопрос «Что лучше, продуктивнее: традиционализм или антитрадиционализм?» мы отвечаем: На наш взгляд, разумной идеологической позицией является «критический традиционализм». Он стремится уравновесить функции и дисфункции той или иной традиции в каждом конкретном случае, принимая в расчет ее содержание и исторические обстоятельства. Критический традиционализм отвергает ошибочный взгляд на прошлое как на источник исключительно добра; вместе с тем он избегает другой крайности, характерной для догматического антитрадиционализма, который отрицает положительную роль традиции в человеческом обществе.

4. Предлагаем рассматривать традиции как хороший ресурс модернизации общества глобализирующегося мира, который позволяет развиваться, сохраняя вековую мудрость предшествующих поколений.

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### ***Designing the content of natural science education in terms of specialized training***

**Abstract:** This article devoted to the designing of the content of natural science education in terms of implementation of competent approach in school. In the article some approaches to the selection of the content of natural science education for specialized classes were considered.

**Keywords:** educational content, educational areas, competence approach, key and subject competencies, expected outcomes.

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### ***Конструирование содержания естественнонаучного образования в условиях профильного обучения***

**Аннотация:** Данная статья посвящена конструированию содержания естественнонаучного образования в условиях реализации компетентностного подхода в школе. В публикации рассматриваются некоторые подходы к отбору содержания образовательной области «Естествознание» для профильных классов.

**Ключевые слова:** образовательная область, содержание образования, компетентностный подход, ключевые и предметные компетенции, ожидаемые результаты.

Президент Республики Казахстан Н.А. Назарбаев в программных выступлениях выделяет основные направления современного развития страны:

- высокое качество жизни;
- конкурентоспособная экономика;
- социальная модернизация.

К условиям, обеспечивающим реализацию данных установок, отнесена поддержка Программы инновационного развития страны.

Все инновации несут на себе печать своего времени и национально-культурного своеобразия, с этой точки зрения преобразования в системе среднего образования Казахстана не является исключением. Суть данного преобразования – приоритетная нацеленность на создание образовательной среды, обеспечивающей становление самостоятельной, конкурентоспособной, социально ответственной и социально успешной личности. Организация образовательной среды с учётом такого конечного результата может быть реализована на основе новой модели содержания образования, ориентированной на результат в виде системы компетенций. Особенность ориентации содержания образования на компетентностный подход заключается в определении целей, проектировании ожидаемых результатов обучения и конструировании содержания образования. В этой связи рассмотрим возможности отбора содержания естественнонаучных предметов в условиях профильного обучения.

В настоящее время накоплен большой опыт по формированию глубоких и прочных знаний по естественнонаучным предметам в общеобразовательной школе республики. Однако многие учащиеся, освоившие теоретические знания

на достаточно высоком уровне, слабо ориентируются в актуальных проблемах естествознания, таких, как экологические проблемы, проблемы здорового образа жизни, влияние науки и техники на развитие общества и др. Их рассмотрению не уделяется должного внимания в школьных курсах естественнонаучных предметов.

Проблемы отбора содержания образования рассмотрены в работах В.В. Краевского и И.Я. Лернера [1], В.С. Леднева [2], применительно к учебным предметам Т.Б. Захаровой [3], Н.С. Пурышевой [4] и др. Разработкой и внедрением компетентностного подхода в современную школьную практику занимаются такие учёные как И. А. Зимняя, О. Е. Лебедев, И. Я. Лернер, А. В. Хуторской и др.

В контексте этих исследований считаем, что содержательная и методическая составляющие естественнонаучных предметов должны быть направлены на реализацию общей цели среднего образования посредством целенаправленного развития у учащихся ключевых и предметных компетенций.

Цели обучения естественнонаучным предметам конкретизированы нами исходя из целей среднего образования в Республике Казахстан [5; 6]. Так, целью изучения естественнонаучных предметов в старших классах является формирование у обучающихся основ естественнонаучного мировоззрения, развитие интеллектуальных способностей и познавательных интересов, воспитание у них ценностных ориентиров.

Ключевая компетенция понимается нами как осознанная человеком способность решать жизненно важные задачи в конкретных ситуациях. Количество ключевых компетенций зависит от степени их обобщенности. Целесообразность той или иной степени обобщенности компетенций зависит от уровня их рассмотрения в содержании образования.

Анализ разнообразных перечней, включающих от 3 до 37 компетенций, предложенных различными авторами [7; 8; 9], показал, что их можно свести к четырем ключевым как информационная, коммуникативная, социальная компетенции и компетенция разрешения проблем. Для обоснования этих компетенций рассматривались основные сферы деятельности человека (познавательная, общественная, трудовая, бытовая, культурная) и, соответственно, его социальные функции, требования общества к личности. На уровне

учебных предметов, выделенные ключевые компетенции должны дополняться предметными компетенциями.

В основе научных подходов к конструированию содержания образовательной области «Естествознание» должны быть заложены следующие принципы как фундаментальность, гуманизация, информационно-технологический, практическая и профильная направленность, межпредметная интеграция, личностно-ориентированный и деятельностный подходы. Учитывая выше-названные принципы предлагаем следующий алгоритм конструирования содержания образовательной области «Естествознание»:

1. Учет вклада соответствующей науки и учебного предмета, как основы наук.

2. Выделение содержательных линий как системообразующих узлов в предметах, составляющих образовательную область «Естествознание».

3. Определение общепредметного содержания естественнонаучного образования, раскрывающую единую естественнонаучную картину мира, которая позволяет ученику воспринимать и осваивать целостный образ окружающей действительности.

4. Выявление возможности вклада данного учебного предмета в формирование каждой ключевой компетенции через сквозные компоненты содержания образования образовательной области «Естествознание». Считаем, для этого необходимо учесть ценностные аспекты наук, лежащие в основе образовательной области «Естествознание» и заключающиеся в следующих концептуальных положениях, принятых нами за основу:

1. Естествознание – совокупность наук о природных явлениях, основной концепт естествознания – познание человеком себя, что предполагает познание природы, причем во всей ее полноте.

2. Образовательная область «Естествознание» составляет единое целое, которое содержит цели и содержание из физики, биологии, географии и химии. Современное естественнонаучное знание выполняет мировоззренческие, дидактические, аксиологические функции, обосновывает взаимовлияние методов естественных наук, играет большую роль как интегрирующий межпредметный фактор.

3. Фундаментальные понятия (материя, вещество, поле, пространство, время, взаимодействие, движение) инвариантны различным областям наук, поэтому эта инвариантность является методологической основой межпредметной связи естественнонаучных предметов.

4. Изучение естественнонаучных предметов создает основу для развития естественнонаучного мышления, познания себя, других людей, природы в целом, для устойчивой связи с окружающей средой.

Исходя из логического структурного анализа содержания учебных предметов составляющих образовательную область «Естествознание» нами выделены содержательные линии как системообразующие узлы данной образовательной области:

1. Естественнонаучные методы исследования явлений природы: познание человеком окружающего мира (подходы, методы, способы); развитие техники и технологий; экологические проблемы, связанные с развитием технологий.

2. Естественнонаучные системы в их взаимодействиях: фундаментальные взаимодействия, определяющие строение природы в масштабах микромира, макромира и мегамира.

3. Естественнонаучное мировоззрение человека: единение гуманитарной и естественнонаучной культур; культурно-исторический подход к изучению естественнонаучных явлений; этические, моральные, аксиологические проблемы, связанные с научным прогрессом.

В эти содержательные линии входят такие разделы естественнонаучных предметов как: Человек в природе. Познание человеком окружающего мира (включает понятие о естественнонаучной картине мира и ее эволюции). Методы и способы научного познания природы. Фундаментальные взаимодействия и их роль в строении Вселенной в различных масштабах. Физические поля. Вещество. Природные и синтетические соединения. Клеточное строение живых организмов. Случайные процессы и вероятностные закономерности. Генетическая информация. Роль информации в современной цивилизации. Биосфера, роль человека в биосфере. Наиболее важные естественнонаучные идеи и открытия, определяющие современные знания о мире.

При отборе содержания естественнонаучных предметов их логическая структура должна:

- подчиняться основным принципам ГОСО;
- отражать национальные традиции;
- учитывать межпредметные связи;
- обеспечивать непрерывность и преемственность обучения.

Кроме того, в условиях профильного обучения на уровень представления учебного материала влияют особенности учебно-познавательной деятельности учащихся разных профилей. В данном случае у учащихся классов физико-математического профиля развито теоретическое мышление, у учащихся гуманитарного профиля – эмоциональное восприятие и конкретно-образное мышление.

Для разных профилей обучения будет различным «вектор действия» вариативной части. В одном случае он будет направлен на усиление теоретической составляющей курса (например, в классах физико-математического профиля), во втором — на усиление прикладной составляющей (классы гуманитарного профиля), в третьем — одновременно на усиление и теоретической, и прикладной составляющей. В связи с этим при отборе содержания для различных профилей обучения должны быть учтены следующие компоненты:

- инвариантное ядро содержания образования естественнонаучных предметов;
- гуманитарный аспект, направленный на реализацию личностно-ориентированного обучения;
- прикладной аспект, определяющий направление профильного обучения;
- научный аспект, способствующий более глубокому изучению материала.

Считаем, что при составлении содержания естественнонаучного образования необходимо учитывать инвариантное ядро содержания, составляющее 70—80% от общего объема естественнонаучной информации. При этом должно учитываться в расчет конкретные идеи, принципы, непосредственно связанные с познавательными возможностями и особенностями учащихся разных профилей обучения.

Кроме того, раскрытие содержания курса естественнонаучных предметов и организация деятельности учащихся должны соответствовать психологическим особенностям учащихся, а методика изучения курса должна непосред-



ственно влиять на мотивацию обучения и на качественные изменения социальных черт личности школьника.

При изучении естественнонаучных предметов необходимо исходить из гуманитарного содержания самого предмета, которое связано с развитием планетарного мышления. В связи с этим можно выделить три основных направления, раскрывающих суть гуманитарного содержания этих предметов:

- значение курса (предмета) в развитии цивилизации, которая открывает перед человечеством огромные возможности преобразования природы, создания материальных богатств, расширения творческих способностей человечества;
- гуманистическая сущность использования достижений науки, лежащей в основе предмета. Это направление предполагает доказательство важности широкого прикладного использования человеком научных знаний;
- воспитание учащихся на примере жизни и деятельности выдающихся ученых, что очень важно с нравственной стороны.

При отборе содержания естественнонаучного образования необходимо учитывать, чтобы отобранные материалы для изучения основ естественнонаучных предметов (факты, понятия, законы, теории) должны быть преподнесены учащимся системно. Известно, что систематизация информации в любой науке играет важную роль как для более глубокого понимания ее сущности, так и для успешного использования этой информации. Систематизация знаний по естественнонаучным предметам должна проводиться в соответствии с дидактическими принципами системности и последовательности изложения знаний.

В преподавании естественнонаучных предметов необходимо широко использовать исторический подход. Например, отдельные разделы целесообразно завершать рассмотрением истории становления научных взглядов по изучаемому вопросу.

Одним словом, преподавание естественнонаучных предметов в школах потребует от учителя не только знания своего предмета, но и методического мастерства. Для творчески работающего педагога это будет увлекательным процессом методического поиска и находок.

Таким образом, разработанный подход к конструированию содержания образования позволит научно обоснованно конструировать учебные программы и учебники по естественнонаучным предметам в профильной школе, создаст

основу для дальнейших теоретических и практических исследований по проблемам методического обеспечения средней школы.

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### ***Relative adjectives in system of the Yakut lexicon***

**Abstract:** The paper considers word formation, semantic means of the Yakut language determining the quality status of genetically relative adjectives resulting in formation of qualitative-relative adjectives. The main semantic, structural-morphological and system characteristics of qualitative-relative adjectives of the Yakut language are refined.

**Keywords:** the Yakut language, qualitative adjectives, relative adjectives, word formation and semantic means of the Yakut language, functioning.

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### ***Относительные прилагательные в системе якутской лексики***

**Аннотация:** В статье рассматриваются словообразовательные, семантические средства якутского языка, определяющие качественный статус генетически относительных прилагательных, приводящие к образованию качественно-относительных прилагательных, а также уточняются основные семантические, структурно-морфологические и системные характеристики качественно-относительных прилагательных якутского языка.

**Ключевые слова:** якутский язык, качественные прилагательные, относительные прилагательные, словообразовательные и семантические средства якутского языка, функционирование.

Имя прилагательное как номинативная единица, обозначающая признак и свойство предметов и явлений объективного мира, наряду с другими лексико-

грамматическими разрядами слов занимает особое место в лексико-семантической системе якутского языка.

А якутском языке *е̄я̄* *төөөө̄а̄а̄о̄а̄е̄ү̄ю̄о̄а̄* *е̄а̄е̄* *һа̄ӣһ̄о̄ӣү̄о̄а̄е̄ү̄ю̄а̄* *÷а̄һ̄о̄ӯ* *о̄а̄÷е̄* отличается от других лексико-грамматических разрядов слов: а) *ӣо̄һ̄о̄о̄һ̄о̄а̄е̄а̄м* *ӣӣо̄ӣе̄ӣа̄е̄÷а̄һ̄е̄е̄о̄* *о̄ӣо̄ӣ* *һ̄е̄ӣа̄ӣе̄ç̄ӣа̄ӣа̄е̄ү̄* *т̄о̄е̄* *һ̄е̄ӣо̄а̄е̄һ̄е̄÷а̄һ̄е̄ӣ* *о̄ӣо̄о̄а̄а̄е̄а̄ӣе̄е̄*; а) *ӣа̄е̄е̄÷е̄а̄м* *һ̄о̄а̄а̄һ̄о̄а̄* *һ̄е̄ӣа̄ӣӣа̄о̄а̄ç̄ӣа̄а̄о̄а̄е̄ү̄ю̄о̄а̄* *а̄о̄о̄е̄е̄һ̄ӣа̄*; а) *һ̄е̄ӣо̄а̄е̄һ̄е̄÷а̄һ̄е̄им* *о̄ӣо̄о̄а̄а̄е̄а̄ӣе̄а̄м* *а̄* *о̄о̄ӣе̄о̄е̄е̄* *а̄о̄о̄е̄а̄о̄о̄а̄* *һ̄ӣһ̄ӣӣа̄ӣ* *т̄о̄е̄ӣү̄е̄а̄ӣе̄ү̄*, *а̄ӣһ̄е̄ӣа̄ӣе̄ү̄*, *е̄ӣа̄ӣӣе̄* *÷а̄һ̄о̄е̄* *һ̄ӣһ̄о̄а̄а̄ӣӣа̄ӣ* *һ̄е̄а̄ç̄о̄а̄ӣӣа̄ӣ*; а) *ӣа̄е̄е̄÷е̄а̄м* *һ̄ӣа̄о̄е̄о̄е̄÷а̄һ̄е̄ӣе̄* *һ̄е̄һ̄о̄а̄ӣү̄* *һ̄о̄а̄а̄һ̄о̄а̄* *о̄һ̄е̄е̄е̄о̄а̄е̄ү̄ю̄о̄а̄* *е̄* *о̄ӣа̄ӣү̄е̄о̄а̄е̄ү̄ю̄о̄а̄* *о̄ӣо̄ӣ*; а) *һ̄ӣ÷а̄о̄а̄а̄ӣһ̄о̄ӯю̄* *һ̄* *ӣа̄о̄а̄÷е̄ү̄ӣе̄* *ӣа̄о̄ӯ* *е̄* *һ̄о̄а̄ӣа̄ӣе̄* *а̄* *е̄а̄÷а̄һ̄о̄а̄а̄* *ӣо̄а̄а̄а̄е̄ү̄а̄ӣӣа̄ӣ* *һ̄е̄ӣа̄а̄*; а) *ӣа̄е̄е̄÷е̄а̄м* *о̄ӣо̄ӣ* *ӣа̄о̄а̄ç̄ӣа̄а̄ӣе̄ү̄* *ӣа̄о̄а̄÷е̄е̄*; æ) *ӣа̄е̄е̄÷е̄а̄м* *о̄ӣо̄ӣа̄ӣо̄ӣа̄* *а̄ӣа̄ӣо̄е̄о̄* *ӣ* *һ̄о̄а̄ӣо̄а̄ӣ÷е̄а̄а̄о̄е̄е̄* *т̄о̄е̄е̄а̄а̄а̄о̄а̄е̄ү̄ю̄о̄а̄*, *о̄.а̄.* *т̄о̄е̄е̄а̄а̄а̄о̄а̄е̄ү̄ю̄о̄а̄* *ӣӣа̄о̄о̄* *е̄ӣа̄о̄ӯ* *е̄а̄о̄а̄а̄ӣо̄е̄р* *÷е̄һ̄е̄а̄*, *һ̄е̄е̄ӣӣа̄ӣе̄ү̄*, *т̄о̄е̄ӣа̄а̄е̄а̄ǣӣһ̄о̄е̄*, *а̄һ̄е̄е̄* *ӣӣе̄* *ӣа̄о̄а̄о̄ӣа̄ү̄о̄* *а̄* *е̄а̄о̄а̄а̄ӣо̄е̄р* имен *һ̄о̄ӯа̄һ̄о̄а̄е̄о̄а̄е̄ү̄ю̄о̄а̄*.

При изучении адъективной лексики якутского языка остается до сих пор вопрос о её границах, месте в лексической системе языка в целом. Ведь хорошо известно, что общей характеристикой строения тюркских языков многими тюркологами считается омонимия основ разных частей речи, которую Б.И. Татари́нцев называл лексико-грамматическими вариантами (далее ЛГВ) слов [1]. В ходе составления словарных статей Большого толкового словаря якутского языка, определяя значения лексических омонимов и ЛГВ, а именно путем сопоставления толкований лексических значений, мы вынуждены были признать, что часть производных прилагательных фактически представляют собой вторичные единицы номинации, пришедшие из других классов – ср. случаи типа баай ‘богатство’ и баай ‘богатый’, тимир ‘железо’ и тимир ‘железный’, киин ‘центр, средоточие’ и киин ‘расположенный в центре, центральный’. Поэтому в соответствии с утвержденным общим правилам в словаре лексические омонимы помечаются римскими цифрами полужирным шрифтом, а ЛГВ слов (переход слова из одной части речи в другую, конверсия) обозначаются полужирной арабской цифрой, а затем следует специальная грамматическая помета. Если принять во внимание, что лексический состав по данным словарей Якутско-русского словаря [ЯРС 1972] и Краткого толкового словаря якутского языка [КТСЯЯ 2008], в последнем насчитывает около 5400 единиц, из них адъективные слова составляют примерно 556 единиц, а в первом 25300 заглавных единиц прилагательные составляют около 4700 единиц. Общий

объем адъективной лексики в словарях достаточно велик – это  $\approx 18\%$ , или 1/6 словарей. Естественно, что, если та или иная лексема в словаре маркирована пометой «да±.» 'прил.', то в целом совокупность таких лексем имеет четкие системные границы. Но, в словарях омонимия форм зафиксирована с единицами разных частей речи и служебных слов: именами существительными, глаголами, наречиями, числительными, глагольными залогами, местоимениями, частицами, послелогами, междометиями. Фактически, однако, лексико-грамматические омонимы, рассматриваемые в якутском языке, зачастую являются результатом словообразовательного процесса конверсии [2]. В данном случае речь не идет об относительных прилагательных, у которых лингвистическая природа и механизм лексикализации до настоящего времени остается неисследованным объектом якутского языка.

В якутском языке адъективные слова представлены: а) качественными прилагательными, обозначающими качество предмета, могущими проявляться с различной степенью интенсивности; б) относительными прилагательными, обозначающими свойства предмета через отношение к другому предмету, признаку или событию. Следует отметить, что основная масса относительных прилагательных (далее ОП) является производными (сааттаах 'подстыдный, позорный' от субстантива саат 'стыд, позор', күөллээби 'озерный' от субстантива күөл 'озеро' и т.п.). Это подтверждает точку зрения об ОП как основном средстве пополнения класса адъективных слов.

Объектом исследования служат словообразовательные, функциональные, семантические средства якутского языка, определяющие качественный статус генетически относительных прилагательных, приводящие к образованию качественно-относительных прилагательных.

Целью данной статьи является выяснение основных семантических, структурно-морфологических и системных характеристик качественно-относительных прилагательных якутского языка.

Качественные прилагательные обозначают признак и относятся к категории так называемых «чистых предикатов». Они обозначают признаки предметов и событий, обусловленные самой их природой (цвет, форма и некоторые другие), и другие их характеристики, связанные с размером, протяженностью, интенсивностью и др. [3].

Основное различие между качественными и относительными прилагательными заключается в том, что семантическая структура ОП не включает в себя центрального признака, так как она соотносится с семантической структурой исходного, мотивирующего предметного слова. В частности, особенностью относительных прилагательных является комплекс отношений, которые существуют между признаком и предметом/явлением объективной действительности [5].

- Ɔɔɔɔɔɔɔ ɔɔɔɔɔɔɔɔ ɔɔɔɔɔɔɔɔɔ ɔɔɔɔɔɔɔɔɔɔ ɔɔɔɔɔɔɔɔɔɔɔ ɔɔɔɔɔɔɔɔɔɔ (ɔɔɔɔ ɔɔɔɔ  
 'ɔɔɔɔɔ ɔɔ') ɔɔɔɔɔɔɔɔ ɔɔɔɔ ɔɔɔɔ), ɔ ɔɔɔɔɔɔɔ, ɔɔɔɔɔɔɔ ɔɔɔɔɔɔɔɔɔɔ ɔɔɔɔɔɔɔɔɔɔɔ  
 ɔɔɔɔɔɔɔ ɔɔɔɔɔɔɔ, ɔɔɔ ɔɔɔɔɔɔɔɔ ɔɔɔɔɔ (ɔɔɔ ɔɔɔ 'ɔɔɔɔɔɔɔɔ ɔɔɔɔɔ', ɔɔ'ɔɔ  
 ɔɔ 'ɔɔɔɔɔ ɔɔɔ' ɔ ɔ.ɔ.).

- Ìðeçíàê, êà÷àñòàí Ìðààíàòà Ìæàò Ìðíàëüòñý ñ Ìàçíé ñòàíáíð èñòáíêeáíí-  
 ñòè, градуальности, êíòíðýe Ìðààààüòñý Ìàðàèòàðíé òíüüêí äëü êà÷àñòàíííáí  
 Ìðèèàààòàëüííáí òêèèèòàëüíé òíðíé, òàáíáíèàì èèè Ìàòíðáíèàì Ìñíà  
 Ìðèèàààòàëüííáí, Ìàçèè÷íüè ñí÷àòàíëüè ááí ñ äòóãèè êèíáàè è ÷àñòèòàè, à  
 òàèæà Ìàêíòíðüè àòèèêíàè (àí-à'üü 'ñíààðáíí áíðüèè', èóóóñ-èóðààíàð  
 'ñíààðáíí ñóðíé', ñðàýýð òèàòáí 'í÷áíü áíüüè, áðíàáíüè', ì÷äýéëýí  
 'ðíðíðáíüèè', Ìèóñ 'éä'<sup>33</sup> 'í÷áíü òííüè', ì÷äýé àà ì÷äýé Ì'í'óè 'í÷áíü òíðíðàà  
 èçààèè', ëýðüòòýí ëýðý êüüñ 'èðàêèààü èð èðàêèààèèèè ààóðàè'. Ìáíðíèà,  
 Ìòííêèòàëüíüà Ìðèèàààòàëüíüà Ìá Ìàðàçòò èííàðàèèà.

- Ñ ìàèáîëüøáé îò÷àòèèâîñòüð èà÷âñòââîíüâ ïðåçìàèîüâ ñèíâà àñòîíàðò à ñèííèèè÷âñèèâ è àòîíèèè÷âñèèâ òòíîâáíèý. Ìàíâíüâ òòíîâáíèý ìà ïðèâèýðòñý ó òòíîèèòâèüíü.

Подчеркнем, что, именно под воздействием аффикса и производной основы ОП, наблюдается иная картина в формировании их категориального



значения. Функция выражения внутреннего предметно-относительного признака, опираясь на обобщенность предметного отношения, более активно связана с предрасположенностью ОП к выражению качественного признака как внутренне присущего к определяемому. В данном случае устанавливается «не качественность прилагательного, а качественность определенного значения (относительного) прилагательного» [6]. Качественность относительных прилагательных «может основываться на особенностях значения словообразовательной модели, зависящих не столько от основы, сколько от аффикса, который имеет так или иначе специализированную семантическую функцию» [7].

В структуре якутских ОП в зависимости от доминантности предметно-относительного или качественно-оценочного значений можно выделить два класса отсубстантивных, отглагольных дериватов ОП: относительные и качественно-относительные прилагательные.

Относительные прилагательные представлены в основном с аффиксами: –гы (-кы, -цы) – ортоку ‘средний’, аныгы ‘современный’, сайынгы ‘летний’; –таабы (-даабы, -наабы, -лаабы) – тыатаабы ‘таежный’, чугастаабы ‘ближний’; –аҕас – тоһоҕос ‘отломанный’, быһаҕас ‘неполный’; –(ы)мтыа – көрүмтүө ‘способный все видеть’.

Значительное количество качественно-относительных прилагательных охватывает производные прилагательные с аффиксами –мсах (-ымсах)-куттамсах ‘трусливый’, улахамсык ‘гордый, считающий себя важным’; –лаах (-даах, -наах, -таах) – дьоллоох ‘счастливый’, күүстээх ‘сильный’; –(ы)мтабай (-и)мтэбэй, –(ү)мтэбэй киһиргэмтэбэй ‘хвастливый’, сиргэмтэбэй ‘пугливый’; –лаа (-лыы, -таа) – сагалыы ‘новый, сделанный по новому’; –бай (-бөй), –гэй (-гөй) – сатабай ‘беспорядочный’ и т.д.

Исходя из наличия в семантической структуре дериватов и самих ОП, данная группа значений в генетическом плане конечно восходит к предметно-относительному, но качественно-относительное значение четко прослеживается на синхронном срезе. Сущность качественно-относительных прилагательных заключается в том, что конкретная семантика ОП зависит от сочетания с предметными именами. В именных группах типа күүстээх киһи (от субстантива күүс ‘сила’) ‘сильный человек’, өйдөөх киһи (от субстантива өй ‘ум, разум’) ‘умный человек’, самнархай дьиэ ‘ветхий дом’ (от глагольной формы самнар

‘развалить, обрушить’, даллабар кулгаах ‘оттопыренные уши’ (от глагола даллай ‘раскинуть руки или крылья в стороны’) можно говорить о преобладании у них значения качественного признака, так как отсубстантивные ОП способны образовать компаративы и могут  $\text{ñi} \div \text{àòàò} \ddot{\text{u}} \text{ся} \text{ñ} \text{ íàð} \ddot{\text{a}} \div \text{è} \ddot{\text{y}} \text{ìè} \text{ íàð} \ddot{\text{u}}$ ,  $\text{èièè} \div \text{áñòàà} \text{ á} \text{ ðièè} \text{ ïð} \ddot{\text{a}} \ddot{\text{a}} \ddot{\text{a}} \ddot{\text{e}} \ddot{\text{y}} \text{á} \text{í} \ddot{\text{a}} \text{í} \text{ ñèi} \ddot{\text{a}} \text{à}$ . Именно такая именная группа формирует качественно-характеризующее значение, а не семантику предметно-относительной признаковости.

В то же время для высокопродуктивного, полифункционального аффикса -лаах характерна устойчивая тенденция к полной лексикализации и выражению качественной и относительной признаковости в зависимости от употребления в контексте. Слова с аффиксом – лаах большинство исследователей рассматривает как «своеобразную форму прилагательных» [8], выражающую «обладание тем предметом или качеством, названием которого служит имя, от которого они образованы». Л.Н. Харитонов отметил, что основное значение формы – лаах «состоит в том, что она выражает обладание данным предметом, мыслимое как признак или свойство другого предмета» [9]. Н.К. Дмитриев считал, что они представляют собой «одну из форм принадлежности (обладания), точнее – более древнюю ее форму» [10]. Е.И. Убрятова выносила эту конструкцию за рамки категории прилагательного: «Имена на –лаах, которые в грамматиках по якутскому языку рассматриваются как имена прилагательные, но которые в действительности, за большим исключением слов, ставших прилагательными (дьоллоох ‘счастливый’, үөрэхтээх ‘образованный’ и др.), не могут быть отнесены ни к одной из имеющихся в якутском языке частей речи и составляют особую группу слов, употребляются в качестве примыкающих определений...» [11]. Мы считаем, что именные формы на -лаах, которые обозначают качество предметов и предметных понятий, и которые образуют степени сравнений, то они в полной мере относятся к категории качественно-относительных прилагательных ( $\text{íyð} \text{íi} \text{x}$  ‘умный’,  $\text{olus} \text{ íyð} \text{íi} \text{x}$  ‘очень умный’,  $\text{krst} \text{é} \text{é} \text{x}$  ‘сильный’  $\text{a} \text{g} \text{à} \text{ra} \text{ krst} \text{é} \text{é} \text{x}$  ‘весьма сильный’). А те, которые не образуют степеней сравнения и не сочетаются с интенсификаторами, то они относятся к категории обладания имени ( $\text{suol} \text{laa} \text{x}$  ‘имеющий дорогу’,  $\text{mastaa} \text{x}$  ‘имеющий деревья, состоящий из деревьев’,  $\text{si} \text{én} \text{n} \text{é} \text{x}$  ‘имеющий внука’).

Следовательно, на образование качественно-относительных прилагательных влияют такие факторы как: 1) семантический; 2) морфологический; 3) контекст.

Основное отличие ОП от других форм адъективной лексики заключается, прежде всего в предельно обобщенном характере предметного значения производящей основы ОП, а также в наличии у него «общего грамматического значения имени прилагательного как средства выражения признака, данного в определяемом предмете» [12].

Таким образом, в якутском языке, в зависимости от семантики, словообразования и контекста можно выделить качественно-относительные и относительные прилагательные. Качественно-относительные прилагательные можно считать промежуточным классом между относительными и качественными. Качественно-относительные и относительные прилагательные проявляют существенные различия как в плане словообразования, так и в плане семантики.

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3. ОП – относительные прилагательные.
4. ЯРС – Якутско-русский словарь. Москва, 1972.

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## ***Means of quantification and length distances in English and other languages***

**Abstract:** In this article the author analyzes the characteristic feature of traditional terms, to measure the length of the English language in comparison with other languages.

**Keywords:** numerativ, mile, statute.

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## ***Средства квантивикации длины, расстояния в английском и в других языках***

**Аннотация:** В данной статье автор анализирует характерные особенности традиционных терминов для измерения длины английского языка в сопоставлении с другими языками.

**Ключевые слова:** нумератив, mile, statute.

На территория Таджикистана и Средней Азии в целом в древнопериод и в первые годы советской власти употреблялось обозначения, которые в настоящее время или не применяются, будучи заменены на термины, основанные на метрической системе измерения длины и расстояния, либо применяются более или менее редко.

Характерной особенностью традиционных терминов для измерения длины расстояния является их величина, зависящая от времени и места употребления /области, города и т.д./ в различных странах мусульманского Востока. В Средней Азии бытовала кроме "обще мусульманской" система также и специфически свойственная ей система. В различных частях, городах и

областях бредшей Средней Азии в различные периоды конкретная мера - величина, обозначаемая тем или иным нумеративом слова - термином также была различной. До сих пор имеются большие трудности в определении конкретных величин, выражаемых до революционными нумеративами как в различных областях и странах Ближнего и Среднего Востока, так различных районах Средней Азии разные периоды. Этой проблеме посвящена довольно обширная научная литература.

В английском одна из самых распространенных единиц длины "миля" (a mile), которая однако имеет разновидности:

For example: Mile, statute - United States = 5,280 feet.

1. The channel between the two points is not quite a mile broad.

Mile, nautical - Great Britain = 6,080.20 feet.

Mile, nautical - Great Britain = 1,852 metres. International.

Примеры:

2. "I'd go ten thousand mile" / 1830. Dickens, Day. Copp. XI.

3. "My eldest pupil...was miles and miles my superior" / 1899.

4. "A hundred mile a day is nothing with me" / Defoe R 167.

Приводим также другие английские меры длины и расстояние:

1. Nail.

2. Hand (length) - US, GB - 1,333 palm - 400 inch - 10 meter.

3. League (land) - US = 3 statute miles.

4. Line - 1/4 barlecorn - 0,8 inch - 2,03.

5. Link, Gunter's or surveyors - US, GB - 7,92 inches.

6. Foot - one third of yard and equivalent to 0,303 m.

7. Furlong - 220 yards = 1/32 bolt.

8. Ell - 45 inches = 1/32 bolt.

9. Fathom - US - 4 cubit GB - 216 c.ft (foot 7).

10. Finger - US - 1/8 yard - 4,50 inch.

11. Cluch - barleycorn = 25.40 millimeter = 1/36 yard.

12. Cord - US - 8 cord ft - 4,74 c.y.

13. Cubit = 6 palm = 1.50 ft.

14. Cubit - the length of the arm from the elbow to the wrist used as a measure.

15. Cut - US, GB - 1/48 spindle - 300 y.

16. Digit I. "палец" 2. ширина пальца /как мера; \*  $\frac{3}{4}$  дюйма/; 3. мат. однозначное число /от 0 до 9/.

Традиционные мера длины, применяемые в англосаксонских странах, достаточно разнообразны.

Длина, расстояние являются одним из наиболее актуальных в повседневной жизни измерений, поэтому неудивительно, что средства его квантификации в различных языках достаточно разнообразны; речь идёт о напряжённом когнитивном поле. Как и в других подобных случаях, при сопоставлении мы сталкиваемся с различными в сравнительных языках традиционными системами, которые в настоящее время в основном заменены единой методической системой.

Как известно, наиболее древними единицами измерения длины и расстояние являются слова, обозначающие пространственные отношения между различными частями тела человека, в особенности при движении рук и ног.

В таджикском языке этот разряд также весьма развит. Хотя они обозначают лишь приблизительные единицы измерения, но в разговорном языке и в быту, а также в литературе нумеративные слова такого рода имеют широкое распространение.

Приводим обзор основных таджикских средств квантификации длины и расстояний.

1. Ангушт - /"палец", тюрке. - узб., туркм, бармак/ - мера длины.
2. Фарсах - /другое обозначение этой меры санг - сокращ. от фарсанг/- мера длины пути, равная 12000 шагов /кадам/, реже газов.

Размер фарсаха колебался от 5,6 км /равный 9 тысяч шагов/ до 8,5 км тысяч шагов-кадамов/.

В среднем для Бухары, Самарканда, Ташкента, Ферганы и Хорезма источники XIX века считают обычным фарсах равный 8-8,5 км.

3. Олчин русский "аршин", равен в основном 71 см.
4. Ваджабмерг - длины - расстояние между концами большого пальца и мизинца в предельно раздвинутом положении.
5. Газ - /соответствует арабскому зарь/ - весьма разнообразная мера длины от 61 см /в Хорезме/ до 106,68/ в Бухаре.



В настоящее время и в быту еще иногда пользуются этим эталоном измерения, в основном для тканей, принимая его длину приблизительно в полметра.

Қадам-средней размер шага. Бухариский эмир подбирал скороходов из мужчии одинокового роста, для того, чтобы они одновременно служили эталоном для установления размера кадама.

Кулоч - обозначает расстояние между кончиками пальцев рук, которые вытягиваются в стороны на уровне плеч. Размеры кулоча варьировалан от 142 до 178 см в среднем преобладала величина равная русской моховой сажени, равной 2,5 аршина, т.е. 177-178 см.

Нетрудно заметить типологическое сходство традиционных средне-азиатских и англосаксонских мер длины и расстояния, основанных на перенесении значениям соматических слов.

С другой стороны, специфика англосаксонских терминов во многом определяется исключительным значением судохоства, в то время как специфика средниазиатских терминов зависит от традиционных способов пересечения пустынь и другие.

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### ***Remedial and State Creation Activity of Ukrainian Diaspora of Western Countries at the End of 70s - Beginning of 90s Years of XX Century***

**Abstract:** This article shows the struggle of Ukrainian Diaspora for the people rights in Ukraine. It analyses international and informational activity of Ukrainian Society of Western Countries, which has the aim to guarantee the freedom and democracy in Ukraine.

**Keywords:** Freedom, Democracy, People Rights, Ukrainian Diaspora, Western Countries, Ukraine.

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### ***Правозахисна та державотворча діяльність української діаспори країн Заходу наприкінці 80-х – на початку 90-х років XX століття***

**Анотація:** Ця стаття присвячена висвітленню боротьби української діаспори за права людини та демократію в Україні. Проаналізовано міжнародну та інформаційну діяльність української громади країн Заходу, спрямовану на забезпечення свободи та демократії в Україні.

**Ключові слова:** свобода, демократія, права людини, українська діаспора, країни Заходу, Україна.

В даний час поза межами України перебуває понад 16 млн. українців. Вони становлять одну з найбільш політично, економічно і культурно активних діаспор в світі. На жаль, історія зарубіжних українців, особливо це стосується

післявоєнного періоду, висвітлена надзвичайно слабо та фрагментарно. Правозахисна та державотворча діяльність закордонних українців, незважаючи на важливість проблеми, взагалі являється “білою плямою” української історіографії.

Серед праць, в яких можна знайти інформацію про боротьбу зарубіжних українців за права людини та демократію в Україні, необхідно відзначити роботи Івана Базарка та Ігнатія Білинського, Майкла Бойара, Олекси Калиника, Леоніда Полтави, Євгена Скоцька в яких докладно проаналізована політична ситуація в середовищі української еміграції США [21;22;23;24;25].

Багато уваги висвітленню процесів в середовищі української громади країн Заходу присвятили відомі вітчизняні вчені А. Атаманенко, М. Лендвел, Ю. Макар, В. Макар, А. Уткін, К. Чернова та інші [1;7;8;9;19;20]. Взаємозв'язкам урядових структур і громадських кіл України з українською громадою Канади в другій половині 1940-1980-ті роки присвячений збірник документів та матеріалів “На скрижалях історії”, підготовлений академіком НАН України П.Т. Троньком, вченими Інституту історії України НАН України О.Г. Бажаном та Ю.З. Данилюком [11]. Багато інформаційного матеріалу про життя і діяльність зарубіжних українців міститься в монографії українських науковців Трощинського В.П. та Шевченко А.А. [18]. Ряд наукових публікацій присвятив висвітленню боротьби української діаспори за демократію та державну незалежність України і автор цих строк [11-17].

Проте, всі вони лише побіжно торкаються зазначеної проблеми. Тому дослідження і висвітлення довголітньої боротьби еміграції за демократію і незалежність України викличе значну зацікавленість як професійних науковців, так і представників політичних партій, громадського загалу і буде становити суспільну користь за нинішніх складних умов перехідного періоду українського державотворення, стане однією з форм співпраці із зарубіжними українцями.

Метою даної статті є висвітлення боротьби української діаспори країн Заходу за права людини, демократію та державну незалежність України. Серед завдань статті: показати міжнародну та інформаційну діяльність української діаспори в контексті досліджуваної проблеми.

Активну діяльність в обороні прав людини в Україні розгорнула українська діаспора під час міжнародних конференцій Гельсінкського процесу, які проводи-

лися згідно мандату Фінального Акту Віденської перевірочної конференції, підписаного 35 державами-учасниками у січні 1989 року.

Перша конференція відбулася в Парижі з 30 травня по 23 червня 1989 року. Вона носила назву «Конференція про людський вимір». Делегація закордонних українців складалася з президента Світового Конгресу Вільних Українців (СКВУ) Юрія Шимка, виконавчого директора Комісії Прав Людини СКВУ (КПЛ СКВУ) Христини Ісаїв, представників організації Американців в Обороні Людських Прав в Україні (АОЛПУ) – Віри Еліяшевської і Наталки Прятки з Чикаго, Марії Зарицької з Детройта, Одарки Полянської і Надії Ратич з Нью-Джерсі та представника організації «ВІЗА» Данила Городиського з Каліфорнії. В складі урядової делегації США перебували спеціальний представник Державного Департаменту США Пола Добрянська та член Гельсінкської комісії Конгресу США Орест Дейчаківський [5, С. 53].

Перед початком роботи Паризької конференції закордонні українці відправили на адреси всіх міністрів закордонних справ та керівників делегацій держав-учасниць документацію про порушення прав людини, політичні та релігійні переслідування в СРСР.

Члени делегації зарубіжних українців, які отримали акредитацію як журналісти брали активну участь у прес-конференціях усіх офіційних делегацій. Вони поширювали серед делегатів та кореспондентів міжнародних інформаційних агентств документацію щодо недотримання прав діяльності громадських організацій в Україні, про заборону вільного функціонування УГКЦ і УАПЦ в УРСР, про наявність політв'язнів та запроторених до психіатричних лікарень, про нові репресивні закони в СРСР [5, С. 54].

1-2 червня 1989 року перед Центром Міжнародних конференцій в Парижі силами КПЛ СКВУ та АОЛПУ було влаштоване голодування-молитва на знак солідарності з українськими єпископами, священнослужителями та віруючими УГКЦ, які в той же час проводили аналогічне голодування у Москві, домагаючись легалізації УГКЦ в СРСР. Голодування-молитва відбувалася на фоні синьо-жовтого прапора, великого різьбленого хреста та двох ікон. Закордонні українці тримали транспаранти з прізвищами священнослужителів «катакомбної» УГКЦ в УРСР: Павла Василика, Софрона Дмитерка, Филимона Курчаби, Миколи Сімкайла, Івана Синкова і Володимира Війтишина. Акцію підтримала українська

громада Парижу, понад 30 представників якої взяли в ній участь. Українці співали релігійні пісні, відповідали на запитання іноземних кореспондентів, роздавали інформаційні матеріали про переслідування віруючих та ставили вимоги щодо дотримання релігійної свободи і легалізації УГКЦ і УАПЦ в СРСР [5, С. 55].

Акція закордонних українців була підтримана представниками американської, канадської, британської, французької, швейцарської, болгарської та прибалтійських делегацій. Серед тих, хто долучився до українців та виступив на підтримку їх вимог, були голова делегації Великобританії лорд Ентоні Вільямс та його дружина леді Едвін Вільямс, голова Кестон Коледжу та член британської делегації Майкл Бурдо, члени делегації США Джон Еванс, Енні Бенкофф, Кеті Косман, Пола Добрянська, Орест Дейчаківський, члени делегації Норвегії Майкл Спендоу та Крістофер Гохерод [5, С. 55-56].

Організована закордонними українцями голодування-молитва мала і іншу мету. Саме на 1 червня делегацією СРСР була запланована велика прес-конференція для іноземних журналістів. Акція українців відбувалася біля будівлі, де проходила радянська прес-конференція, а тому викликала великий резонанс серед представників зарубіжних делегацій і світових мас-медіа та стала інформаційним приводом підняти перед делегацією СРСР питання порушення прав людини, свободи релігії та легалізації УГКЦ і УАПЦ в СРСР. Христина Ісаїв та Одарка Полянська поставили керівнику радянської делегації Юрію Кашлеву питання про недопуск представників неурядових організацій та окремих осіб з СРСР на конференцію. Французька неурядова група в складі делегації Франції в цей же час оприлюднила список з 15 осіб, які були запрошені, але так і не отримали від уряду Радянського Союзу дозволу на виїзд. Серед них було і ім'я В'ячеслава Чорновола, запрошеного урядом Канади та заарештованого на 15 діб в УРСР для того, щоб не дати йому можливості взяти участь в роботі Паризької конференції [5, С. 56].

3 червня 1989 року закордонні українці підняли питання про зловживання психіатричними закладами, заборону еміграції, наявність політ'язнів, заборону УГКЦ і УАПЦ, нищення українських національних цінностей в СРСР під час наступної з серії прес-конференцій, яку проводила делегація СРСР.

5 червня 1989 року президент СКВУ Юрій Шимко провів зустріч з головою делегації СРСР Юрієм Кашлевим, у розмові з яким порушив питання релігійної

свободи в СРСР та окремого представництва УРСР на конференціях Гельсінкського процесу. Посол СРСР підкреслив, що за всі справи, пов'язані з правами людини та релігійної свободи в Радянській Україні, відповідальним є уряд УРСР, і тому він не має застережень щодо присутності окремої делегації УРСР на Паризькій конференції, та щоб Україна була 36-країною – учасником конференції.

Керівник делегації СРСР звісно лукавив. Він не мав повноважень вирішувати подібні питання. Адже після того, як президент СКВУ Юрій Шимко обговорив це питання з керівниками делегацій Франції та Канади і вони заявили про те, що якщо СРСР поставить відповідне питання під час конференції, то вони його підтримають, делегація СРСР цього не зробила. Відмовилася вона і включити до свого складу довголітнього в'язня радянських таборів Левка Лук'яненка, який прибув з України [6, С. 58].

Його поїздка на Паризьку конференцію ретельно пророблялася та була одним з «козирних тузів» делегації закордонних українців. Три групи Міжнародної Амністії в Бельгії, Франції та ФРН зверталися за підтримкою з метою забезпечення його приїзду у Бельгію під час Паризької конференції до президента Франції Франсуа Міттерана, короля Бельгії Бодуена IV, прем'єр-міністра Великобританії Маргарет Тетчер та голови Ватикану і Римо-Католицької церкви Іоанна Павла II [5, С. 57-58]. Офіційним приводом його поїздки за кордон було лікування. 8 червня 1989 року Левко Лук'яненко прибув до Бельгії. Члени української делегації на чолі з Христиною Ісаїв відразу ж вирушили до Брюсселю для того, щоб підготувати опозиційного українського політика та громадського діяча до виступу на Паризькій конференції.

15 червня 1989 року члени української делегації з країн Заходу Христина Ісаїв та Наталка Прятка організували у великій залі прес-центру Паризької конференції прес-конференцію Левка Лук'яненка. Її спонсорами виступили КПЛ СКВУ, Міжнародна Амністія та офіційна делегація Бельгії на Паризькій конференції. Прибуття Левка Лук'яненка викликало справжній «фурор» зважаючи на його недавнє звільнення та керівну роль в Українській Гельсінкській Спілці. Під час прес-конференції в залі були присутні більше 60 делегатів конференції, акредитованих журналістів та представників неурядових правозахисних делегацій [5, С. 57].

Левко Лук'яненко на початку прес-конференції зачитав заяву УГС до Паризької конференції, в якій було змальовано посилення адміністративного терору в Україні, завдяки прийняттю «нових репресивних законів про громадську діяльність». Він підкреслив відсутність вільного обміну інформацією між країнами Заходу і СРСР, «паперовий формалізм» заяв М. Горбачова щодо права «суверенного вирішення життя народів», декларативний характер «перебудови», брак політичного плюралізму в політичній і профспілковій діяльності, потребу належного забезпечення прав людини, релігійної свободи та національних прав народів в СРСР [5, С . 58].

Необхідно зазначити, що під час роботи конференції делегація закордонних українців провела напружену і кропітку роботу в міжнародній та інформаційній площині, спрямовану на захист національних та людських прав в Україні.

Делегації КПЛ СКВУ та АОЛПУ провели неодноразові зустрічі з керівником французької делегації - послом Хавьером Дюфренесом де ла Шевальєре, бельгійської делегації - послами Жаком Лаурентом та Вернером Бауенсом, канадської делегації - послом Вільямом Бауером та першим секретарем МЗС Канади Жилем Поір'є, американської делегації - послом Морісом Абрамом, Міжнародної Амністії - Альбертом Небо, кардиналом Франції Жаном Мішелем Лустіже. Останні заявили про повну підтримку вимог українців у сфері дотримання прав людини, релігійної свободи та національних прав українського народу.

Так, виступаючи 2 червня 1989 року Голова делегації Великобританії посол Ентоні Вільямс заявив: «Я хочу звернути увагу на Українську католицьку церкву, що нараховує не менш 4 мільйони, а може й більше вірних і тому є найбільш забороненою релігійною організацією в світі. Я хотів би запитати сучасну совєтську владу, чи вона також вважає, що ліквідація її старим сталінським законом була оправдана?» [5, С. 54].

Голова Канадської делегації Вільям Бауер 5 червня 1989 року розкритикував радянський закон про публічні зібрання та збори від квітня 1989 року та заявив: «Відносно України, то ми постійно чуємо звідомлення про політичних в'язнів і зловживання психіатрією, як також про інші різні форми переслідування осіб та організацій, які борються за людські права, такі як Українська Гельсінкська Спілка. Я хотів би вірити, що це припиниться. Я також приєднуюся



до моїх британських та інших колег, що кінець-кінців Українська уніатська церква буде легалізована» [5, С. 54-55]. 19 червня він закликав Російську Православну церкву долучитися до процесу легалізації УГКЦ і УАПЦ в СРСР.

12 червня 1989 року посол США Моріс Абрам виступаючи на тему релігійної свободи, зокрема, заявив про те, що деякі уряди не виявляють толерантності до релігійних віровизнань незважаючи на те, що вони підписали кінцевий документ Віденської угоди «Про Права і Релігійну свободу» і поставив вимогу, щоб їх застосовували на практиці. Він мав на увазі СРСР. Посол США Абрам під час роботи Паризької конференції підняв питання про дискримінаційне розпорядження органів влади СРСР про реєстрацію релігійних громад. Адже саме від органів влади залежала угода на реєстрацію і відповідно право релігійної громади на легальну діяльність в Радянському Союзі. Продовжуючи цю тему він дослівно заявив: «Чому деяким віросповіданням відмовлено на офіційне визнання, що робиться всупереч Кінцевої Віденської угоди? Наприклад, Українська католицька церква й Українська православна церква ще й досі не визнані советським урядом. Українську католицьку церкву насильно включено в Російську Православну церкву в 1946 році, а Українську Православну церкву заборонено в 1930-х роках за сталінських часів» [5, С. 54].

Член американської делегації Пола Добрянська 16 червня 1989 року підкреслила репресивний характер урядової політики СРСР стосовно нових демократичних рухів, зокрема в Україні: «В Україні ми мали змогу бачити діяльність Української Гельсінкської Спілки та Руху, Народного Руху за перебудову. На жаль, діячів Української Гельсінкської Спілки та інших подібних груп далі переслідують, карають гривнею та 15-денною тюрмою за те, що вони намагаються поширити плюралізм і демократизацію» [5, С. 54].

Під час прес-конференції 7 червня 1989 року, спеціально влаштованої делегацією української діаспори за підтримки Канадської офіційної делегації та Міністерства закордонних справ Канади, зарубіжні українці підняли питання щодо наявності українських політв'язнів в СРСР, недотримання в УРСР релігійної свободи, порушення національних прав українського народу, негативного ставлення уряду СРСР до участі в Паризькій конференції неурядових громадських організацій з України [5, С. 56-57].



Одним із основних результатів, якого добилися закордонні українці під час Паризької конференції стала резолюція її учасників з вимогою до СРСР легалізувати УГКЦ і УАПЦ в СРСР [6, С. 58].

Друга міжнародна перевірочна конференція країн-учасниць Гельсінкського процесу відбулася в Копенгагені 5-29 червня 1990 року. До складу української делегації на цій конференції увійшли представники КПЛ СКВУ Андрій Вітер і Христина Ісаїв, кореспондентка «Голосу України» Леся Шимко, Володимир Малинович із Франції, а також народний депутат України Олесь Шевченко, депутат Київської міської Ради і голова Всеукраїнського товариства репресованих Євген Пронюк.

Серед завдань української делегації були наступні:

1. Довести до уваги урядів-учасників конференції інформацію про тогочасне становище в Україні, порушення там прав людини, а також надати рекомендації з метою їх усунення.

2. Провести інформаційну роботу серед представників іноземних мас-медіа, зокрема, організувати прес-конференцію. Інформувати країни Центральної і Східної Європи та СРСР про боротьбу української діаспори за національні та людські права українців у державах соціалістичного табору, а також про перебіг конференції за допомогою радіопередач BBC International.

3. Налагодити співпрацю з іншими неурядовими представництвами і взаємно посилювати власні позиції [2, С. 15].

Перед початком роботи Копенгагенської конференції КПЛ СКВУ передала всім посольствам країн Заходу Меморандум у якому були змальовані порушення прав українців в Радянському Союзі та ставилося ряд вимог. Зокрема, закордонні українці підкреслювали, що близько 20-30 українських політв'язнів й надалі залишилися в ув'язненні та психлікарнях, що суперечило 7-му принципу Прикінцевого акту Віденської конференції. Серед них Богдан Климчак, Микола Бердник та Олександр Фухніков. Представники української діаспори наголошували, що уряд СРСР досі не визнав офіційно УГКЦ і УАПЦ як легальні інституції і тому їм не повертають конфісковане майно. КПЛ СКВУ засуджувало уряд СРСР за перешкоди для вільного виїзду громадян за кордон та зверталася до учасників конференції закликати органи влади Радянського Союзу не чинити перепон для участі представників неформальних організацій і мас-медіа в роботі

Копенгагенської конференції, а також дотримуватися підписаних Гельсінських угод про вільний обмін інформацією, літературою, творами мистецтва [2, С . 15].

Окремий розділ меморандуму стосувався забезпечення вільних виборів в СРСР і УРСР. Закордонні українці засуджували явні порушення демократичних процедур у радянській виборчій системі, яка діяла на користь керівної Комуністичної Партії Радянського Союзу. Це стосувалося, зокрема, аспектів реєстрації громадських організацій та їх кандидатів, скликання зборів для висунення кандидатів, формування відданих владі виборчих комісій, забезпечення доступу до мас-медіа і реклами, використання особового складу військових частин під час голосування на виборах на користь компартії, практики використання з боку органів влади засобів залякування, наклепів, шантажу, фальсифікації, заборону на в'їзд в Україну офіційних спостерігачів за виборчим процесом від Сенату Канади та Конгресу США [2, С. 15].

Представники української діаспори засуджували уряд СРСР за використання загонів особливого призначення і військових підрозділів проти цивільного населення в Україні, Грузії, Вірменії та Азербайджані з метою придушення національно-демократичних рухів, а також пропонували учасникам Копенгагенської конференції оголосити економічну блокаду Литви з боку СРСР агресивним актом, що загрожував безпеці і економічній співпраці в Європі. Зарубіжні українці закликали учасників конференції з огляду на право національного самовизначення, закріплене у 8 принципі Прикінцевого Гельсінського акту підтвердити право народів на політичну незалежність. Вони рахували, що підпорядкування уряду СРСР урядів союзних республік було примусовим і могло привести до хаосу, економічної нестабільності та громадянській війні. Це в свою чергу загрожувало б безпеці Європи [2, С. 14].

Вони вимагали державних гарантій у справі дотримання прав людини в СРСР, зокрема, існування там незалежного суду, який би базувався «на силі права, а не на праві сили». На думку української діаспори це забезпечило б надійний захист прав людини від переслідувань з боку уряду [2, С. 14].

Представники української делегації постійно брали участь в усіх офіційних заходах під час роботи конференції, звертаючи особливу увагу на прес-конференції, які організовувала радянська делегація. Закордонні українці на кожній із них підіймали українську проблематику. Значно допомагала в подібній

діяльності зарубіжних українців їх активна співпраця з єврейською та литовською неофіційними делегаціями. Спільні виступи та заяви цих трьох груп під час конференції лише посилювали одне одного та були позитивно сприйняті західними та східноєвропейськими делегаціями [2, С. 17].

Дуже важливою, на думку української діаспори, була участь у цій конференції депутатів з України. Євген Пронюк і Олесь Шевченко провели ряд переговорів із головами і членами іноземних урядових делегацій та кореспондентами світових мас-медіа. Олесь Шевченко взяв участь у зустрічі з делегацією Норвезької міжнародної амністії, яких запросила координатор української делегації Христина Ісаїв. Норвежці спеціально приїхали до Копенгагену з метою підтримати українські вимоги під час зустрічей із головою урядової делегації Норвегії, а також делегаціями інших Скандинавських країн [2, С. 16].

Українці в розмовах із урядовими делегаціями піднімали питання необхідності повної легалізації УГКЦ і УАПЦ, звільнення усіх політв'язнів, зокрема Богдана Климчака, реабілітації уже звільнених, зважаючи на їх подальше моральне та адміністративне переслідування, надання Україні статусу офіційного учасника-спостерігача на конференціях Гельсінкського процесу, демократизації виїзду та в'їзду в СРСР, відміни Закону УРСР про проведення демонстрацій, мітингів та зібрань.

Під час прес-конференцій, влаштованих українцями, ставилися вимоги проведення вільних виборів в Україні з присутністю міжнародних спостерігачів, заборони вживання спецпідрозділів КДБ для розгону маніфестацій та мирних зібрань громадян, неприпустимості запроторення до психіатричних лікарень інакодумців та опозиційних до режиму громадян. Крім того докладно висвітлювалося політичне і соціально-економічне становище в Україні та прагнення її народу до державної незалежності [2, С. 16-17].

Європейська преса та телебачення детально висвітлювали діяльність української делегації під час Копенгагенської конференції. Результатом роботи цієї конференції стало узгодження кінцевого документу, який включав в себе, крім іншого, 12 правил проведення вільних виборів із регламентацією обов'язкової присутності на них міжнародних спостерігачів. Конференція в Копенгагені прийшла до висновку про необхідність проведення позачергової заключної конференції НБСЄ у Парижі восени 1990 року.

Необхідно зазначити, що напередодні Паризької конференції НБСЄ, виконавчий директор КПЛ СКВУ Христина Ісаїв взяла участь у Конференції міністрів закордонних справ, яка відбувалася у Нью-Йорку 1-3 жовтня 1990 року. Вона провела переговори з представниками США, Канади, Великобританії та інших європейських країн щодо можливості самостійної участі України у Гельсінкському процесі [3, С. 16].

Участь в Паризькій конференції НБСЄ взяла спільна українська делегація, яка включала в себе як представників української діаспори, так і українців з УРСР. Серед них, зокрема, виконавчого директора СКВУ Христину Ісаїв, голову Комісії закордонних справ Верховної Ради України Дмитра Павличка, народних депутатів України Івана Драча та Богдана Гориня. Українські учасники конференції вже піднімали питання не щодо вирішення тієї чи іншої проблеми, пов'язаної з порушенням прав людини в СРСР. Це втратило свою актуальність. Ставилося питання про право самостійної участі України, яка прийняла 16 липня 1990 року Декларацію про свій державний суверенітет, в Гельсінкському процесі. Українська делегація оприлюднила заяву з цього приводу та лист Голови Верховної Ради України Леоніда Кравчука про самостійну участь України в роботі Паризької конференції НБСЄ [3, С. 17].

Завдяки активній допомозі КПЛ СКВУ та членів редакції «Українського слова» делегація з України мала змогу дати чисельні інтерв'ю кореспондентам світових мас-медіа щодо політичного становища в Україні, прагнення українського народу до самостійності та державної незалежності України. Спільно з вірменською делегацією була влаштована прес-конференція для європейських засобів масової інформації [3, С. 17].

Христина Ісаїв, як представник КПЛ СКВУ, брала участь в офіційних засіданнях конференції. Вона відвідала ряд делегацій країн Заходу та передала вимоги делегатів - членів українського парламенту, яким через протест уряду СРСР було не дозволено брати самостійну участь у роботі конференції [3, С. 17].

Під час роботи конференції НБСЄ було прийнято Паризьку хартію для нової Європи, засновану на гельсінкських принципах, а також створено постійні органи: секретаріат НБСЄ у Празі, Бюро вільних виборів у Варшаві та Центр для відвернення конфліктів у Відні. Було домовлено також про проведення регулярних політичних консультацій [4, С. 502].

Не могли закордонні українці пропустити Конференцію з безпеки і співпраці в Європі «Культура і спадщина», яка проходила у Кракові з 28 травня по 7 червня 1991 року. Делегація КПЛ СКВУ на цю конференцію складалася з Андрія Вітера, Христини Ісаїв, Іванки Яців, Мирослави Олексюк-Бейкер. З України прибули народний депутат України Дмитро Чобіт і радник Комісії культури Верховної Ради УРСР Олександр Кириченко. Проте вони не мали повноважень представляти Міністерство культури КРСР. Це ускладнило діяльність спільної української делегації в плані можливостей виступів під час роботи конференції, а також щодо представлення вимог українців перед іншими делегаціями [3, С. 17].

Проте, незважаючи на це, українці провели зустрічі з делегаціями 21 країни, інформуючи їх про нищення матеріальної і духовної культури в Україні з боку комуністичної системи, наголошуючи на важливості обміну культурними і науковими досягненнями для збереження та відродження національної культурної спадщини. Христина Ісаїв та Мирослава Олексюк-Бейкер брали участь в чисельних прес-конференціях, під час яких піднімали питання пов'язані з проблематикою України. Фінальний документ Краківської конференції російською та англійською мовами був переданий КПЛ СКВУ представникам з України для інформування українського парламенту та громадських організацій про перебіг конференції, важливість Гельсінкського процесу та участі України у ньому [3, С. 17-18].

8-9 вересня 1991 року на запрошення МЗС Канади представники КПЛ СКВУ Андрій Вітер, Христина Ісаїв та Мирослава Олексюк-Бейкер взяли участь в офіційному відкритті канадського консульства в Києві. Вони провели зустрічі з Головою Верховної Ради України Леонідом Кравчуком, міністром закордонних справ України Анатолієм Зленком, представниками українського уряду, парламенту та національно-демократичних сил. Закордонні українці доклали багато сил та енергії, щоб переконати членів уряду України взяти офіційну участь у Міжнародній конференції НБСЄ «Людський вимір» у Москві [3, С. 18-19].

Крім того закордонні українці відвідали ряд активістів українських правозахисних організацій та колишніх політв'язнів. Це було зроблено з метою кращої підготовки до Московської конференції НБСЄ. Країнам Заходу було вислано документацію, яка змальовувала політичну ситуацію в Україні після

проголошення державної незалежності 24 серпня 1991 року. Андрій Вітер зустрівся з канадським консулом Нестором Гайовським та висловив йому побажання закордонної української громади в зв'язку з проголошенням державної незалежності України [3, С. 16, 18].

З 10 вересня по 4 жовтня 1991 року українська делегація брала участь в Московській конференції НБСЄ. В її складі були голова Комісії прав людини при Верховній Раді України, народний депутат Олександр Ємець, посол України в РСФСР, народний депутат Володимир Крижанівський, перший секретар і представник МЗС України Андрій Веселовський, представник Товариства репресованих в Україні та групи «Гельсінкі-90» Наталія Беліцер, голова товариства «Зелений світ» в Україні Наталія Преображенська, голова КПЛ СКВУ Андрій Вітер, виконавчий директор КПЛ СКВУ Христина Ісаїв, голова АОЛПУ Божена Ольшанівська, члени КПЛ СКВУ Мирослава Олексюк-Бейкер і Ольга Заверуха [3, С. 19].

Протягом трьох з половиною тижнів конференції члени української делегації провели чисельні зустрічі з делегаціями країн Заходу, інформуючи та переконуючи їх про те, що Акт проголошення державної незалежності України повністю повноправний та веде до прийняття нової Конституції України та ряду різних договорів, які приведуть до повного відділення України від СРСР. З представниками іноземних делегацій докладно обговорювалися питання повноправної участі незалежної України в НБСЄ, ставлення України до сусідніх держав та республік СРСР, непорушності кордонів України, наявності на її території ядерної зброї, ставлення уряду України до військових і економічних союзів, а також національних меншостей, які проживали в Україні [3, С. 19].

Ці ж теми обговорювалися і на проведеній 13 вересня 1991 року прес-конференції української делегації. Українці підкреслювали той факт, що на кінцевому етапі боротьби за державну незалежність України національно-демократичні сили уникнули будь-яких насильств, кровопролиття та воєнних конфліктів, які були характерні для більшості регіонів колишнього СРСР [3, С. 20].

Про зацікавлення українською проблематикою свідчила кількість кореспондентів світових мас-медіа, які відвідали українську прес-конференцію. Їх було понад 60, тобто вдвічі більше ніж приходило зазвичай на інші подібні заходи, та втричі більше ніж з'явилося на зустріч із відомою російською правозахисницею

Еленою Бонер, яка також прийшла для того щоб висловити підтримку українській делегації [3, С. 20].

Під час роботи Московської конференції НБСЕ було прийнято ряд доповнень до фінального документу Копенгагенської конференції щодо принципів, яких мали дотримуватися учасники Гельсінкських угод щодо поширення діяльності учасників правозахисного руху. Зокрема, була створена Місія експертів НБСЕ для перевірки усіх проблем із порушенням прав людини. Був зроблений наголос на механізмах, які повинні були забезпечити невідворотність демократичного поступу і підтримувати правові системи, які спиралися на принципи справедливості. Крім того, було підкреслено важливість праці таких неурядових організацій як КПЛ СКВУ. Їм надавалося більше можливостей для діяльності під час Гельсінкського процесу [3, С. 20].

Загалом, як підкреслювали представники КПЛ СКВУ, присутність української делегації на Московській конференції НБСЕ була дуже корисною в плані налагодження міжнародних відносин, поширення демократії та для подальшої розбудови української державності [3, С. 20].

Підсумовуючи все вищесказане необхідно відзначити, що:

1) Українська діаспора країн Заходу вела активну боротьбу за права людини і права української нації в УРСР. Вона трактувалася як видозмінена форма боротьби за відродження державної незалежності України;

2) Українські правозахисні організації в країнах Заходу здійснили відчутний тиск на органи влади, громадськість та мас-медіа США, Канади та країн Західної Європи під час розвитку Гельсінкського процесу з метою здобути їх підтримку та підняти питання дотримання прав людини в Україні під час переговорів з СРСР наприкінці 80-х – на початку 90-х років XX століття;

3) Дії української діаспори увінчалися успіхом, про що свідчить реакція міжнародної спільноти та її тиск на органи влади СРСР для позитивного вирішення питань, які піднімали зарубіжні українці під час міжнародних конференцій НБСЕ. Реальним результатом стали законодавчі зміни в СРСР, припинення порушення прав людини та релігійної свободи в УРСР, звільнення ряду ув'язнених українців, започаткування самостійної участі України, як незалежної держави у Гельсінкському процесі на початку 90-х років XX століття.



Серед перспективної тематики подальших досліджень – необхідність висвітлення боротьби української діаспори за релігійну свободу в Україні.

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## ***Synonymy of Latin anatomical terms: contrastive aspect***

**Abstract:** The article is honored to the problem of analysis of the phenomenon of synonymy in the Latin anatomical terminology. The author proposes differential features of presented synonyms noun pairs (rows) in the Latin anatomical terminology.

**Keywords:** synonymy, anatomical terminology, nomenclature, Latin language, contrastive aspect.

Usually Synonymy is analyzed as inherent characteristic of art style, however Synonymy in scientific style is considered as an unacceptable phenomenon: it is disturbed to exact and unequivocal definition of certain term. Selection of the most exact for names of concepts causes arising different nomination-variants. Therefore synonymy of term-system indicates it's development.

Some scientists consider synonymy as quite negative phenomenon (A. Koval, E. Tolikina, A. Dyakov). They highly recommend to exclude all the synonyms and to reach the prompt unification of nomenclature. On the one hand, synonymy prevents the exact research of the subject. Moreover, it requires special knowledge for storage and understanding of units. However, A. Akhmanova and V. Danilenko adhere to the contrary opinion. Scientists consider synonymic terms to be preeminence of Latin nomenclature as far as synonymic language units reflect all the semantic nuances of the concept. It helps us to describe this concept more exactly. It is important that synonymic terms have the same meaning [1].

Synonymy phenomenon inherent in each of terms, including anatomical terminology. A. Avksentyev studied in detail the problem of synonymy in anatomic terminology; also scientific works of S. Shvetsova, V. Hantakova, Y. Shaglayeva are worthy of attention. One of the main task of their scientific works is to draw up synonymous concepts and to establish clear boundaries between them. Thus, the

purpose of our research is to find-out the features of synonymy usage in some Latin anatomical noun-terms and to determine accurate differential signs of the present synonymic pairs, groups (rows) of the Latin anatomical terms. Object of this research work is the Latin noun anatomical terms, synonymous to human head and neck [2; 3; 4]. The topicality of this research is related with recent adoption of a new anatomical terminology, in which the question of synonymy remains unexplored.

There are 65 synonymic rows in modern anatomic nomenclature [5; 6]. In the course of our work 11 synonymous rows, indicated head and neck, were researched. Particular importance are the following dominant denotations: "aperture", "groove", "crack", "neck", "comb", "lip", "cell", "cavity", "bunch", "seam", "well".

For designation of concept "**aperture**" (93) in anatomic terminology such lexemes are used: *foramen*, *inis n*; *ostium*, *ii n*; *porus*, *i m*; *apertura*, *ae f* and *hiatus*, *us m*. Each lexeme has it's own shade and uses only in specific, accurately defined by the Nomina Anatomica cases.

The most frequent lexeme, indicated an "aperture", ***foramen***, ***inisin*** (it occurs in 46 cases in anatomic terminology) is translated into Latin as "hole, outage, pit" [7]. In anatomy it is used for designation of different formations (namely in osteology, arthrology and miology). Most of the values of this lexeme are related to the skeleton holes (*foramen apicis dentis*, *foramen lacerum*, *foramen zygomaticoorbitale* etc.). Moreover, this lexeme is used to refer anatomical units formed tendons of muscles, ligaments or cartilage (*foramen ischiadicum majus*, *foramen trilaterum*, *foramen thyroideum*, *foramen venae cavae inferioris*), there is no one similar formation in the head and neck anatomy.

Almost equally lexemes *ostium*, *ii n* та *apertura*, *aef*. ***Ostium***, ***ii n*** (in 19 cases), comes from the Latin "*entrance, mouth, doors, gates*", are used in anatomic terminology [7]. In anatomical terminology this lexeme indicates the hole in a hollow, tubular formation: *ostium pharyngeum tubae auditivae*, *ostium tympanicum tubae auditivae*. The usage of these lexemes deserves special attention, while they show differences in the usage in anatomical terminology, namely *ostium venae cavae inferioris* та *foramen venae cavae inferioris*. In spite of these lexemes are not related to the anatomy of the head, first one marks the location of the entry vena cava to the heart, and the other is used for nomination of the hole, formed tendon of the

diaphragm through which the inferior vena cava enters the abdominal cavity in the chest.

**Apertura, ae f** (16 cases) is derived from the Latin "disclosure section; hole" [7] and denotes holes cavities: ventricles of the brain, of the nasal sinuses, curls etc. (*apertura externa aqueductus vestibuli, apertura sinus frontalis, apertura mediana ventriculi quarti diana ventriculi quarti*). This lexeme is mostly not translated in Ukrainian anatomic terminology.

**Porus, i m** (in 3 cases) matters "passage, channel" [7]. This lexeme indicates the following openings, which start (or end) the ducts: *porus acusticus externus, porus acusticus internus, porus gustatorius*.

**Hiatus, us m** (in 9 cases) is derived from the Latin "deep hole", "crack" [7]. In anatomic terminology this one is used in senses "crack", "roztvir": *hiatus canalis nervi petrosi majoris, hiatus oesophagi, hiatus tendineus adductorius*.

For a designation of concept "furrow" (108) a couple of nouns is used in anatomic terminology, namely: *sulcus, i m* and *rima, ae f*. The most frequent in anatomic terminology lexeme **sulcus, i m** (103) is used to denote the grooves, which other organs or blood vessels, nerves, tendons, etc. left on the bones (*sulcus cruris helialis, sulcus frontalis inferior*). **Rima, ae f** (y 5) is translated as "crack crack", "exit" [7]. In anatomical terminology this lexeme denotes the space between the parts of the body (tissue) that are partially fused with each other: *rima glottidis, rima oris, rima palpebrarum*.

Also discribed synonymic series include lexeme *philtrum, in*, of Greek origin, meaning "love drink". In anatomical terminology *philtrum, in*, occurs only once to indicate grooves of the upper lip or labial groove.

The concept "**comb**" (39) is presented in anatomical terminology by the following lexemes: **pecten, inis n** and **crista, ae f**. The last one is quite frequency in the anatomic terminology (37 cases): *crista vestibuli, crista buccinatoria, crista conchalis*; first lexeme occurs only twice in researched material (*pecten ossis pubis, pecten analis*).

Synonymic row with dominant concept "**fissure**" (30 ones) in the anatomic terminology consists of lexemes: *hiatus, us m*; *rima, ae f* and *fissura, ae f*. The first two lexemes (*hiatus and rima*) are polysemous and had discussed above. Instead

**fissura, ae f** is used in anatomical terminology in 22 cases to refer any fissure (*fissura petrooccipitalis, fissura longitudinalis cerebri*).

The concept “**lip**” (17) has the Latin equivalents: *labrum, in* and *labium, ii n*. **Labrum, in** (3) - and correlatest with the Latin word-form “lip, edge” [7]. This token is used to display tendon structures, improved the congruence of the shoulder and hip joints: *labrum acetabuli, labrum and glenoidalet* and glenoid lip – *labrum articularis*. In all other cases in the anatomical terminology lexeme **labium, ii n** (14) is used: *labium limbi tympanicum, labium oris* [8].

To display anatomical term “**neck**” (15) *collum, in* (12) and *cervix, icis f* (4) are used. These lexemes are also synonyms in common Latin, but in anatomical terminology they designated a narrow part of the body. However, the difference is the arrangement of the cervix. **Cervix** is part of the term of organ-formations, which do not have a head (*cervix dentis*). **Collum** nominates formations between the head and the rest of the body (*collum mandibulae*). In addition, only the "neck" is translated as *collum*, and everything associated with it, such as the neck muscles (*musculi colli*), neck fascia (*fasciae colli*) etc.

Less frequent synonymous row with meaning “**cell**” is displayed in the anatomical terminology by the following lexemes: *alveolus, i m* and *cellula, ae f*. **Cellula, ae f** (5) indicates the position in the bones of the skull. For example: *cellula ethmoidalis; cellula mastoideus; cellula tympanicae; cellula pneumaticae; cellulae anteriores* [8]. However, this lexeme is polysemous, and in the Latin anatomical terminology is used mainly in the sense of “cell”.

The lexeme **alveolus, i m** is used less frequently than the previous one. This lexeme indicates the alveoli – the components of acini (structural and functional units of the lungs) and cells, in which the teeth are placed on the lower and upper jaws: *alveoli dentales; alveoli pulmonis*.

The main reason of the existence of synonymous row with meaning of “cavity” (28 cases) is caused by historical factors. Concept of “cavity” is used to denote lexeme **cavum, i n**. But according to the International anatomical nomenclature (is adopted in São Paulo in 1997), in most cases, it was replaced by **cavitas, atis f**. In the present Latin anatomical terminology lexeme *cavitas, atis f* (in 26 cases) is used more often. However, for marking cavity of sink (shell) two equivalent synonyms are used: *cavum conchae seu cavitas conchae*.

A numerous synonymous row **"connection"** (190) in the anatomic terminology consists of lexemes: *ligamentum, i n*; *vinculum, i n*; *retinaculum, i n*. **Retinaculum, i n (15)**, derived from the Latin "bond", "bonding", "holder", is used for nomination of tendons that support other anatomical formations (*retinaculum musculorum flexorum, retinaculum patellae laterale, retinaculu minguis*). In head and neck anatomy this term is not found. Polysemantic lexeme ***vinculum, i n (4)*** is translated from Latin like "bridle", "dressing": *vinculum breve tendinis digitorum manus, vinculum longum tendinis digitorum manus* [8]. Similar to the previous noun ***vinculum, in*** is used only in the limbs anatomy.

The most frequent lexeme ***ligamentum, i n (171)*** is derived from Latin "dressing", "connection": *ligamentum apicis dentis, ligamentum auriculare anterius, ligamentum cricopharyngeum*.

Synonymous row with the dominant concept **"joint"** (50) consists of two lexemes: *sutura, ae f* and *raphe, es f*. ***Sutura, ae f (41)*** belongs to syndesmosis, which are continuous fibrous joints of the bones, formed only between the bones of the skull: *sutura sagittalis, sutura lacrimoconchalis, sutura ethmoideomaxillaris*.

The exact translation of ***raphe, es f (9)*** is a "fusion of two halves line organ or body parts", used for the nomination of such formations: *raphe palpebralis lateralis, raphe pharyngis*.

Synonymous row **"pit, hole"** (69) is indicated in the anatomic terminology by two lexemes: *fovea, ae f* and *fossa, ae f*. The first one ***fovea, ae f (16)*** indicates the formation, which to some extent is related to the articular surfaces (it is used only in osteology and arthrology): *fovea articularis inferior atlantis, fovea dentis*.

Unlike previous ones, more frequency lexeme ***fossa, ae f (53)*** denotes any "hole": *fossa hypophusialis, fossa temporalis, fossa pterygopalatina*.

Consequently, the analysis of synonymic terms in anatomical terminology demonstrates that synonymic row with the main sense "hole" is the widest (5) and the dominant lexeme is *foramen, inis n* (46 cases). However, the actual material of this research showed that the most frequency lexemes, used in anatomical terminology, are *ligamentum, in "communication"* (171) and *sulcus, im "groove"* (103).

The phenomenon of synonymy in the International Anatomical Nomenclature as in any other terminological system is quite common, which influence greatly on the rapid development of science. Synonymy helps to differentiate structure, to



determine its main characteristics and features. Consequently the elucidation of the specific synonyms' usage in Latin anatomical terms and installing differential features presented synonymous pairs, groups (rows) of Latin anatomical terms will facilitate learning and memorizing anatomical terminology for students of medical facilities and avoid misunderstandings, connected with their usage.

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## Mathematics, Technology & Engineering

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### ***Novel Data Mining Techniques for Incomplete Clinical Data in Diabetes Management***

#### **ABSTRACT**

An important part of health care involves upkeep and interpretation of medical databases containing patient records for clinical decision making, diagnosis and follow-up treatment. Missing clinical entries make it difficult to apply data mining algorithms for clinical decision support. This study demonstrates that higher predictive accuracy is possible using conventional data mining algorithms if missing values are dealt with appropriately. We propose a novel algorithm using a convolution of sub-problems to stage a super problem, where classes are defined by Cartesian Product of class values of the underlying problems, and Incomplete Information Dismissal and Data Completion techniques are applied for reducing features and imputing missing values. Predictive accuracies using Decision Branch, Nearest Neighborhood and Naive Bayesian classifiers were compared to predict diabetes, cardiovascular disease and hypertension. Data is derived from Diabetes Screening Complications Research Initiative (DiScRi) conducted at a regional

Australian university involving more than 2400 patient records with more than one hundred clinical risk factors (attributes). The results show substantial improvements in the accuracy achieved with each classifier for an effective diagnosis of diabetes, cardiovascular disease and hypertension as compared to those achieved without substituting missing values. The gain in improvement is 7% for diabetes, 21% for cardiovascular disease and 24% for hypertension, and our integrated novel approach has resulted in more than 90% accuracy for the diagnosis of any of the three conditions. This work advances data mining research towards achieving an integrated and holistic management of diabetes.

**Keywords:** data mining; missing value imputation; diabetes management; classifiers; diagnosis accuracy.

## 1. INTRODUCTION

There has been a growing interest in understanding the applications of data mining for clinical decision support in metabolic syndrome and diabetes mellitus type 2 due to its clinical complexity and its association with an increasing risk for heart disease and stroke, and hypertension [1-3]. Many studies have consistently reported suboptimal diabetes control outcomes despite improvements in clinical information and self-management support systems that have been recently established [4-9]. This is in part due to missing clinical data which reduces the information content for accurate decision making. The rationale of the study is that, given appropriate algorithms for imputing missing values, the accuracy of diagnosis based on clinical data should improve. The prime objective of this study is to propose novel imputation techniques in data mining to improve the predictive accuracy of diabetes, hypertension and cardiovascular disease (CVD) from clinical data.

A naive approach to dealing with a record having one attribute value missing involves deleting the entire record. However, the removal of records may leave too few examples covering specialized subsets of data and compromises the analytics. Another approach involves restructuring the dataset into smaller sets, where each new set has minimal missing values [10]. However, the decomposition of the data mining task into a series of smaller interconnected tasks can impose a structure that reduces the associations that can be discovered across all attributes. An alternative is to substitute the missing values with imputed values. Experts familiar with diabetes can conceivably impute missing values manually but this is rarely practical for

assembling a large diabetes dataset as the amount of missing data may be extensive and the method is subjective and therefore not repeatable.

Common approaches to imputation involve filling in missing values with the mean values of corresponding attributes. This is computationally easy to apply but can compromise generalisation because the record with the missing values may not be representative of all records. However, if the mean is calculated solely from those records that have the same class value as the record with the missing value, predictive accuracy can be expected to increase.

The approach presented in this study involves two strategies we call *Incomplete Information Dismissal* and *Contextual Data Completion* by Mode. *Incomplete Information Dismissal* involves eliminating features and records that do not contribute to a classification. This involves a formally specified feature ranking algorithm. In [11], each class is considered as a cluster of data points in the problem space. The cluster centre represents a signature for the class. A new instance is classified by selecting the cluster centre closest to the point representing the new instance. The least important features for a class are those that cause data points to be closer to centres of other classes. With nominal/discrete data, it is more convenient to use feature ranking based on association measures, particularly Information Gain (IG). However, the approach described in [11] is conceptually the same.

The *Data Completion* involves the imputation of missing values. In this approach, a set of points closest to the missing value point are selected, so that the class was the same. Each possible replacement value is evaluated to identify the replacement that will make the missing value instance closest to the others. This approach is dependent on other missing values, so the algorithm iterates through successive imputations. Other approaches to missing value imputation involve use of a classification algorithm where the data set is prepared so that the class is the attribute with the missing value. A classification algorithm such as a decision tree induction exemplified by C4.5 is trained using records with known values and run to predict the attribute's missing value. Imputation using classification algorithms in this way is computationally expensive because a model for each attribute must be trained. Values imputed by our algorithm involving the *Data Completion* approach are finely tuned to more likely lead to high predictive accuracies when the dataset completed with imputed values is used for classification. In addition, we propose a

novel integrated approach where the classes are defined by *Cartesian Product* of class values for underlying problems, namely diabetes, cardiovascular disease (CVD) and hypertension so as to set up a super problem that would classify diabetes, CVD and hypertension at the same time - a step toward a holistic management of diabetes.

Some diabetic prediction studies conducted recently [12] have achieved good classification accuracies with a weighted sum approach compared to other data mining models such as logistic regression and neural networks. However, the highest accuracy level achieved to predict diabetes or prediabetes was only 77.87% based solely on traditional risk factors and results are not presented in a clinical useful way. This paper reports that common data mining algorithms can demonstrate higher accuracies for classification of diabetes, CVD and hypertension if incomplete clinical data is managed appropriately by including a two-stage approach of *Incomplete Information Dismissal* and *Data Completion* with convolution (*Cartesian Product*) of class values of the three problems.

### 1.1 Background

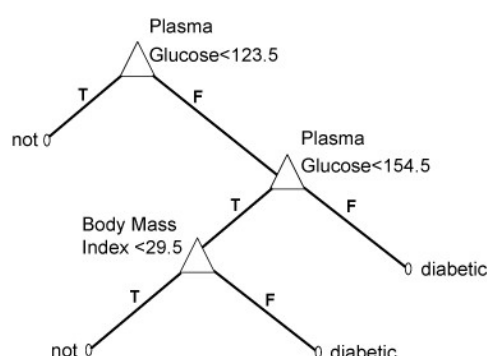
Diabetes Mellitus (DM) is a metabolic disorder of multiple etiology. It is characterized by chronic hyperglycemia and disturbances of carbohydrate, fat, and protein metabolism resulting from defects of insulin secretion, insulin action, or a combination of both [7-8,13]. The most common types of diabetes are type 1 diabetes (insulin sensitive due to cellular-mediated autoimmune destruction of the  $\beta$ -cells of the pancreas in 90% of cases and is idiopathic in 10% of cases), and type 2 diabetes (insulin insensitive due to pancreatic  $\beta$ -cell dysfunction and insulin resistance) [14]. Uncontrolled diabetes leads to a risk of microvascular (retino-, nephro- and neuropathy) and macrovascular (cardio-, cerebrovascular and peripheral vascular) health problems. Diabetes is increasingly reported as a primary cause of death, and the risk of death for people with diabetes is twice as high as for the general population with similar age [15].

While many clinical tests consider various standard factors such as age, blood pressure (BP), age at clinical onset, body weight, family history, urinary blood sugar levels and ketones, there is much more investigation required into how traditional and emerging biomarkers combine for optimal control of diabetes [16,17]. As clinical tests become more sophisticated, there is a huge amount of data collected from each

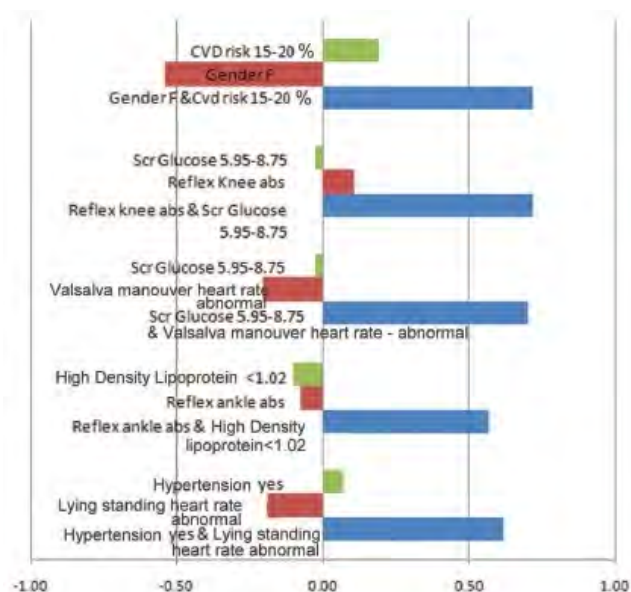
patient on various attributing factors including inflammatory, oxidative stress and genetic biomarkers that need to be integrated into a comprehensive clinical decision making model. However, analysis may be hampered or may not give the correct results when information is missing.

The way a data mining algorithm presents results for interpretation by an analyst depends, to a large extent, on the algorithm. The ID3 classifier described by [18] generates a decision tree where nodes are attributes, arcs represent possible values, and leaf nodes represent data to be classified, as illustrated in Fig. 1. Decision trees can readily be understood by clinicians, however decision trees generated from many variables are typically very large and cannot easily be interpreted [19]. Fig. 2 depicts the weighted sum visualization (AWSum) output [20]. The horizontal bars depict the influence a pair of features has on a classification of diabetes on the right side of Fig. 2 compared with one of no-diabetes on the left side. A clinician can readily ascertain that the propensity toward diabetes for females with a cardiovascular risk of 15-20% is quite high despite gender and CVD risk category not contributing on their own to this conclusion.

Although data mining algorithms that present data visually in ways that enhance insight, as exemplified by Figs. 1 and 2, are emerging, their usefulness is limited by the extent to which missing values impede the classification.



**Fig. 1. Conventional decision tree**



**Fig. 2. Weighted sum visualisation**



## 1.2 Missing Value Imputation Techniques

Most techniques for the imputation of missing values treat numerical and categorical attributes differently, so the same technique cannot be used when both numerical and categorical features are present. A review of the imputation of numerical values including techniques based on the Nearest Neighbor approach, Linear Interpolation, Cubic Spline Interpolation and Neural Networks is provided by [21,22]. In general, these approaches use the numerical values in a distance function that represents the degree of similarity between records. In [23,24], approaches based on modeling of a data probability density function using kernels such as Gaussian were evaluated, allowing the relationship between attributes to be exploited. In this connection, [25] discusses the Expectation Maximization algorithm (EM) introduced by the authors of [26], which relies on the data mean and covariance matrix. Generally, a model of data can be fit to a sample. Many statistical software packages (SPSS, SAS, to name a few) implement derivatives of EM and the alternative technique of Multiple Imputation (MI) from the authors of [26]. A review of MV imputation methods in classification is also given in [27]. A more recent missing value imputation technique using an entropy based decision tree algorithm provides better results for datasets having higher correlations among attributes [28]. However, attributes in medical datasets may not necessarily be highly correlated and these methods are therefore still not optimal.

In dealing with incomplete medical data, some researchers have attempted to use missing value imputation with general practice data [29-31], and longitudinal dietary data [32,33]. However, pitfalls in adopting a single technique have been reported by [34]. In [35], less than forty studies that had applied data mining techniques to diabetes were found in a recent systematic review of the literature. The relative paucity of studies can be explained by noting that the performance of an effective data mining study in diabetes requires the assembly of an appropriate dataset, comprehensive approaches for preparing the data for mining from both discrete and continuous data, and presentation of results in a manner that can be meaningfully understood by diabetes analysts.

As clinical tests become more sophisticated and numerous, there is a huge amount of data collected from each patient on various attributing factors. Virtually all patient datasets are replete with missing values for various reasons: equipment used for measurements sometimes malfunctions; a value could be missing because data

was never collected – eg HbA1c test was never obtained or the patient was unable to complete the test. In other situations, the value was simply not available at the time of collection but may have become available subsequent to the assembly of the dataset.

This paper addresses the issues of missing values (MV) in clinical data sets, and as a first step proposes novel data mining techniques to deal with, and impute missing values to provide an improved and reliable diagnosis and management of diabetes.

## **2. MATERIALS AND METHODS**

In this section, we describe how clinical datasets were collected and organized, and the proposed methods adopted for the experimental study. We provide below details of how our approach discretizes continuous variables to nominal values and deals with missing values MVs using 3 classifiers: Decision Tree (DT), Nearest Neighbor (NN) and Naïve Bayesian (NB).

### **2.1 Clinical Datasets**

The dataset used in this study is derived from the Diabetes Screening Complications Research Initiative (DiScRi) conducted at a regional Australian university [36]. It is a diabetes complications screening program in Australia where members of the general public participate in a comprehensive health review. The DiScRi community screening concentrates on diabetes, cardiovascular disease and hypertension as a triad of diseases. There are no explicit groupings for retinopathy and neuropathy provided in the database and therefore these were not considered in the current investigation. The screening clinic has been collecting data over ten years and includes over one hundred features such as demographics, socio-economic variables, education background and clinical variables. Clinical variables included blood glucose level, HbA1c, cholesterol profile, inflammatory and oxidative stress markers, other medical history, body mass index, peripheral vascular function, and ECG derived variables. Data on 273 attributes from approximately 2500 attendances of nearly 900 patients have been collected in recent years. The dataset has been used in several data mining applications [37-39]. Application of the Data-driven Decision Guidance Management System (DD-DGMS) approach to this dataset is discussed in the following subsections. Currently, the project is still continuing to

collect data, and therefore the dataset is not yet made public until completion of the project.

The database of 2429 records underwent compression to instantiate patients instead of attendances. The latest data in chronological order was used to initialize patient records. Any MVs in 102 applicable attributes were sourced from previous attendances leading to approximately one-fourth of MVs being restored. Altogether, the 824 instances included patients not diagnosed with diabetes mellitus of any type (594), those diagnosed with T2DM (211) and T1DM (19). Type 1 instances were later excluded as the feature-set was not discriminating T1DM enough from control and T2DM, and due to the small T1DM sample. Fig. 3 provides a typical dataset snapshot of the attributing factors collected from the clinical trials of patients diagnosed with diabetes, cardiovascular disease and hypertension. The database includes patients' demographic information that form pre-determined data along with the main clinical data as well as derived data.

The diabetes dataset assembled for this study contained 97 attributes, of which 65% were incomplete, and 805 instances, of which none was complete, with 32% values missing across all data, as appears in Table 1. The class structure for the current classification problem is shown in Table 2. For example in row one, Type II Diabetes is the diagnostic class (Class 1), anything else is in Class 0.

In this work, with many nominal attributes in the data, we adopt an approach based on continuous attributes discretized.

### **2.1.1 Even frequency discretization**

We discretize any continuous attribute using an algorithm we call *Even Frequency Discretization*, so methods that work with all-nominal data could be applied. The technique is an interpretation of the Fixed Frequency method [40]. Real-valued data is distributed into intervals to accumulate frequencies of corresponding discrete values. The frequencies are targeted to be as even as possible. Due to the limited precision in obtaining data, a value, even though perceived as unique, may repeat. The number of intervals is same for all attributes discretized. The adopted approach has proved being reliable in many applications.

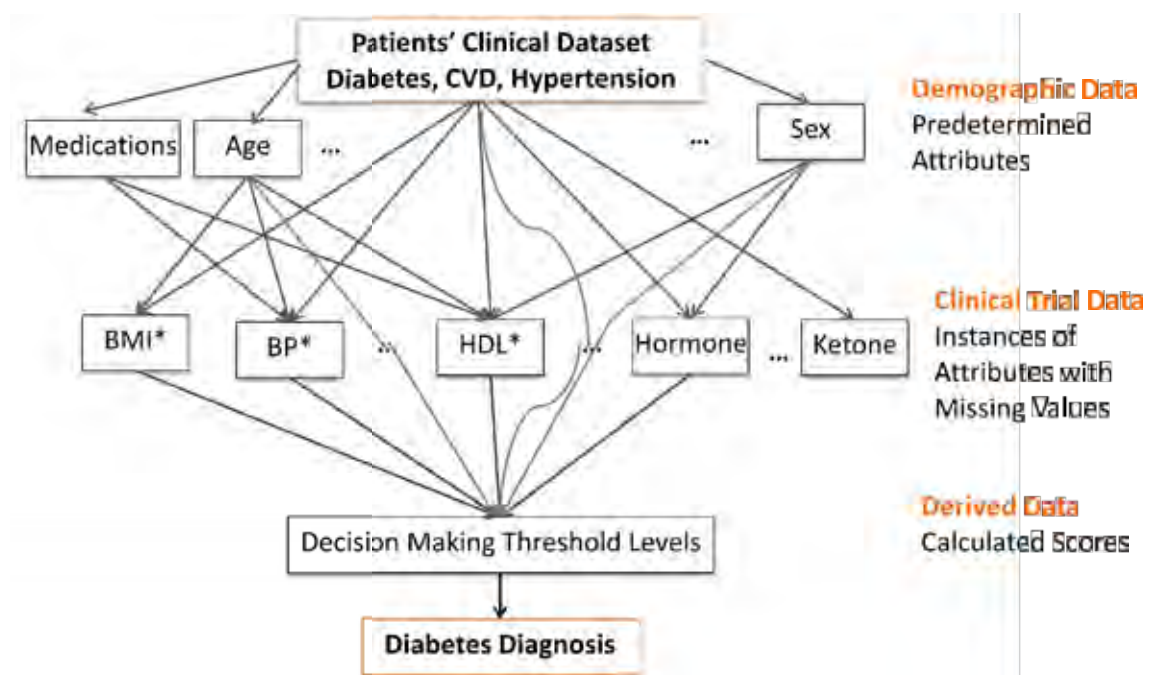
**Table 1. Diabetes dataset**

All	Attributes		Instances		Values
	Numerical	Incomplete (%)	Incomplete (%)	Missing (%)	Missing (%)
97	56	65	805	100	32

**Table 2. Data subdivision by class**

Problem	Classes (%)		
	Unknown	0	1
Diabetes mellitus	0	74	26
Cardiovascular disease	28	54	18
Hypertension	20	32	48

'Unknown' – instances not having class attribute set; '0' – control class; '1' – diagnostic class

**Fig. 3. Typical clinical dataset model**

\*BMI-Body Mass Index; BP-Blood Pressure; HDL-High Density Lipoprotein

## 2.2 Classifiers

### 2.2.1 Decision tree

The tree induction algorithms ID3, C4.5, C5 advanced by [18] partition data in a hierarchical manner in the form of a tree where branches are represented by values of a particular selected attribute. An optimal tree is formed by selecting a feature at each node that gives the highest Information Gain (IG). Highly mixed partitions are nominated for further subdivision. In this work, we pursue a simpler version of DT where no model of data is learned but an appropriate leaf is directly

accessed by mining through the training set. It is appropriate to call this DT variety - Decision Branch (DB).

### **2.2.2 Nearest neighbor**

The NN algorithm used in this study is an adaptation of the well-known k-NN technique [41] for nominal data. It uses the Hamming loss for a distance function in the pseudo-space of data attributes. The loss, which normally counts dissidence of attribute values of two compared instances, is weighted by Information Gain (IG) to make the space metric conform better to the data [42,43].

### **2.2.3 Naive Bayes**

This is a classical method and widely used on nominal data despite the limiting assumption of attribute conditional independence, given a class [44].

### **2.2.4 Classifying with MVs**

The NB classifier is easily adaptable for data with MVs since any test instance can be evaluated with some attributes withheld. However, this property also holds for NN and DB methods. This feature of classification algorithm implementation is the short memory, or lazy learning mode, whereby the learning is carried out anew for every test instance. Indeed, this mode offers a general method of obviating MVs when classifying any new data.

## **2.3 Filling-in the Blanks**

For a discrete or categorical variable with MVs, some dummy value can be assigned to denote the missing value (e.g. "MV"). However, such an assignment of a dummy value outside the attribute's domain cannot be carried out as elegantly with numerical features. Statisticians are known to have resorted to the insertion of dummy data (e.g. "999.999") that invariably distorts distance metrics underpinning classifiers. The distortion of results when using distance metrics then provides an additional rationale to discretize continuous attributes in mixed attribute type domains. If MVs are sparsely distributed, they can be ignored during the learning and generalization steps of the algorithm. However, this is not possible for the data in this study because of the highly expressed attribute patterns of MV inundation.

Some condensation of incomplete data can also be achieved by discarding instances or attributes replete with MVs. However this cannot be a general method as only the training set can be dealt with in such a manner. Therefore incomplete information dismissal is proposed as a pre-processing step in the next section and is the first part of our approach for MV handling.

### **2.3.1 Incomplete information dismissal**

Data layers, namely instances or attributes, are eliminated one by one, whichever currently conveys the least information, until a predetermined data reduction effect is achieved. Attribute information is calculated using IG, and is associated with any value unless it is missing. An attribute may be dismissed, even though it may have no MVs, which doubles as a feature selection step [11].

A data completion algorithm as proposed in this research utilizes the ability of classification algorithms to classify data without referencing MVs. The knowledge of class of an instance being dealt with provides a clue to MV substitution from applicable ranges. However, it is not required to label all of the classifier training dataset. Data completion forms the second part of the proposed technique.

### **2.3.2 Data completion**

Our algorithm performs completion and classification of test instances at the same time by substituting the attribute modes for MVs from an applicable sample of training data, which a classifier accesses to make the prediction. It is necessarily an iterative process of tuning instances in turn to the rest of the set that requires at least one valued instance per attribute per class. MVs are substituted from the subset with the same class label as the test instance within the extracted sample, whether the predicted class is the same or not. In the case where the test instance is not labeled, the respective classification algorithm is used to set the label. The iteration ends when the introduced values stop changing or a limit for the number of cycles is reached. The goal is to achieve the highest possible classification accuracy, which the training set assumes, even though the instances may be rare.

## **2.4 Assembling an Appropriate Dataset**

Despite the preponderance of patient data collected in digital forms, assembling an appropriate dataset to explore efficient diabetes management methods is

inherently difficult because of a paradox in the formulation of the analytics exercise: on one hand, one cannot readily frame a question of interest without knowing what data is available, and on the other, one cannot identify what data is required without knowing the question of interest. The paradox presents itself in data mining process models such as Cross Industry Standard Process for Data Mining (CRISP-DM) [45], where the need to identify business objectives is advanced as a first step so that appropriate questions can be formulated to guide the selection of data. There are no clear 'business' objectives in diabetes mining, as the questions of interest are usually framed as high level questions such as "Identify risk factors for diabetes", or "Predict blood glucose level" that cannot inform the selection of data, because variables that might be relevant are not known. In this study we advance the claim that the paradox inherent in assembling a dataset for diabetes mining necessitates the use of an extensive set of features that not only consists of features relevant only to diabetes but covers a range of other health and clinical indicators.

### 3. RESULTS AND DISCUSSION

#### 3.1 Classifier Performance

The performance of Naive Bayesian (NB), Decision Branch (DB) and Nearest Neighbor (NN) classifiers in diagnosing diabetes, CVD and hypertension when applying the traditional model in Fig. 4 with MVs skipped, is compared to the accuracy after MV imputation using different strains of the proposed method in Fig. 5.

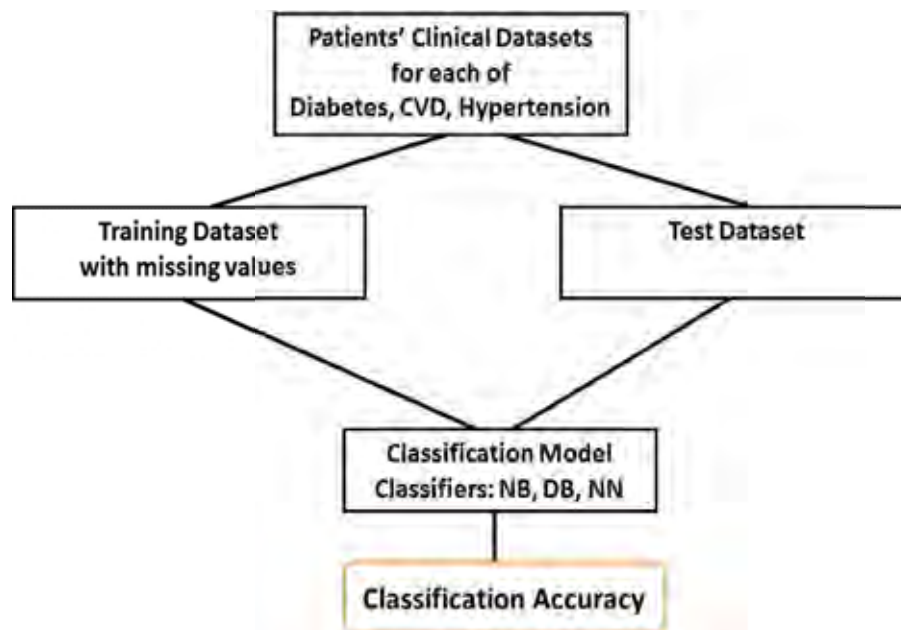
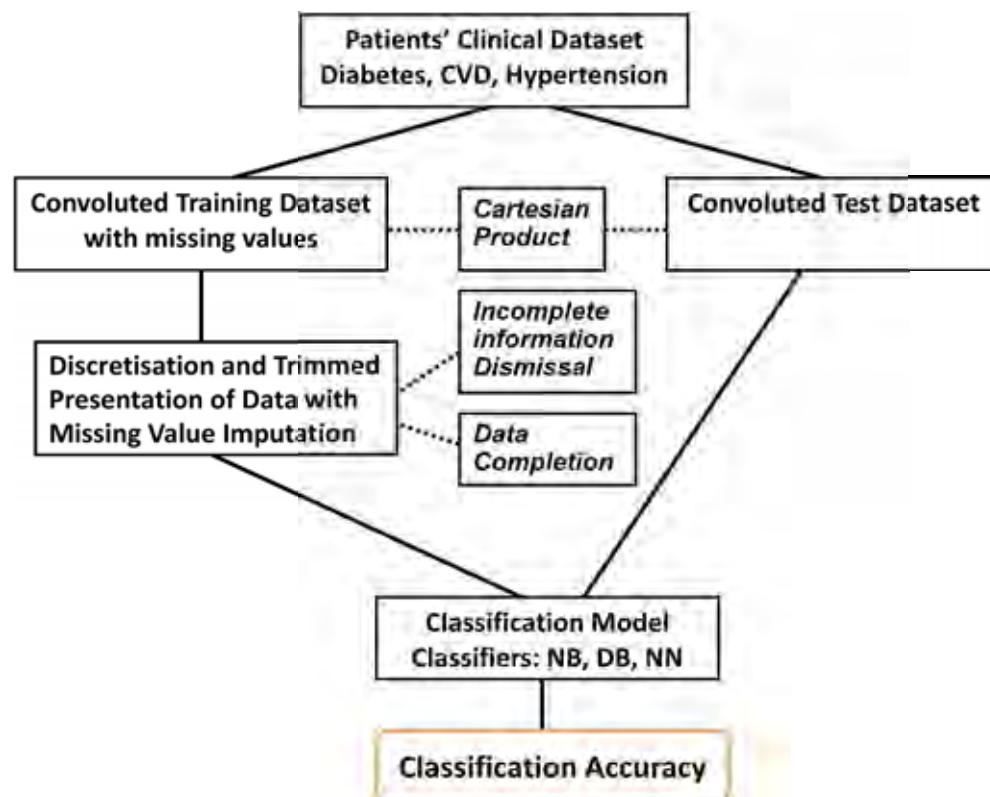


Fig. 4. Traditional classification model with missing values



The strains are denoted as NB, DB, and NN - same as the classifiers at the core of the principal method. The accuracy is calculated using leave-one-out cross-validation which is a conventional technique when a comparison is involved.

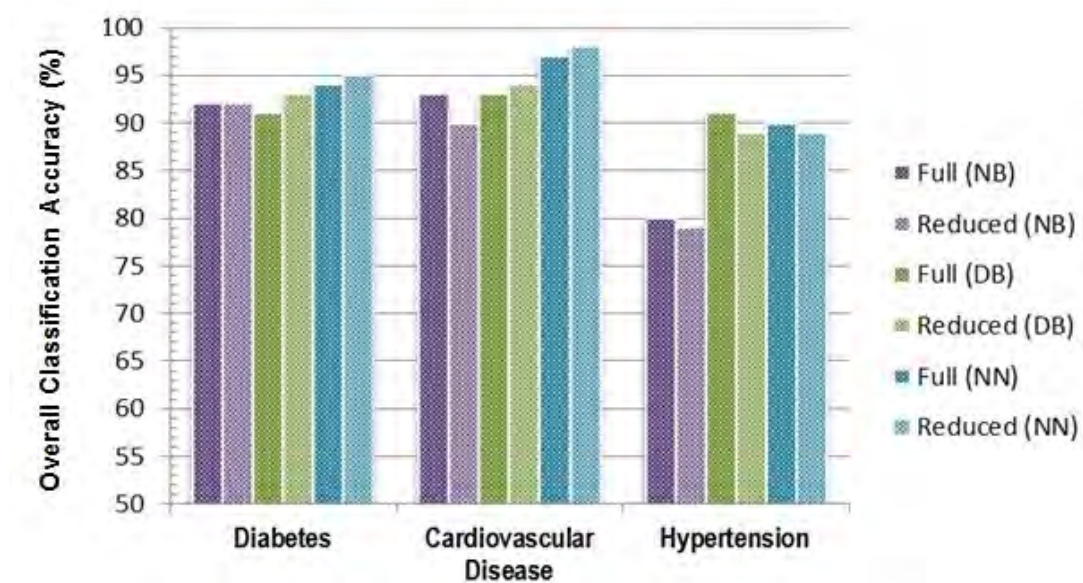


**Fig. 5. Proposed classification model with missing value imputation**

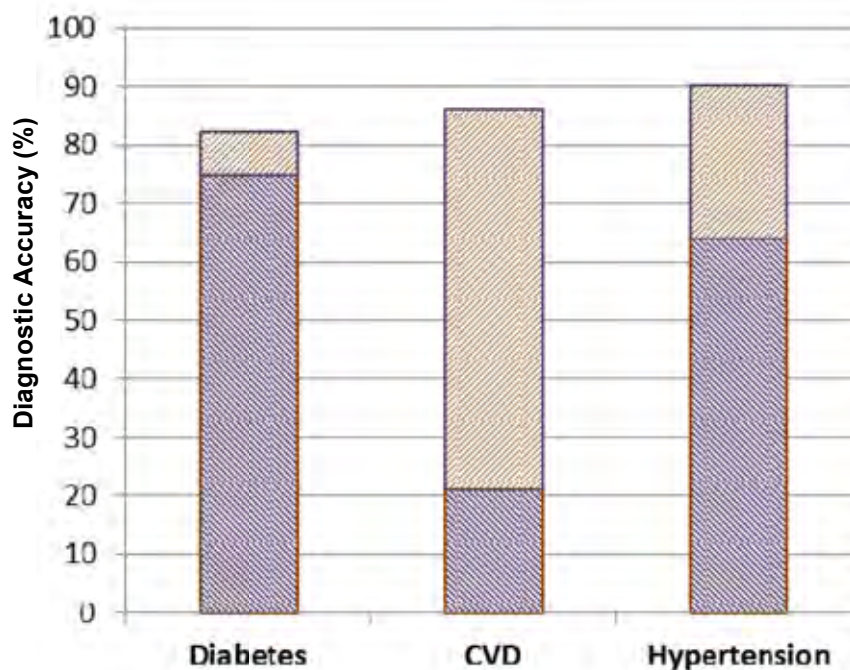
Fig. 5 provides an overview of the proposed classification model using our novel MV imputation techniques. The transformation of the training and test set involves convolution of class values for diabetes, hypertension and cardiovascular disease using *Cartesian Product*. The *Incomplete Information Dismissal* and *Data Completion*, after having any continuous features discretized, are performed prior to exposure of the dataset to the three classifiers. These three moments form the main novelty of our proposed model.

To evaluate the performance of our proposed *Incomplete Information Dismissal* method, we obtain a smaller dataset by reducing the amount of data by 50%. Fig. 6, used for illustration, provides the overall, any-class accuracy for both full and reduced datasets after performing data completion using the DB strain of the proposed method. It is evident from Fig. 6 that the reduction not only does not impact on the diagnostic ability, but also gives an improvement in some cases. At the same

time, about 40% of MVs have been dealt with, without having to fill them. Different results pertain to different sub-problems featured within the DiScRi data.



**Fig. 6. Overall classification accuracy (%) on full and reduced datasets - by different classifiers (NB, DB, NN) after substituting MVs with Decision Branch inspired surrogates**



**Fig. 7. Improvement of diagnostic accuracy after MV submission after applying the cartesian product**

*Dark portion: Class 1 diagnostic accuracy with MVs skipped; Light portion: Accuracy gain after Data Completion using the DB strain of the proposed method. The classifier is NN*

To illustrate the performance of our proposed *Data Completion* method, the accuracy of the three classifiers when sidestepping MVs and after entering them using the DB strain of the principal method is compared in Fig. 7. For example, with DB substituted MVs, the NN classifier achieved 97% accuracy for CVD diagnosis with the full dataset as compared to 98% with the reduced dataset. High accuracies were also achieved for the diagnosis of diabetes (94% to 95%), with some exception for hypertension (90% to 89%), which had a minor decrease, using this combination. Similar results were obtained for NB and NN based completion methods for each of the three classifiers.

### 3.2 Benchmarking

We staged a super problem where classes are defined by *Cartesian Product* of class values for diabetes, CVD and hypertension: this is a novelty of our approach that complements our unique imputation techniques of *Incomplete Information Dismissal* and *Data Completion*. For example, an instance may have the new attribute value as YNY (Yes for diabetes, No for CVD status and Yes for hypertension). This 'additional' class is used to take advantage of the nearest points formulation to cater for incomplete information dismissal and data completion. The advantage is that MVs on other attributes are imputed in a way that exalts the new triple attribute.

The improvements in the diagnostic accuracy of our algorithm are benchmarked using the three classifiers. The results of NN accuracy for full data of Class 1 is shown in Fig. 7 for both before and after data completion by the DB based method.

### 3.3 Discussion

Overall, from the performance results it is evident that the diagnostic predictions are better after data completion. While each classification method has its own merits and demerits, a particular advantage of our data completion procedure is that it imparts better estimation of any involved probabilities effectively extending the feature-set.

The classifiers sidestepping MVs achieve low accuracy in the diagnosis of diabetes, cardiovascular disease as well as hypertension. Also, when MVs are ignored and replaced with dummy data, the results are similar. This is probably due to the attribute rather than instance pattern of inundation of data with MVs, as shared

by the entire dataset. Hence, we can infer that the affected attributes with MVs are predominantly irrelevant.

The performance of the NB based MV submission method in the current work stands out. The algorithm not only completes the iterations much faster but also rather accurate. The breadth of mode selection in the algorithm causes high contraction of data distribution in the pseudo-space of attributes, that is, classes become identified by the distinct feature modes. The DB guided MV submission performed slower and somewhat less accurate over the NB counterpart, although any possible improvement may have been restricted due to the data. The NN based data completion method shows the least improvement, although the accuracy is still acceptable. This is quite contrary to the usual high performance of the NN classification method and has to do with choices available for MV selection that are more limited than in completion with DB.

In medical diagnostic problems, the attribute pattern of MV inundation is often prevalent. Reducing the data set by 50% leaves all instances intact, though this is not the case with the number of attributes. Our algorithm tries to withhold attributes that are either less informative or with many MVs. In either case, trimming by half appears to be safe for all diabetes linked problems as the results are almost unchanged. Nonetheless, if too many features are removed the accuracy is expected to drop. Also, even though individual features are ranked by overall information gain, and attribute reduction occurs only for those that are least informative and found at the end of the list, improvement in accuracy may not be always guaranteed. However, the computational aspect of performance improves dramatically when such superfluous attributes are discarded.

While the results obtained are good, filling many missing entries could be misleading. The data is too flexible, and the high accuracy may be unwarranted. In this regard, the more classes are embraced by a problem, the better. However, here there are only two for any featured condition. There are no other constraints to narrow the range of MVs further. By linking the diabetes, cardiovascular and hypertension classes, additional clues can be arrived at. The three problems together interpret the same data, and so we expect the substituted values to be the same. Hence, we have used a convolution of the three to stage a super problem where classes are defined by the Cartesian product of class values of the underlying problems. Cartesian attribute products in classification were made popular by [46].

Here, each combination of the values corresponds to a class in the super problem. This forms the main novelty of our approach of MV imputation as compared to existing ones in the literature. In our model comprising the three problems with two classes, the Cartesian product generates eight classes same in all problems, thereby imposing much tougher constraints on MV ranges. This approach is innovative and provides an advancement towards an integrated and holistic management of diabetes.

#### 4. CONCLUSION

Large clinical data collected from patients often include missing values or incomplete data, which poses a major problem for an integrated diagnosis. Data mining techniques dealing with such incomplete data problems in clinical trials become popular. This work demonstrated a considerable improvement in diagnostic accuracy after adopting the proposed methodology for missing value submission. The data completion methodology can be applied to data of any type via discretization of continuous attributes. The advancement is significant because quite high predictive accuracies, as measured with leave-one-out cross-validation resampling, appear to be achievable even when datasets contain substantial missing data.

Future work could involve the development of decision rules derived through the learning mechanism of our novel missing value handling techniques of *Incomplete Information Dismissal* and *Data Completion* in order to arrive at a decision tree model for new patients with clinical data. This would provide an enhanced decision support system for an integrated diabetes management, despite missing values in the patient's clinical data.

#### COMPETING INTERESTS

The authors declare that they have no competing interests.

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## ***Agricultural Water Technologies Adopted by Smallholder Farmers in Lare Division, Nakuru County Kenya***

### **ABSTRACT**

This study aimed at investigating agricultural water use technologies adoption by smallholder farmers in Lare Division Nakuru County Kenya. The study adopted a descriptive research design and was carried out between February and March 2014. It involved smallholder farmers who had adopted agricultural water technologies namely; water harvesting, water storage and irrigation to mitigate effect of climate change induced agricultural water scarcity. Data was collected by use of face-to-face administered interview schedule and analyzed using descriptive statistics such as percentages and means. Out of 115 household heads interviewed, 53.9% were male, 46.1% were female and 75.6% had primary level education and below. The main source of income was farming (70.4%). Water harvesting, storage and irrigation technologies were adopted by 98.3%, 93.9% and 37.4% of the farmers respectively. Common water harvesting structures were gutters and runoff drains (59.1%) and tanks (plastic and concrete) for storage (98.30%). Out of those that have adopted irrigating technology, 86.1% and 9.3% used buckets and drip respectively. However, the farmers face challenges in technologies adoption in terms of inadequacy of water harvesting (74%) and storage (81%) structures' capacities and use of efficient irrigation facilities (78%). Farmers' adult education, improvement of technologies structures' capacities and usage of efficient irrigation facilities are recommended. Formulation and implementation of policies that would facilitate Lare farmers' accessibility and usage of efficient irrigation technologies are advised.

**Keywords:** agricultural water use; technologies adoption; climate change; food and economic security.

## 1. INTRODUCTION

In sub-Saharan Africa, climate change-induced rainfall scarcity has led to increased incidences of extreme droughts resulting in food insecurity at household, regional and national levels [1]. This has prompted affected governments and development partners to get actively involved in sensitizing rural resource scarce smallholder farmers, in water constrained Arid and Semi-Arid Legions (ASALs), to adopt appropriate agricultural water technologies. This approach is aimed at empowering the farmers in mitigating effects of climate change induced agricultural water scarcity and vulnerability. This effort aims at ensuring both food and economic securities at household levels hence stimulate rural development.

Water scarcity is a rural developmental challenge facing Kenya [2]. This is because close to 80% of Kenya's population is rural and dependent on agriculture for basic livelihoods. This makes the country highly vulnerable to rainfall variability since 98% of the country's agriculture is rain-fed [3]. The water scarcity problems in Kenya have been exuberated by decreased rainfall amount and frequency of occurrence due to climate change, high population which leads to high water demand, vulnerability of water resources and human encroachment of marginal areas among others [4]. One way of addressing this challenge is through rural farmers' empowerment in adopting agricultural water technologies. Agricultural water technologies are easily acceptable and replicable across many cultural and economic settings [5]. However, the technologies' adoption depends on socio-economic status of the adopting farmers such as age, education level, family size, perception of farming and land tenure among others [5].

In Kenya rainfall scarcity is a major challenge facing rural communities in farming activities from which they derive both households' foodstuffs and economic returns. Therefore, adoption of water harvesting, water storage and irrigation application technologies may be one approach of increasing smallholder farmers' access and efficient use of agriculture water. This would enable the farmers to engage their farms all year round including off seasons, as natural rainfall would now not be a limiting factor in agricultural production. This paper focuses on agricultural water technologies adoption namely water harvesting, storage and irrigation, by smallholder farmers in Lare Division, Nakuru County Kenya in the face of climate change induced agricultural water vulnerability.

### **1.1 Agricultural Water Technologies**

Three agricultural water technologies of interest are water harvesting, water storage and irrigation. They are ancient practices and still form an integral part of many farming systems worldwide. They were first used in Iraq over 5000 years ago, in the Fertile Crescent [6]. In sub-Saharan Africa, over 90% of farmers depend on rain-fed agriculture. However, agricultural activities face many constraints due to erratic and unreliable rainfall in quantity and distribution patterns. Therefore adoption of agricultural water technologies use in sustainable and integrated production systems can assist smallholder farmers in boosting agricultural output by supplementing the rain-fed agriculture production [7].

### **1.2 Agricultural Water Harvesting Technology**

In Kenya, runoff harvesting from roads, footpaths and compounds is a practice that is currently not so widely used considering its potential replicability. Road runoff harvesting systems vary from simple diversion structures that direct surface water into agricultural fields or water pans, to deep trenches with check-dams in to trap eroded soil [8]. The rainwater harvesting potential in Kenya is estimated at over 12,300 m<sup>3</sup> per person per year compared with the current annual renewable water availability of just over 600 m<sup>3</sup> per person per year, indicating a significant gap [9].

### **1.3 Agricultural Water Storage**

Agricultural water can be harvested and stored in situ or transported and stored away from the point of harvesting. Water storage systems can be cistern or pond. In the former, water is stored in underground or above ground tanks while in the latter, in dams, ponds, pans and trenches. Where soil type permits, pond system can be cost-effective [10]. In the Tigray region of Ethiopia, small earth KRA 2006). - dams harvesting stream-flow diverted from small gullies are used for storing water [9]. In the semi-arid parts of Laikipia District, in central Kenya, underground water tanks have been constructed for agricultural water storage [5]. The largest concentration of rock catchment, water storage dams in East Africa, is found in the semi-arid parts of Kitui District in Eastern Kenya (8).

### 1.4 Irrigation Application

Traditional agricultural water application technologies include farming using irrigation, kitchen gardening, poultry keeping; zero grazing, biogas making, fish and apiculture farming among others. Modern agricultural water applications technologies encompass efficient use of agricultural water such as drip and sub-surface irrigation, among others. Harvested water application is seen as a major component in curbing the rural-urban migration by ensuring farmers economic stability, enhanced living standards and jobs' creation at rural farm levels. Agricultural water application technology has been used to stabilize farm yields hence enhancing food security in rural India [11]. Studies done in Zibambwe, Tanzania and Niger on irrigation using harvested agricultural water showed increased sustained agricultural yields for local rural communities involved [12].

## 2. RESEARCH METHODOLOGY

Descriptive survey design was deemed suitable as it provided information about subjects under study on the past and current situation [13]. Lare Division was purposively selected for this study because the area is water constrained and is inhabited by resource scarce smallholder farmers. The division had a human population of 36,924 and 6008 households in 2009 [14], 60% of who use agricultural water technologies. The study targeted 115 household heads and employed purposive sampling in selecting four out of eight study locations with high concentration of farmers who use the water technologies. Proportionate sampling technique was then employed to assign a representative sample from each selected location. Simple random sampling was finally applied, at 95% confidence interval, in picking study sample size for each location, [15] as shown in Table 1.

**Table 1. Farmers that have used the technologies in Lare division**

Location	Households	Sample size
Kabati	1,552	30
Bagaria	762	14
Kiriri	3,156	61
Ngano-in	538	10
Total	6,008	115

The study used face to face administered semi-structured interview guide to collect data from the respondents. The data was analysed with statistical package for

social sciences (spss) using descriptive statistic involving frequencies, percentages and means.

### **3. RESULTS**

#### **3.1 Demography of Farmers in Lare Division**

Out of 115 household heads interviewed, 53.9% were male while 46.1% were female. According to [16] Women contribute 66% of all the hours worked throughout the world. In Lare Division, some female are also household heads hence decision makers on agricultural water technologies' adoption. Therefore, views of both genders have been captured in this study as both are involved in agricultural water technologies adoption. Respondents aged 51 years and above constituted 51.7%. This age category consists of those farmers that first acquired and settled in Lare Division. They regard themselves as original land owners, hence the ultimate decision makers on issues touching use of land. Their rather advanced age may have bearing on adoption of agricultural water technologies in their own farm and even in those pieces of land in the hands of their off springs. A study by [16] found that age influences a farmer's adoption of technologies, but direction of the influence is in contention. Some researchers find it positively influencing adoption and others find a negative correlation or no significant influence at all.

#### **3.2 Lare Farmers' Education Levels**

Generally, respondents had low levels of education by Kenyan standards with more than 76% having primary or no formal education, as indicated in Fig. 1.

#### **3.3 Lare Farmers' Family Sizes**

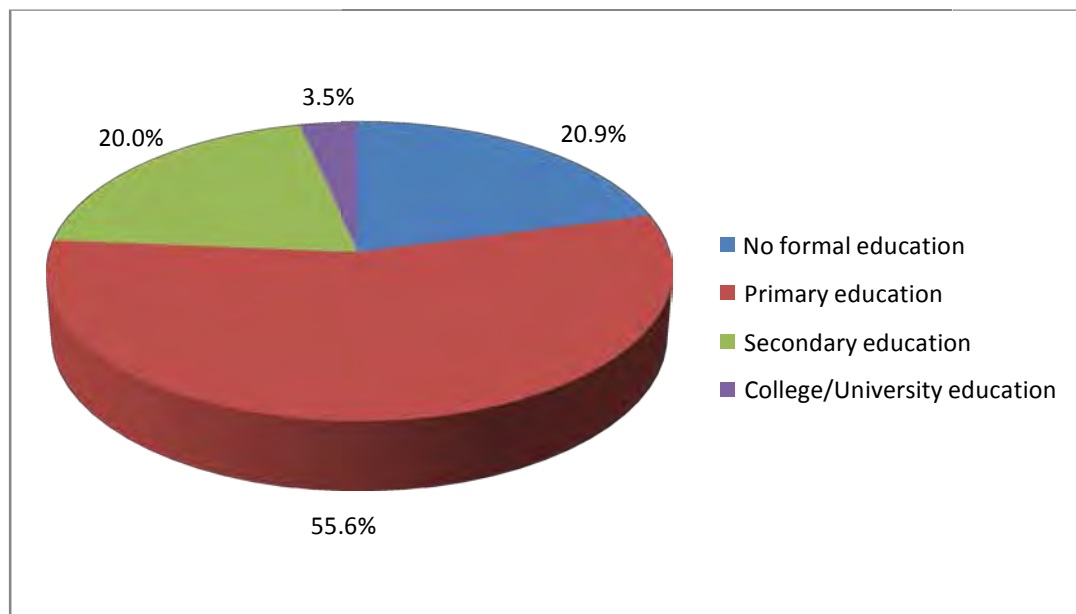
On family sizes, 60.9% of the respondents are in the range of 6-10 members. This is in line with rural African communities that tend to have large families or live with extended families.

Having a large family to house, feed, pay school fees and medical bills among others, may encourage or discourage a household head in adopting farming related technologies.

Technologies may be adopted if they are perceived as having the potential to boost farm production so that there would be enough food for household consumption. However, the technologies may not be adopted if they are perceived as having



inherent potential risks of underperforming. This would translate to inability of household heads to meet household's dependents' basic needs.



**Fig. 1. Farmers' education levels in Lere division**

### **3.4 Socio-economic Characteristics of The Farmers In Lere Division**

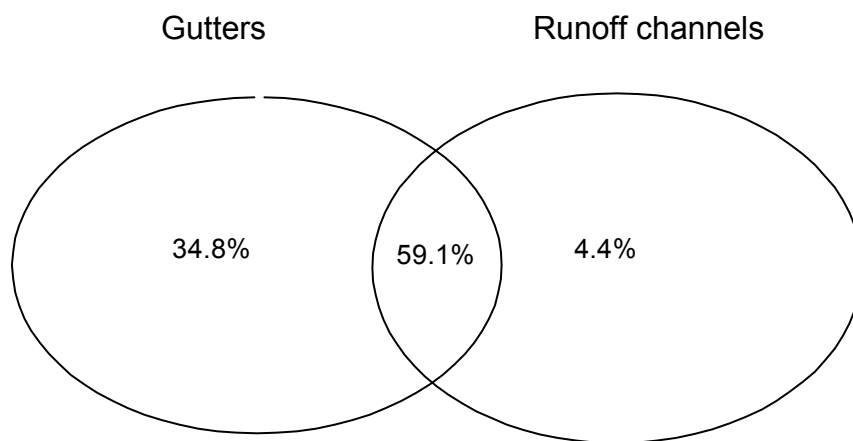
The main source of income (70.4%) is farming, the rest (29.6%) indicating business and employment as their other income sources. On community interaction, only 20.0% of the respondents belonged to farmers' groups. 75.7% of the respondents indicated that the foodstuffs consumed in their households were obtained from their farms. The rest (24.3%) supplemented by buying from markets.

### **3.5 Adoption of Agricultural Water Technologies in Lere Division**

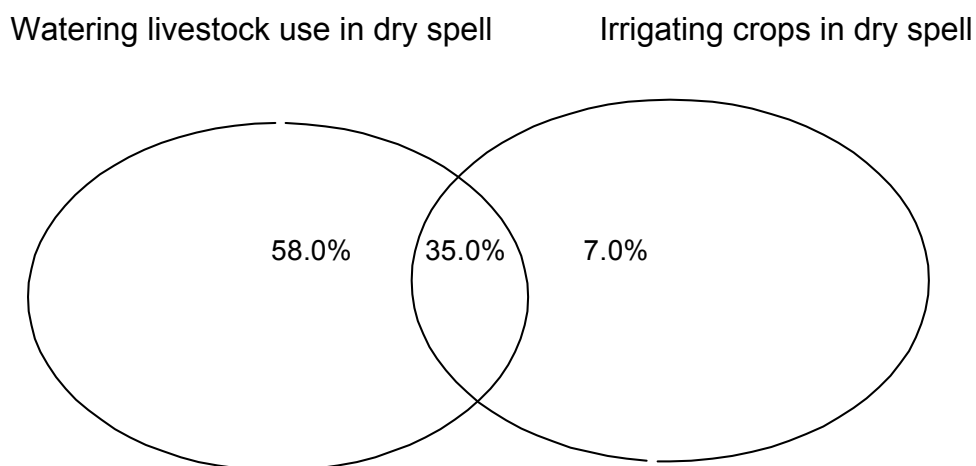
Water harvesting technology was adopted by 98.3% with 67.8% of them indicating a period between 5-10 years of this technology adoption using water harvesting structures such as gutters (93.9%) and runoff channels (63.5%). However, (59.1%) of the farmers use both gutters and runoff channels. The farmers, (74%) felt water harvesting structures capacities were inadequate leading to a lot of rain water going to waste in rainy seasons.

Water storage technology was adopted by 93.9% of the smallholder farmers with commonly used water storage structures being plastic and concrete tanks (98.30%). Plastic tanks are popular as are affordable, maintainable and water stored

in them is hygienically clean hence suitable for domestic use. These tanks are also locally available in various capacities to suit households' water requirements. 49.3% of the farmers use water pans for water storage. Water storage technology has been adopted for over 10 years by over half of the respondents (54.8%). A few farmers have designed innovative way of conserving and cleaning the stored water in pans. Azolla plants have been introduced to cover the stored water surfaces thereby minimizing water loss through evaporation. Suspended plant roots physically clean water stored in water pans. Out of 115 farmers investigated, only 37.4% have adopted irrigation application technology. Out of these 37.4% that have adopted irrigation technology, 42% of them irrigate crops, 93% water livestock while 35% use the water for both purposes as shown in Fig. 3. Bucket, drip and sprinkler irrigation facilities have been adopted by 86.1%, 9.3% and 2.3% of Lare farmers respectively.



**Fig. 2. Water harvesting structures in Lare division**



**Fig. 3. Applications of stored water in dry spell by Lare farmers**

#### **4. DISCUSSION**

Out of 115 household heads interviewed, 53.9% were male while 46.1% were female. Therefore, there was gender streaming on issues of agricultural water adoption by Lare farmers. Women contribute 66% of all the hours worked throughout the world [16]. Besides, men and women do not benefit equally from agricultural water technologies adoption. Respondents aged 51 years and above constituted 51.7%. This rather advanced age may have had bearing on adoption of agricultural water technologies. A farmer's age influences technologies adoption. However the direction of the influence is in contention. Some researchers have found positive and negative correlation or no significant influence at all [16]. Generally, Lare farmers had low levels of education by Kenyan standards with more than 76% having primary or no formal education. Education is believed to create a favourable mental attitude for the uptake of new practices [16]. Since educated farmers are expected to embrace new farming related technologies, it would appear that the low level of education among Lare farmers could have led to low adoption of irrigation technology as it requires some knowledge which these farmers may not adequately have. The main source of income (70.4%) is farming, the rest (29.6%) indicating, business and employment as their other income sources. Relying on farming alone or partly for source of income may have bearing on a farmer's effort in adopting agricultural water technologies. Resources farmers commit to these technologies such time, labour and finance may determine amount of benefits accrued from technologies' adopting. Therefore, fulltime farmers are expected to be highly involved in adoption of agricultural water technologies given that farming is the only source of their households' income [17]. However, an extra occupation may mean an extra source of finance that could possibly be ploughed into agricultural water technologies management [16]. In Lare Division, a few farmers were observed as having left other businesses to fully concentrate on farming but not the other way round. On community interaction, only 20.0% of the respondents belonged to farmers groups. Farmers groups are effective avenues for passing farming technologies to farmers. According to [18], new ideas' such as adoption of agricultural water technologies, spread effectively through groups found in communities. A study done in India found that smallholder farmers active in farmers groups had adopted farming related technologies twice as much compared to their counterparts who did not [19]. The low level of community interaction in Lare may explain low adoption of irrigation techno-

logy. Majority of the respondents indicated that the foodstuffs consumed in their households were obtained from their farms. The rest supplemented by buying from market implying that majority of the smallholder farmers in Lare Division are subsistence farmers [20]. They are therefore resource, knowledge and skills scarce hence would be expected to adopt simple farming technologies that would boost their farms' agricultural production. Lare Division has no single permanent river. Hence, roof and runoff are techniques adopted by Lare farmers for water harvesting during rainy season each year. Using simple channels with tree twigs placed at intervals inside the channels, to trap eroded soils, road runoff is diverted either directly into cropped land or into water pans. The trapped fertile soil is periodically scooped from the channels and spread on farms as manure. The farmers felt water harvesting structures' capacities were inadequate leading to a lot of rain water going to waste in rainy seasons. Water storage technology was adopted by 93.9% of the smallholder farmers with commonly used water storage structures being plastic and concrete tanks (98.30%). Plastic tanks are popular as are affordable, maintainable and water stored in them is hygienically clean hence suitable for domestic use. These tanks are also locally available in various capacities to suit households' water requirements. 49.3% of the farmers use water pans for water storage. Water storage technology has been adopted for over 10 years by over half of the respondents (54.8%). A few farmers have designed innovative way of conserving and cleaning the stored water in pans. Azolla plant has been introduced to cover the stored water surfaces thereby minimizing water loss through evaporation. Suspended plant roots physically clean water stored in water pans. Majority of Lare farmers use bucket while others use drip and sprinkler irrigation facilities. The low percentage of Lare farmers that use water efficient irrigation facilities was attributed to cost involved and skills needed acquisition and maintenance.

## 5. CONCLUSION

The low education level and rather advanced general age of majority of Lare farmers may have limited adoption of agricultural water technologies that would require relatively high knowledge and skills to effectively operate. The low level of community interaction in Lare, may explain low adoption of irrigation technology. Majority of the respondents are subsistence resource, knowledge and skills scarce farmers. Lare Division has no single permanent river. Hence, roof and runoff are

techniques adopted by Lare farmers for water harvesting during rainy season each year. The commonly used water storage structures are plastic and concrete tanks. A few farmers have designed innovative way of conserving and cleaning the stored water in pans using azolla plant which covers the stored water surfaces in water pans thereby minimizing water loss through evaporation and suspended plant roots in the water physically clean stored water. However, water harvesting and storage structures' capacities are inadequate leading to a lot of rain water going to waste in rainy seasons. Low usage of water efficient drip and sprinkler irrigation facilities by Lare farmers may be attributed to cost involved and skills needed acquisition and maintenance.

## **6. RECOMMENDATIONS**

Agricultural water technologies' adoption is an all-inclusive social learning process involving farmers, extension workers, researchers, decision makers and other stake holders on how to respond to farming challenges brought about by climate change. Intervention measures should include both technical and financial empowerment components. For ownership and sustainability, agricultural water technologies adoption process should start off from farmers' indigenous technical knowledge, skills and experiences.

## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## **Modeling of a High Performance Grid Connected Photovoltaic System**

### **ABSTRACT**

This paper presents detailed modelling of a grid-connected photovoltaic (PV) system components. The study is helpful to understand the working principles of the PV system. The performance of the system has been discussed by means of a Matlab/Simulink Toolbox. The results show that the PV system capable of tracking the maximum power point (MPP) quickly and precisely in case of sudden changes in solar radiation, cell temperature, and in case of existence of sand. Under the non-uniform atmospheric conditions, to get a high performance of the PV system, appropriate converters are required to operate at the MPP.

**Keywords:** photovoltaic system; solar irradiation; maximum power point tracking (MPPT).

### **1. INTRODUCTION**

Solar energy provides the opportunity to develop electric energy from clean, endless, and green energies [1,2]. A PV cell is a basic unit that generates voltage in the range of 0.5 to 0.8 volts depending on cell technology being used [3,4]. Therefore the solar cells are connected in series and parallel in order to create a solar module depending on the capacity demands [5]. Regardless of the intermittency of sunlight, solar energy is widely available and completely free of cost [6-8]. The efficiency of the PV cells is quite dependent to the environmental and operational conditions. The output power of the PV systems affected by solar radiation, ambient temperature, and sand (dust, clouds, shading, etc.) [9,10]. The cell conversion ranges from 12% up to a maximum of 29% for very expensive units [11,12]. So to extract the maximum possible power from a PV system, tracking the single maximum power operating point is very important to raise the efficient operation of the PV system, and so,



MPPT is one of the most important issues in PV system [13,14]. MPPT methods are various and they differ in terms of complexity, speed of response, and cost [15,16,17,18,19]. A popular method of perturb and observe (P&Q) based on a boost converter as MPPT device is considered in this paper.

In the last few years, the demand for electrical power in Jordan has increased significantly due to developments in the industrial sector and people's standard of living conditions. Solar energy can cover these conditions in the future, and achieve great results due to the location of the Kingdom and the large desert areas. The demand for solar energy, globally, has increased by 20% to 25% over the past 20 years [20]. The electrical system powered by solar arrays requires special design considerations due to the varying nature of the solar power generated resulting from unpredictable and sudden changes in weather conditions, which change the solar radiation level as well as the cell operating temperature. A PV array is interfaced with DC/DC converter to obtain the desired DC voltage by utilizing Maximum Power Point Tracking (MPPT) technique to extract the maximum power, which is converted to alternating current (AC) by an inverter.

The nonlinear output PV characteristics, Power-Voltage (P-V) and Current-Voltage (I-V), are affected by the solar radiation and the temperature. The PV system should always operate so as to extract the maximum power under the variations of solar radiation, while the environment temperature supposed to be maintained at nominal value (25°C), therefore the PV current only depends on solar radiation. The time, required, to reach MPP under variable conditions has to be analysed to evaluate the performance of the PV system [21,22].

## 2. PHOTOVOLTAIC SYSTEM MODELLING

### 2.1 PV Cell Model

A mathematical description of current-voltage terminal characteristics for PV cells is available in the literature. The single exponential equation (1) which models a PV cell is derived from the physics of the PN junction and is generally accepted as reflecting the characteristic behavior of the cell [7].

$$I = I_{ph} - I_s \left\{ \exp \frac{q(V+R_{sl})}{NKT} - 1 \right\} - \frac{V+R_{sl}}{R_{sh}} \quad (1)$$

Where:

$I_{ph}$ : Represents the current generated by the photons (it will be constant if the radiation and the temperature are constants too). The photon generated current will flow out of the cell as a short-circuit current ( $I_{sc}$ ).

$I_s$ : Is the panel dark saturation current, in A, which depends strongly on temperature,

$q$ : Is the electron charge ( $1.602 \times 10^{-19}$  C),

$V$ : Is the voltage across the diode (V),

$K$ : Is the Boltzmann's constant ( $1.381 \times 10^{-23}$  J/K),

$T$ : Is the working temperature of the cell, in Kelvin,

$N$ : Ideality factor of the diode,

$R_s$ : Is the series resistance in ohm, which models the ohmic losses,

$R_{sh}$ : Is the shunt resistance, in ohm, which represents the current leakage.

From the equations, an equivalent circuit can be easily determined, and this aids in the development of the simulation model. This equivalent circuit model is shown in Fig. 1. It includes a current source, a diode, a series resistance and a shunt resistance.

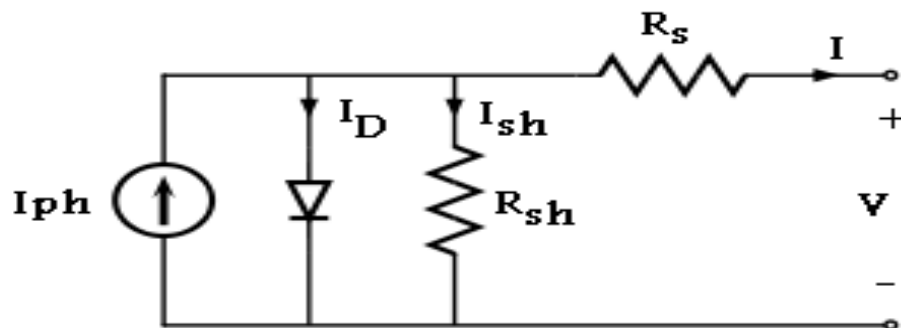


Fig. 1. PV cell equivalent circuit

## 2.2 The Influence of Solar Irradiation Variation

Based on the above equation, the subsystem of Fig. 1 is obtained. The above model includes two subsystems: one that calculates the PV cell photocurrent which depends on the radiation and the temperature [23].

$$I_{ph} = [I_{sc} + K_i(T-298)] \frac{G}{1000} \quad (2)$$

Where  $K_i=0.0017 \text{ A/C}^\circ$  is the cell's short circuit current temperature coefficient and  $G$  is the solar radiation ( $\text{W/m}^2$ ).

### 2.3 The Influence of Cell Temperature Variation

Like all other semiconductor devices, solar cells are sensitive to temperature, Increase in temperature, reduce the band gap of a semiconductor, thereby effecting most of the semiconductor material parameters. In a solar cell, the parameter most affected by an increase in temperature is the open-circuit voltage. Panel temperatures in the summer in warm climates can easily reach  $50^\circ\text{C}$  resulting in a 12% reduction in output compared to the rated output at  $25^\circ\text{C}$ . To calculate the exact percentage of losses due to the difference of temperature in Jordan, For the PV module selected in section below (Kyroce KD235XL) the temperature confection for voltage is  $(-1.33 \times 10^{-1} \text{ V/C}^\circ)$  and for current is  $(5.13 \times 10^{-3} \text{ A/C}^\circ)$ .

The Jordan ambient temperature is about  $45^\circ\text{C}$  so it's greater than the STC (standard test conditions) value by  $20^\circ\text{C}$ . By calculating the value of the reduction in voltage and current the expected effect of temperature is about 1% of losses in power. The diode reverse saturation current varies as a cubic function of the temperature and it can be expressed as [23]:

$$I_s(T) = I_s [T/T_{\text{nom}}]^3 \exp [(T/T_{\text{nom}} - 1)E_g/(N \cdot V_t)], \quad (3)$$

where

$(I_s)$  is the panel dark saturation current, in A;

$T_{\text{nom}}$  is the nominal temperature, equals to 300K;

$E_g$  is the band gap energy of the semiconductor;

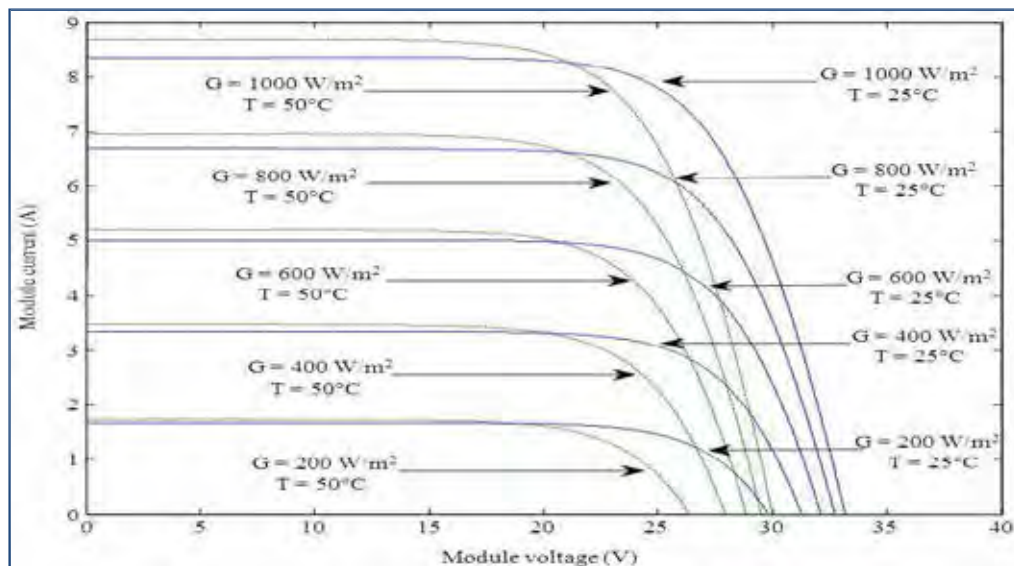
$V_t$  is the thermal voltage.

When there is no connection to the PV cell (open circuit), the photon generated current is shunted internally by the intrinsic p-n junction diode, this gives the open circuit voltage ( $V_{oe}$ ). In general, for a given solar radiation, when the cell temperature increases, the open circuit voltage  $V_{oe}$ , drops slightly, while the short circuit current increases. Figs. 2 and 3 show temperature effect.

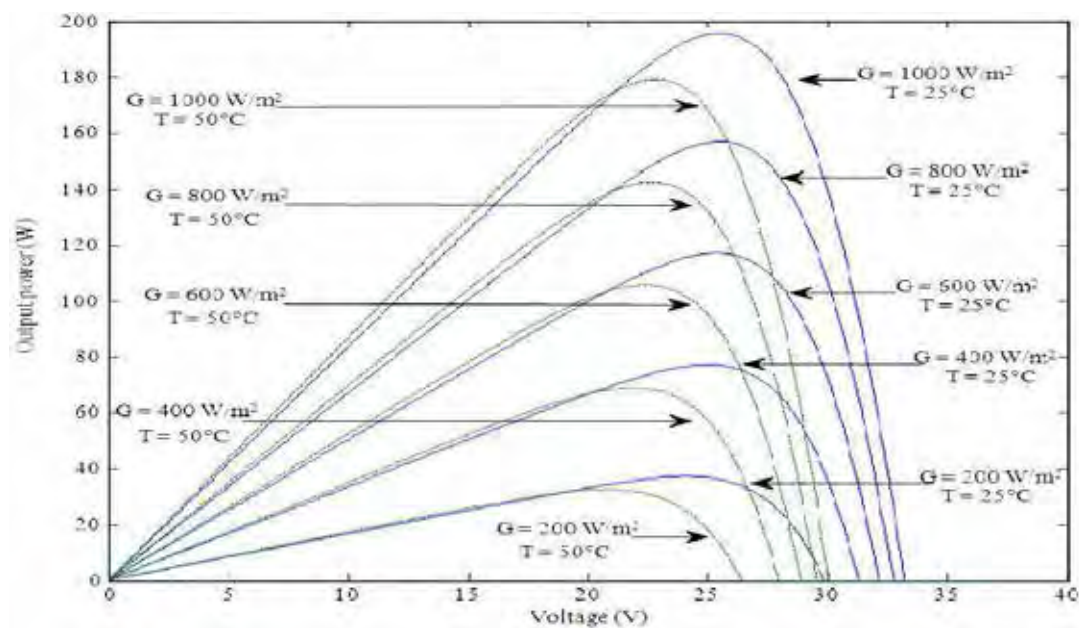
### 2.4 The Influence of Dust and Sands

Dust, Sands, clouds, and snow decrease solar panel efficiency. For our reign in Jordan as Mediterranean climate high altitudes require high tilt in a PV system. A lower fixed tilt angle is recommended to optimize year-round solar. Gain dust

generally tends to fall off with the increase in the tilt angle. The reign of Jordan is almost clear and not dusty or windy so the effect of the dust and soil can be reduced when using a fixed (manual change) title angel is about 3-4%.



**Fig. 2. The I-V characteristic for 25° C and 50° C**



**Fig. 3. The P-V characteristic for 25° C and 50° C**

## 2.5 Boost Converter with MPPT Controller and the Voltage Sourced Converter

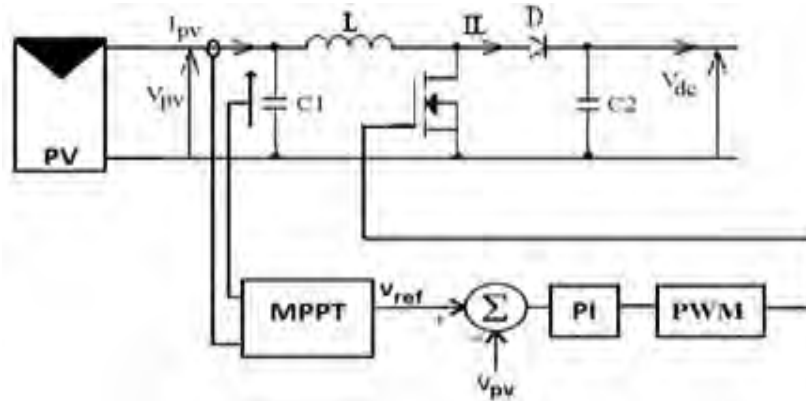
A DC-DC power, converter boosts the DC power from one voltage level to another higher or lower to the input voltage, has to be added at the output of the

photovoltaic array to achieve the optimum voltage and to implement the Maximum Power Point Tracking (MPPT).

$$V_o = V_{in_j} (1 - D), \quad (4)$$

where  $V_{in}$  is the input voltage (output voltage of PV array),  $V_o$  is the output voltage and  $D$  is the duty ratio of controllable switch. With the boost topologies the output voltage could be higher than input voltage. And can vary from 0 to 1, although there is no practical value of  $D$  equal to 1 due to voltage limitation issues Fig. 4. Is the configuration of the boost circuit and its control system [10]. In the detailed model, the DC-DC converter boosts DC voltage from 273.5 V to 500 V. Basically, the module current is perturbed by a small increment, and the resulting change in the power is observed. A simple updating algorithm is given as follows: The terminal voltage  $V$  and current  $I$  of PV arrays are first measured and PV power  $P$  is therefore obtained from the product of  $V$  and  $I$ . If the maximum power point  $P_m$  is the demarcation point, when  $V(k) > V(k-1)$ , if  $P(k) - P(k-1) > 0$ , then the solar cell works in the left section of the curve. To make the operating point close to the maximum power  $P_m$  point, need to continue to increase the output voltage  $V$ ; In contrast,  $V(k) > V(k-1)$ , if  $P(k) - P(k-1) < 0$ , then the solar cell works in the right part of the curve, in order to make the operating point near the point of maximum power  $P_m$ , require to reduce the output voltage  $V$ . With this control algorithm, the operating point of PV arrays can move toward the maximum power point corresponding to different temperature and irradiance. In order to suit the frequency and voltage level requirement of the load, a suitable switching power inverter is used. PV array is connected to the AC grid via a common DC/AC inverter. The inverter is used in current control method with PWM switching mechanism to make the inductance current track the sinusoidal reference current command closely and obtain a low THD injected current.

The direct current (DC) link capacitor maintains the solar PV array voltage at a certain level for the voltage source inverter. The single phase inverter with the output filter converts the DC input voltage into AC sinusoidal voltage by means of appropriate switch signals and then the filter output passes through an isolation step up transformer to set up the filter output voltage required by the electric utility grid and load [24].



**Fig. 4. Boost converter with MPPT controller**

### 3. RESULTS AND DISCUSSION

Fig. 5 shows the system model configuration that will be used to generate electrical energy using PV array, then feed it to a building in Amman (load) as a case study. And the extra power to the grid. The system is composed of two main buses: a DC bus and an AC bus. The PV panels are connected to the DC bus. This power is then converted to AC bus to which the electrical load and the grid will be connected. The annual global solar radiation in Amman-Jordan is about  $5.47 \text{ kWh/m}^2/\text{day}$ . Suppose that the electrical load of the research building is  $40 \text{ kWh/day}$ . Due to the losses of the system the Electrical load will be  $E_l = 1.15 * 40 = 46 \text{ kwh/day}$ . The average number of the sunshine of hours in Jordan for the year is set to 9.5 hours per day If the selected PV module is KYOCERA KD235GX solar panel with 235 Wp peak power. The parameters of the PV module used in our study are tabulated in Table 1 and its approximated I-V and P-V characteristics are depicted in Figs. 2 and 3 respectively [15]. PV array size = Electric. Load / sunshine hours  $46 / 9.5 = 4.85 \text{ kW}$ . Due to the inverter losses PV array size becomes: PV array size =  $1.045 * 4.85 = 5.07 \text{ KW}$ . The number of PV modules = PV array sizing / peak power of module =  $5.07 / 0.235 = 22$ . If the selected Grid Tie Solar Inverter is GT5.0SP with the specifications in Table 2 Inverter power =  $4850 * 0.95 = 4651.15 \text{ W}$ . So the number of PV in series =  $600/36.9 = 16$  modules Number of PV modules in parallel =  $22/16 = 2$  modules. So the final number of PV panels =  $2*16 = 32$  modules. The maximum current = (number of PV in parallel) \*  $I_{sc} = (2) * 8.55 = (17.1) \text{ A}$ . So number of PV in parallel =  $22/8.55 = 2$  modules Number of PV modules in parallel =  $22/2 =$

11 modules. So the final number of PV panels =  $2 \times 11 = 22$  modules, and the maximum voltage = number of PV in series \*  $I_{sc} = 11 \times 36.9 = 405$  V.

The I-V and P-V characteristics for the array and for each module are shown in Figs. 6 and 7, respectively. The duty cycle of the boost is set to 0.5.



**Fig. 5. System model configuration**

**Table 1. The PV module data**

Power peak	235 watt
Maximum power voltage $V_{mpp}$	29.8 V
Maximum power current $I_{mpp}$	7.89 A
Open circuit voltage $V_{oe}$	36.9 V
Short circuit current $I_{se}$	8.55 A
Max system voltage	600 V
Temperature voltage coefficient	$-1.33 \times 10^{-1}$ V/C0
Temperature current coefficient	$5.13 \times 10^{-3}$ V/C0

**Table 2. The specification of selected inverter**

AC power	5000
AC voltage	240 V
AC current	21 A
Frequency	50 Hz
Maximum DC voltage $V_{max}$	600 V
Maximum DC current $I_{max}$	22 A
Maximum efficiency	95 %

### 3.1 The Effect of Irradiation

#### 3.1.1 Irradiation varying in a ramp up/down form

At  $t=0$  sec the radiation is set to  $1000 \text{ w/m}^2$  then at  $t=0.7$  Sec it decreases with a rate of  $1500 \text{ w/m}^2/\text{Sec}$  for 0.5 sec then at  $t=1.5$  sec it increases with a rate of



1500 w/m<sup>2</sup>/search for 0.5 sec. As it is shown in Figs. 8 and 9. shows the variation of the PV DC voltage, PV DC current, and the diode current as a result of the radiation variation. Fig. 10 shows the PV output power and the effect of the variation of the radiation. And how the duty cycle decreases to track the PV output power close to the maximum power point of the PV for the given conditions.

### 3.1.2 Irradiation varying in a step form

At  $t=0.7$  Sec a step from 1000 w/m<sup>2</sup> to a 200 w/m<sup>2</sup> has been done as shown in Figs. 11-13 show the variation of the output array voltage and power. It is shown that the output PV current decreases and increases as the radiation decreases or increases. Once the radiation changes sharply consequently the output PV power changed sharply Fig. 13 shows that the duty cycle value follows the changes of the radiation (the response of the MPPT) in order to track the maximum power point that can be attained from the PV array under these conditions.

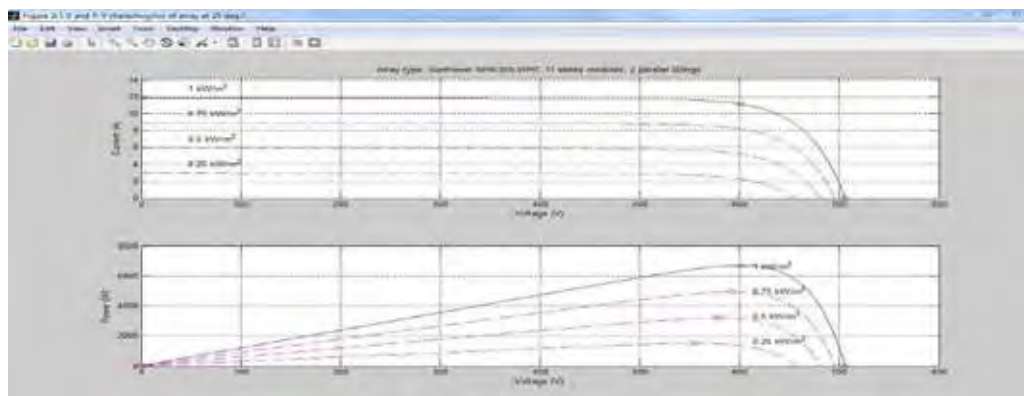


Fig. 6. Array 1-V and P-V characteristics

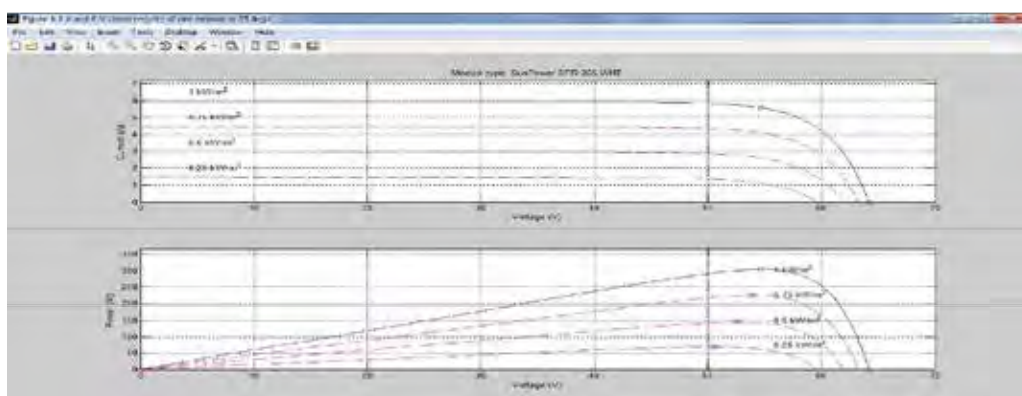
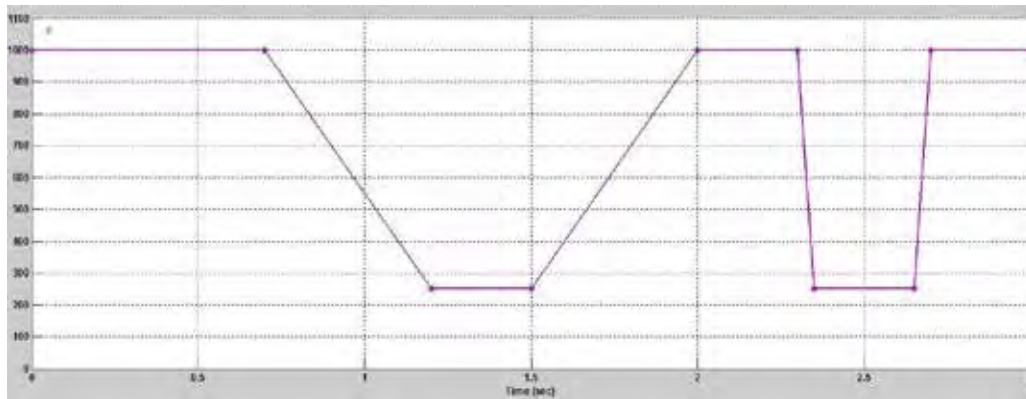
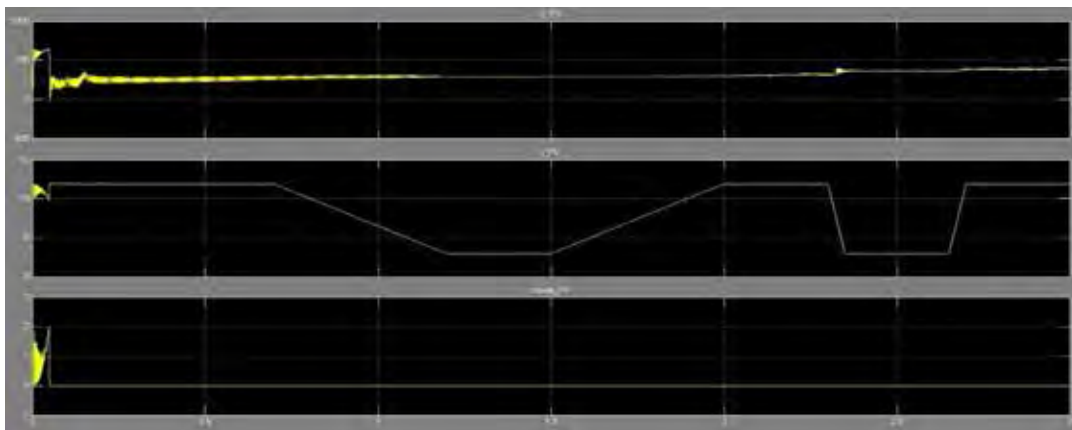


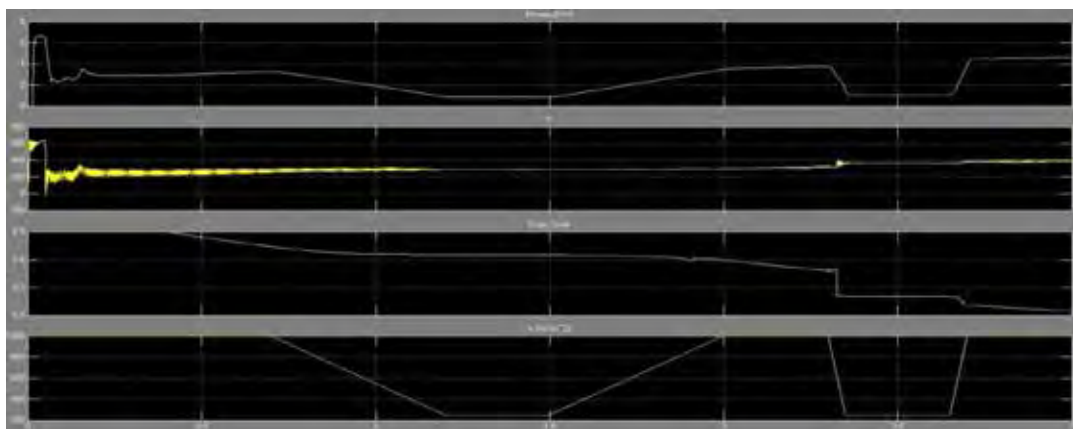
Fig. 7. One module 1-V and P-V characteristics



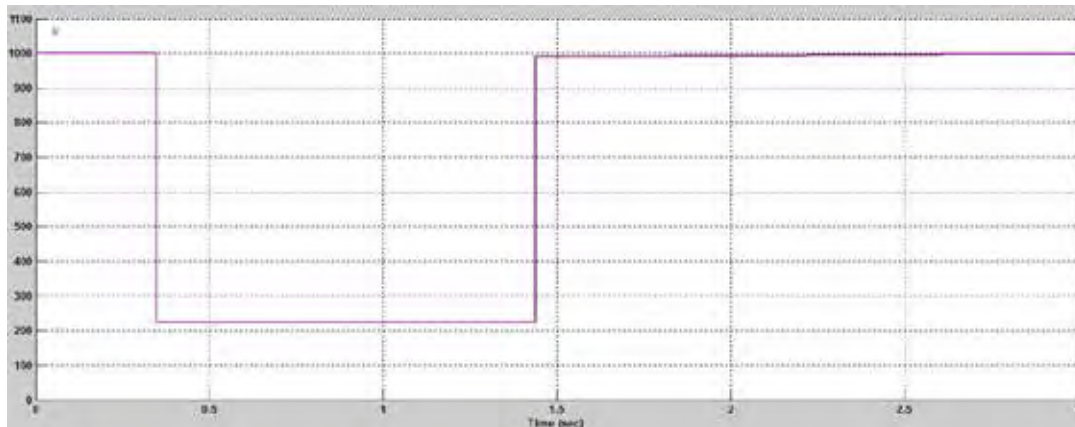
**Fig. 8. The radiation as a function of time**



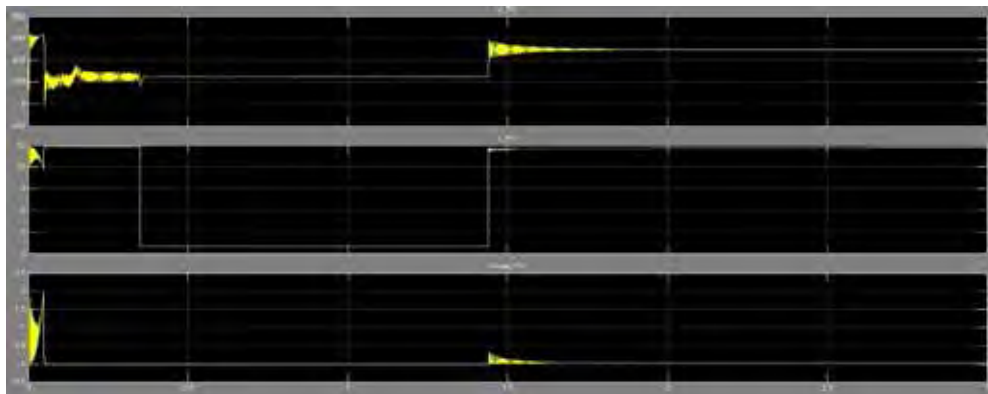
**Fig. 9. The output PV-voltage, PV-current, and the PV diode's current**



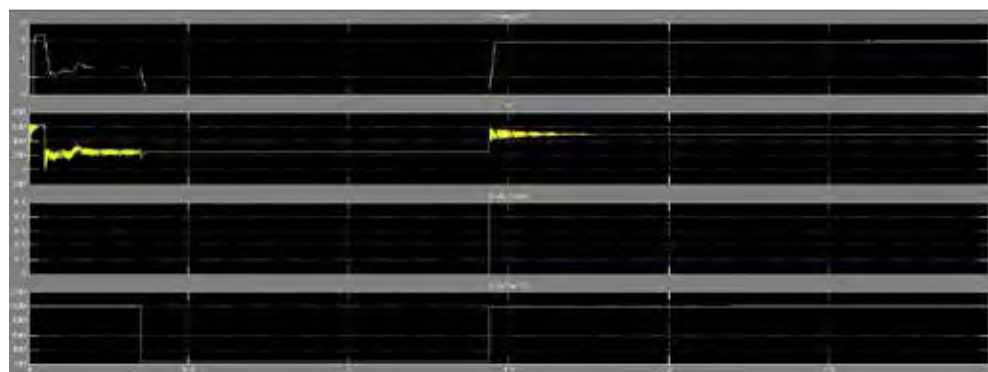
**Fig. 10. The Boost converter output mean power, boost converter output voltage, the duty cycle, and the PV array irradiation**



**Fig. 11. Step irradiation**



**Fig. 12. The boost converter output voltage, output current, and the diode's current**



**Fig. 13. The boost converter output mean power, output voltage, the duty cycle, and the PV array irradiation**

### 3.1.3 Changing the duty cycle (D) of the boost

The duty cycle set to 0.75 instead of 0.5, and the same parameters of the first case. Fig. 14 shows how the output PV power under such conditions decreases than that of case one.

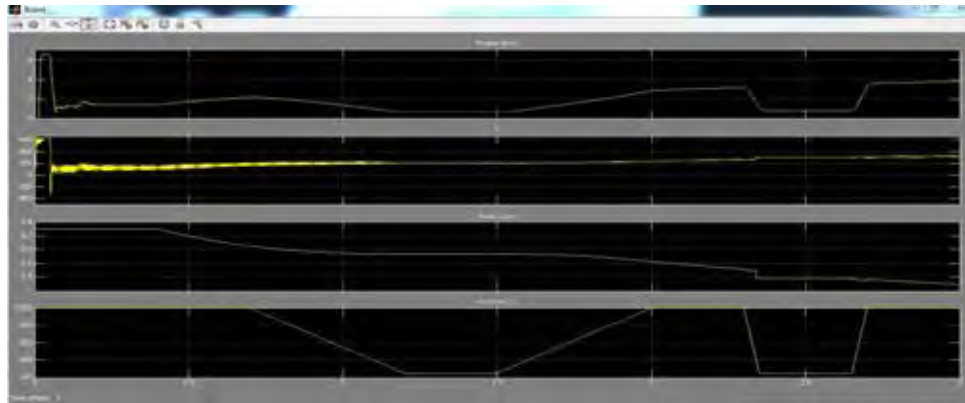


Fig. 14. PV power, boost converter output voltage, duty cycle, and the irradiation

### 3.1.4 Sand effect on PV array

Sand effect, or any analogue effect like shading, dust, snow, clouds., etc., can be simulated by adding another signal to the signal of irradiation. As shown in Figs. 15 and 16 shows how the PV current changed following the irradiation variation caused by the sand effect. Leading to a decrease of the output PV power which means minimization of the efficiency and so the performance of the PV.

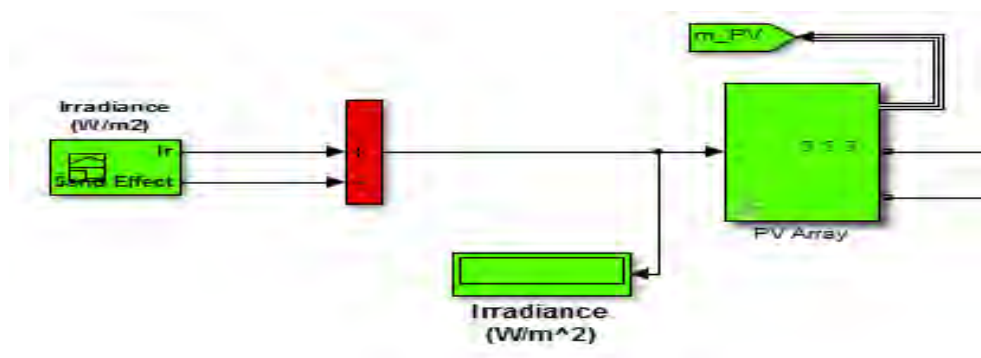
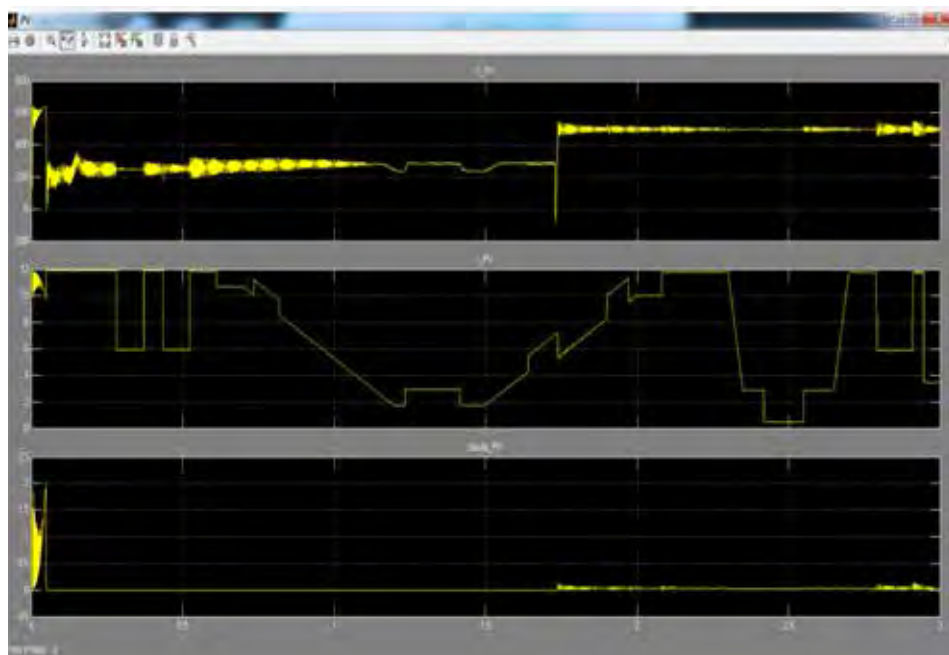


Fig. 15. Sand effect models



**Fig. 16. The PV voltage, PV current, and the diodes current under the sand effect**

#### **4. CONCLUSION**

The paper presents an approach of modelling a solar PV cell. The model is based on the fundamental circuit equations of a solar PV cell taking the effects of the environmental parameters such as the solar radiation, the cell temperature and the sand effect. The module was simulated on a Matlab/Simulink model using a KYOCERA KD235GX solar panel with 235 Wp peak power, such model would provide a tool to predict the I-V, and P-V characteristics of the solar PV cells and to select the proper power electronics and the associated control method to track the maximum power point under the changes of the environmental parameters.

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## ***Adsorption of Cu (II) Ions from Aqueous Solution onto Chemically Prepared Activated Carbon from Theobroma Cacao***

### **ABSTRACT**

This present research was aimed at studying the adsorption characteristics of Cu (II) ions from aqueous solutions onto two samples of low-cost, cocoa shell-based activated carbons (CSBAC) using the batch adsorption mode. Activated carbon samples were obtained by chemical treatment via pyrolysis using phosphoric acid (PAA) and potassium hydroxide (PHA) as activation agent. Findings from the studies unveiled a pH at zero-point charge (pH<sub>zpc</sub>) of 7.0 and 5.9 for PAA and PHA samples respectively. Contact time of 35 minutes for PAA and 15 minutes for PHA at pH<sub>max</sub> = 4 by 0.1 g were observed. Optimum adsorption quantities were 62.2 mg/g for PAA and 42.2 mg/g for PHA for an initial metal ion concentration of 2400 ppm. The Langmuir model for PHA and Freundlich model for PAA best described the adsorption of Cu (II) ions from aqueous solution. The two CSBAC samples both obeyed pseudo-second order kinetics. Generally, these results indicate that CSBAC can be used as an effective and low-cost adsorbent for the removal of Cu (II) ions from aqueous solutions.

**Keywords:** cocoa shell; chemical activation; activated carbon; Copper (II) ions; adsorption; kinetic model; isotherm model.

### **ABBREVIATIONS**

PAA: Phosphoric acid activated carbon, PHA: Potassium hydroxide activated carbon, CSBAC: Cocoa shell-based activated carbons, In: Iodine number, ASTM: American Society for Testing and Materials, pH<sub>zpc</sub>: pH at zero-point charge.

## 1. INTRODUCTION

Voluntary or accidental water, air and soil pollution by some chemical substances of industrial (heavy metals, colorants, microorganics, toxic gases, etc.) or agricultural origin (pesticides, fungicides, fertilizers, etc) constitute a major source of environmental degradation. These problems have been receiving worldwide attention from researchers to savage the health of mankind [1]. Heavy metals on their part are well known for their non-biodegradation properties that render them very toxic even at very low concentrations to all organisms of the plant and animal kingdoms. They accumulate in living organisms even during mass transfer in trophic chain [2]. It is therefore imperative to partially or totally eliminate heavy metal ions from industrial effluents to acceptable levels.

Copper is used in cloth making, marine painting, electrical equipments, boilers, pipes, etc. International norms according to WHO prescribe limiting concentrations of Copper in drinking water to 1 mg/L of copper [3]. Although Copper constitutes one of the micronutrients in the human body, its accumulation have been reported in the liver, brain, pancreas and myocardium of humans that often leads to Wilson Disease [4,5]. Continual inhalation of Copper vapor may lead to lung cancer [6]. The development of several techniques and methods such as chemical precipitation, adsorption on mineral or organic materials, complexation, biosorption, cementation, solvent extraction, distillation, emulsified liquid membranes and membrane processes (microfiltration, ultrafiltration, nanofiltration, reverse osmosis, ion-exchange resins etc), are geared towards greater amelioration of the quality of the environment/water quality [7]. Amongst these methods, adsorption which is reported in this work has shown high potentials and simplicity in management in the depollution of industrial waste water, especially in the elimination of some heavy metals [8]. Nevertheless, its efficacy depends largely on the adsorbent (cost, availability, and its regeneration) put in place.

In this regard, much work has been carried out on diverse materials, be it of natural or biological origin in the elimination of heavy metals from aqueous solutions. Low cost and high adsorption capacity agricultural by-products such as saw-dust, coco fibers, coconut palm fibers, banana peelings, sugar cane bagasse, orange peelings and nut shells etc [9], cola nut shells in the adsorption of colorants [10] have been used as adsorbents for the removal of heavy metals from aqueous solutions. The adsorption of cadmium on bacterium cells and algae has been studied [11-13]

for the adsorption of some heavy metals on cucumber pulps. Adsorption studies of crystal violet [14]; reactive yellow 2 dyes on activated carbons based on cocoa shells showed that they can serve as low-cost adsorbent material for colorants in aqueous solutions [15]. In 2011, in particular, the fixation of methylene blue in aqueous solutions by activated carbon produced from cocoa shells was reported in the literature according to which maximum monolayer adsorption capacity of 37.03 mg/g was obtained [16]. Also, 7.56 mg/g of Pb (II) ions was adsorbed maximally from aqueous solutions onto activated cocoa shells [17]. In another study, 111.1 mg/g of Cu (II) ions was found as maximum adsorption capacity in investigations carried-out on monolayer adsorption of Cu (II) ions on activated water-melon shells [18]. In yet another study, maximum adsorption capacities of Cu (II) ions from aqueous solution by activated sugar cane bagasse, orange peelings, mango saw-dust studied in 2007 stood at 3.19, 3.12, 2.89 mg/g, respectively [19]. Recently, the investigation of the adsorption of Cu (II) ions on synthetic goethite and natural red soils resulted in the following values respectively 78.2 mg/g, 41.2 mg/g, and 32.2 mg/g [20]. All these results show that the adsorbents act as substitutes or compliments to commercial activated carbon in waste-water treatment.

In the same vein, investigation of palm oil empty fruit bunch in the adsorption of Hg (II), Pb (II) and Cu (II) ions showed that the least adsorption capacity of 0.84 mg/g with respect to the others was by Cu (II) ions [21]. Maximum adsorption capacity of Cu (II) in aqueous solutions onto different initial masses of lignite (30, 45 and 60 g) gave the following values respectively: 4.045, 3.908 and 2.625 mg/g [22]. In Cameroon, the fifth largest cocoa producer in the world [23], agriculture represents an important part of total Gross National Products (GNP) and enormous quantities of agricultural waste products are generated on daily basis near agro-industrial zones/installations. Annual production of cocoa is estimated at 320,000 tons in 2015 according to reports [24]. Cocoa shells present post harvest environmental problems as large quantities are left behind as agric waste. The main purpose of this work was to valorize some of these local precursors (*cocoa shells*, *Theooroma cacao*) for the production of activated carbon. In this study, activated carbon was obtained by chemically treating grounded raw samples by phosphoric acid (PAA) and potassium hydroxide (PHA), followed by simple pyrolysis procedure.

## 2. MATERIALS AND METHODS

### 2.1 Collection and Pre-Treatment of Raw Materials

In order to valorize low-cost local materials as activated carbons, the forasteros variety of cocoa shells (*Theobroma cocoa*) was used as precursors. The choice of this biomass was attributed to its availability in the sub-region in particular and in the world in general. Samples of raw-materials were collected basically one hour after the splitting of the cocoa pods after harvesting from cocoa plantations of the Santchou locality, a village situated in the West Region of Cameroon. These samples after collection were abundantly washed with distilled water to eliminate dusty and hydrosoluble substances and were sun-dried for 14 days, after which were grounded using RETCH SM 2000/1430 UPM grinder, which were further sieved to obtain fractions of diameter between 0.50 and 1.25 mm.

### 2.2 Chemical Activation and Pyrolysis

In this study, chemical activation was carried out with the help of phosphoric acid ( $\text{H}_3\text{PO}_4$ ) and potassium hydroxide (KOH), as activation agents. The precursor materials obtained were of diameters ranging between (0.50-1.25 mm). They were chemically pre-treated before pyrolysis step, although the order could be reversed as prescribed by [25]. The method involved mixing the chosen precursor fraction of cocoa shells with either 10% wt/wt  $\text{H}_3\text{PO}_4$  (for PAA samples) and 50% wt/wt of KOH (for PHA samples) in a 1:2 weight ratio before carbonization. The impregnated samples were placed in an oven at  $110^\circ\text{C}$  for 24 hours. Pyrolysis of the impregnated samples was carried-out for one hour duration in a carbolite furnace in the absence of air (oxygen) which was preheated to  $400^\circ\text{C}$  at a  $10^\circ\text{C min}^{-1}$  heating rate, which was then allowed to cool down to ambient temperature, after which a dry residue was obtained. Total elimination of phosphate ions from the acid samples of activated carbon obtained (PAA) were eliminated by abundantly washing with distilled water until a neutral pH was obtained [26]. On their part, the PHA samples were initially washed abundantly with a 10% solution of hydrochloric acid followed by abundant washing with distilled water until the pH of the resulting samples ranged from 6-7 in order to eliminate all chloride ions [27]. The resultant activated carbon samples (PAA and PHA) were then dried in an oven at  $110^\circ\text{C}$  for a period of 24 hours. The final material samples were grounded and then sieved to obtain particles with diameters less than 71 microns and later on conserved in desiccators for further use.

## 2.3 Characterization of Adsorbent

### 2.3.1 Iodine number (In)

The iodine number was measured according to the procedure established by the American Society for Testing and Materials (ASTM 02866-94) [28]. The iodine number is defined as the milligrams of iodine adsorbed by 1.0 g of carbon when the iodine concentration of the filtrate is 0.02 N. The iodine number is accepted as the most fundamental parameter used to characterize activated carbon performance.

Iodine number was employed in this study as a test for micro porosity via volumetric analysis. This fundamental test for the potentials of the prepared activated carbon determines its microporosity up to values as small as 2 nm. Iodine number is often correlated with sample specific surface area from BET studies, and is obtained from the following expression:

$$\text{Iodin number} = \frac{25.4 \times (20 - V_n)}{m_{AC}}, \quad (1)$$

where,  $m_{AC}$  (g) is the mass of the activated carbon and  $V_n$  (ml) the volume of the sodium thiosulphate solution at the equivalence point.

### 2.3.2 Standardization of iodine solution

10 ml of 0.02 N iodine solutions were pipetted into a conical flask. 2-3 drops of starch solution were added. The pale yellow color of iodine solution turned blue and was titrated with 0.005 N sodium thiosulphate till it became colorless.

### 2.3.3 Surface fonction determination by the boehm method

Titration of total surface acidity and basicity of the activated carbons was carried out via the Boehm method [29,30]. In the determination of acidic surface functions (carboxylic, lactonic, phenolic), 40 ml each of decimolar solutions of  $\text{NaHCO}_3$ ,  $\text{Na}_2\text{CO}_3$ ,  $\text{NaOH}$  and  $\text{HCl}$ , were introduced into different reactors and each put in contact with 0.10 g of activated carbon sample. Titration of excess base was done by  $\text{HCl}$  solution. In the determination of the basic functions, 0.1 g of activated carbon was put in contact with 40 ml of a decimolar solution of  $\text{HCl}$  and the excess acid titrated with  $\text{NaOH}$ . Stirring was maintained during 48 hours with the aid of a magnetic agitator.

### 2.3.4 Determination of pH at zero-point charge (pH<sub>zpc</sub>)

pH of zero charge, pH<sub>zpc</sub>, corresponds to a pH at which the surface charge is nul. pH<sub>zpc</sub> of the activated carbon was estimated according to standard procedure [31]. 50 ml of a decimolar solution of NaCl was introduced each into a reactor each containing 0.1 g of activated carbon to be analyzed. The pH of each solution was adjusted by addition of decimolar solutions of NaOH or HCl (by varying values of pH between 3 and 11). pH<sub>zpc</sub> was determined by the intersection point of the representative curves  $\text{pH (final)} = f[\text{pH (initial)}]$  and the first bisector curve. Stirring was maintained at 27°C for 48 hours with the aid of a multi-agitator system. The contents of the reactors were then filtered with Whatman N°4 filter paper after which the pH of the final solutions was measured.

### 2.3.5 Analysis by fourier-transform-IR spectrophotometer (FTIR)

In order to determine the surface functional groups existing on the carbon samples, FTIR were carried out on samples using infrared spectrophotometer (trade-mark bruker alpha-p spectrometer) with ethanol as solvent with a resolution of 4cm<sup>-1</sup> within the interval 400-4000 cm<sup>-1</sup>.

## 2.4 Batch Adsorption Experiments (Equilibrium Studies)

### 2.4.1 Preparation of Cu (II) Ion solution

The UV-Visible absorption spectrum of Cu (II) ions was obtained by spectral scanning of a 3 g/l mother solution of CuCl<sub>2</sub>.2H<sub>2</sub>O between 770 and 870 nm. Results show a wavelength of maximum absorption of Cu (II) at 830 nm. The mother solution was prepared by dissolving 8.04834 g of CuCl<sub>2</sub>.2H<sub>2</sub>O (M=170, 48 g/mol at 99% purity by mass) in a liter of freshly prepared distilled water contained inside a volumetric flask, and homogenized (agitation for 1 hour). Successive dilution of mother solution gave rise to the working solutions.

### 2.4.2 Batch adsorption experiments

Kinetic and equilibrium studies of Cu (II) ions adsorption were carried out in a batch reactor maintained at 27°C. In each trial (in a total of ten), 0.1 g of carbon sample preserved as described above was weighed and introduced into 20 ml of a Cu (II) ions solution in a volumetric flask. The pH of the mixture was then adjusted by 0.1 N solution of HCl or NaOH to a pre-determined value to permit maximum

adsorption. The different mixtures obtained were agitated within a time interval of 5-60 minutes in order to determine the time required for equilibrium to be attained. The residual Cu (II) ions concentration in each sample, after filtration of the residual solutions with Whatman filter paper N°4 was determined by UV-visible spectrophotometer (CORNING 259) at 830 nm wavelength. The sorption capacity of samples at equilibrium ( $Q_e$ ) and the percentage removal (% R) are given by the relations (2) and (3) below:

$$Q_e = \frac{C_o - C_e}{m} \times V, \quad (2)$$

$$R = \frac{C_o - C_t}{C_o} \times 100, \quad (3)$$

where  $C_o$  is the initial concentration of Cu (II) ions,  $C_e$  is the equilibrium concentration, while  $V$  is the volume of the Cu (II) ions solution.

## 2.5 Kinetic Models

Several kinetic models are often used in modeling the adsorption mechanism of dissolved solutes on adsorbents. In this study, four kinetic models have been studied in describing the adsorption phenomenon of Cu (II) ions onto the two activated carbon samples studied herein: pseudo-first order, pseudo-second order, Elovich's model and intra-particle diffusion model.

### 2.5.1 Pseudo first-order

Pseudo-first order or Lagergren [32] model was established for liquid phase adsorption and is applicable only in the first few minutes of adsorption. It requires pre-knowledge of the adsorbed quantity at equilibrium. This model takes the form of the following differential equation [33].

$$\frac{dQ_t}{dt} = K_1(Q_e - Q_t), \quad (4)$$

where,  $K_1$  is the pseudo-first-order rate constant ( $\text{min}^{-1}$ );  $Q_e$  and  $Q_t$  are the adsorption capacities at equilibrium and at a given time  $t$  expressed in (mg/g).



By integration of equation (4) within the time interval  $t = 0$ , and  $t = t$  corresponding to  $Q_t = 0$  and  $Q_t = Q_t$ , the following relation is obtained:

$$\ln(Q_e - Q_t) = \ln Q_e - k_1 t \text{ with } \ln C_t = -k_1 t + \ln C_o \text{ after reduction.} \quad (5)$$

Linear plot of  $\ln(Q_e - Q_t)$  versus  $f(t)$  should provide values for  $k_1$  and  $Q_e$  from the gradient and y-intercept respectively.

### 2.5.2 Pseudo second-order model

Represented by equation (6) below, the pseudo-second order model [34,35] has been frequently used in diverse experiments involving the adsorption of organics and heavy metals on activated carbon. The pseudo-second order chemisorption kinetic rate equation is expressed as [36]:

$$\frac{dQ_t}{dt} = K_2(Q_e - Q_t)^2, \quad (6)$$

where,  $K_2$  is the pseudo-second-order rate constant ( $\text{mg.g}^{-1} \cdot \text{min}^{-1}$ ).

By integration between  $t = 0$  and  $t = t$  corresponding to  $Q_t = 0$  and  $Q_t = Q_t$ , we obtain the following relation:

$$\frac{t}{Q_t} = \frac{1}{K_2 Q_e^2} + \frac{t}{Q_e}. \quad (7)$$

The parameters  $K_2$  and  $Q_e$  are obtainable from the intercepts and the slope of the graph of  $t/Q_t$  versus  $t$ .

### 2.5.3 Elovich model

This model (equation 9), which is often used in modeling chemisorptions of gases on solids can also satisfactorily be applied to solid-liquid adsorption systems especially those with heterogeneous adsorption surfaces [37].

$$a.dQ/dt.exp(-qt), \quad (8)$$

where,  $a$  is the initial adsorption rate (mg/g.min) and

$$Q = \frac{1}{a} \ln(a_t) + \frac{1}{a} \ln(t). \quad (9)$$

The value of the constants can be obtained from the slope and intercepts of a plot of  $Q_t = f(\ln\{t\})$ .

#### 2.5.4 Intra-particle diffusion model

The intra-particle diffusion model or the Weber and Morris equation [38] models the type of diffusion mechanism involved in adsorption processes. It is given here by equation (10):

$$Q_t = k_{id}t^{1/2} + C, \quad (10)$$

where  $k_{id}$  is the intra-particle diffusion constant (mg.g<sup>-1</sup>.min<sup>-1/2</sup>). The linear form of this equation takes the following form [39].

$$\ln R = \ln K_{id} + a \ln t, \quad (11)$$

where  $R$  is the percentage of Cu (II) ions removed at instant  $t$  and  $a$  is a constant that depends on the adsorption mechanism. When intra-particle diffusion plays a significant role in controlling the kinetics of the sorption process, the plots of  $\ln R$  versus  $\ln t$  yield straight lines passing through the origin and the slope gives the rate constant,  $K_{id}$ . However, when the transport of the solute molecules from the liquid phase up to the solid phase boundary plays the most significant role in adsorption, the liquid film diffusion model may be applied.

### 2.6 Isotherm Models

Maximum sorption capacities at a given temperature are obtainable from adsorption isotherm models. In this study, three adsorption models of Cu (II) ions on two activated carbons derived from cocoa shells have been investigated: Langmuir, Freundlich and Dubinin-Radushkevich-Kaganer (D-R-K) models.

#### 2.6.1 Langmuir adsorption isotherm

In this model valid for monolayer adsorption (equation 14), the quantity adsorbed  $Q_e$  (mg/g) is related to the maximum adsorption capacity of the adsorbent

$Q_m$  (mg/g), equilibrium adsorbate concentration  $C_e$  (mg/L) at a given temperature. The general form of the Langmuir equation is [33]:

$$\frac{Q_e}{Q_m} = \frac{K_L C_e}{1 + K_L C_e}, \quad (12)$$

where,  $K_L$  is the Langmuir adsorption constant (L/mg). The linear transformation of this model takes the following expression:

$$\frac{1}{Q_e} = \frac{1}{Q_m K_L C_e} + \frac{1}{Q_m}. \quad (13)$$

A graph of  $1/Q_e$  versus  $1/C_e$  provides values for the constants  $1/K Q_m$  (gradient) and  $1/Q_m$  (y-intercept) respectively.

The essential characteristics of a Langmuir isotherm can be expressed in terms of a dimensionless constant separation factor or equilibrium parameter,  $R_L$ , which is defined as:

$$R_L = \frac{1}{1 + K C_o}. \quad (14)$$

The  $R_L$  value indicates the shape of the isotherm to be either unfavorable ( $R_L > 1$ ), linear ( $R_L = 1$ ), favorable ( $0 < R_L < 1$ ), or irreversible ( $R_L = 0$ ) as shown in Table 3 in this work.

### 2.6.2 Freundlich adsorption Isotherm

Adsorption of micro pollutants is best modeled by Freundlich isotherm which takes the following mathematical expression [36]:

$$Q_e = K_f C_e^{1/n_f}, \quad (15)$$

where,  $Q_e$  is the quantity of  $\text{Cu}^{2+}$  ions adsorbed per gram of adsorbent material (mg/g); and  $C_e$  is the concentration of  $\text{Cu}^{2+}$  ions at equilibrium (mg/L).

$K_f$  and  $1/n_f$  are Freundlich constants that characterize adsorbent efficiency with respect to a given adsorbate. Equation (14) is the linear form of the Freundlich isotherm.

$$L_n Q_e = L_n K_f + \frac{1}{n_f} \ln C_e. \quad (16)$$

A linear graph of  $L_n Q_e$  versus  $L_n C_e$  gives the values of  $1/n_f$  (gradient) and  $L_n K_f$  (y-intercept). The  $1/n$  values indicate the type of isotherm to be irreversible  $1/n = 0$ , favorable  $0 < 1/n < 1$ , unfavorable  $1/n > 1$ .

### 2.6.3 Dubinin-Radushkevich-Kaganer adsorption model

Langmuir and Freundlich isotherms are insufficient to explain the physical and chemical characteristics of adsorption. D-K-R isotherm is commonly used to describe the sorption isotherms of single solute systems. The D-K-R isotherm, apart from being an analogue of Langmuir isotherm, is more general than Langmuir isotherm as it rejects the homogeneous surface or constant adsorption potential. The D-K-R isotherm is expressed as [33].

$$Q_e = Q_{max} \exp I \frac{(RT_{in}(1+\frac{1}{C_e}))^2}{-2Ea^2} D, \quad (17)$$

where,  $Ea$  is the main energy of adsorption and gives information about the physical and chemical features of adsorption. The linear form of the D-K-R isotherm equation is:

$$\ln Q_e = \ln Q_{max} - E^2, \quad (18)$$

where  $E = RT_{in} \left(1 + \frac{1}{C_e}\right)$  is called the Polanyi Potential.

## 3. RESULTS AND DISCUSSION

### 3.1 Characterization of Adsorbents

#### 3.1.1 Chemical composition of raw cocoa shells

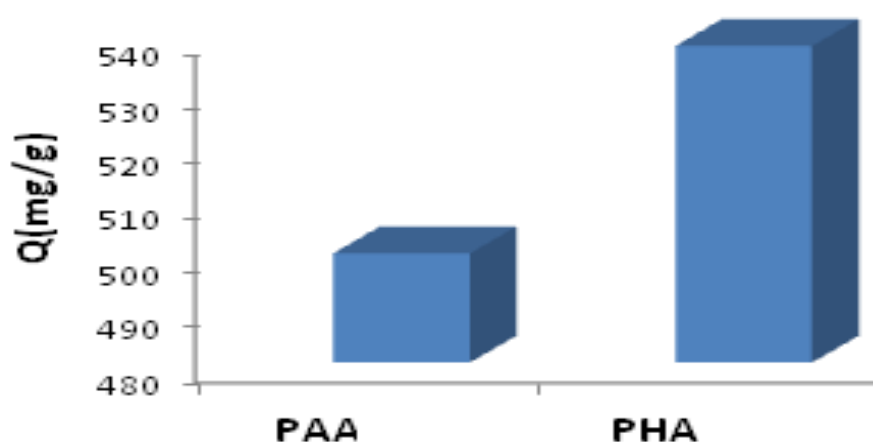
The chemical composition of raw cocoa shells was determined by X-ray fluorescence using Bruker-S4 Pioneer Wavelength Dispersive Fluorescence Spectrometer (WDFS) analyzer. In this study, X-ray fluorescence showed the following percentage compositions for the raw materials (cocoa shells): K<sub>2</sub>O (83.28%); CaO (4.905%); MgO (1.04%); SiO<sub>2</sub> (0.671%); SO<sub>3</sub> (0.652%); P<sub>2</sub>O<sub>5</sub> (0.527%); Fe<sub>2</sub>O<sub>3</sub> (0.467%); Al<sub>2</sub>O<sub>3</sub> (0.329%); MnO (0.224%); TiO<sub>2</sub> (0.112%); Rb<sub>2</sub>O (0.0867%); ZnO (0.0793%); CuO (0.0468%); Na<sub>2</sub>O (0.041%); SrO (0.0259%); LOI (7.21%); Sum (99.6967%).

### 3.1.2 Iodine number test (In)

Iodine number (In) is a fundamental parameter used to characterize activated carbon performance. It is a measure of the micropore content of the activated carbon and is obtained by adsorption of iodine from solution by the activated carbon sample. The micropores are responsible for the large surface area of activated carbon particles and are created during the activation process [28]. Tests were carried out according to the ASTM D2866-94 procedures, and the results obtained for activated carbons prepared by chemical activation (Fig. 1) suggest that the values of (In) obtained for PHA based-carbon is greater than the value obtained for PAA based-carbons with values 538 mg/g and 500 mg/g respectively. This implies that there are more micropores in PHA than PAA.

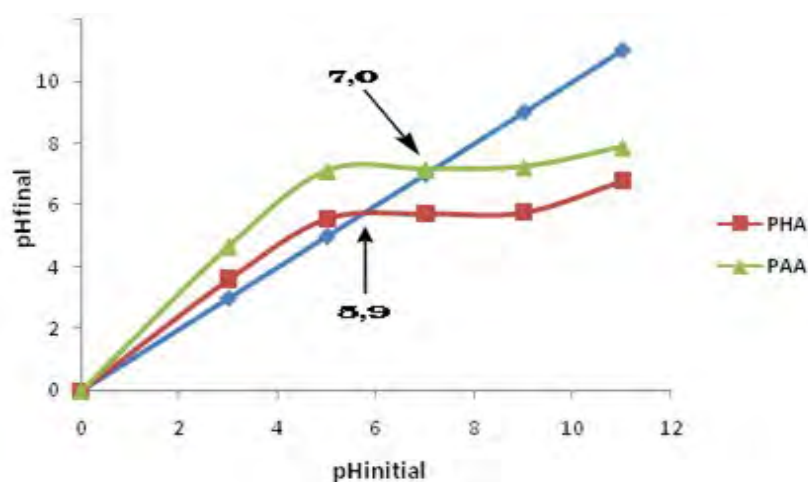
### 3.2 Determination of pH at Zero-point Charge (pHzpc)

Basic or acidic character of the activated carbon samples are often indicated by values of pH<sub>zpc</sub> obtained and consequently, knowledge of net surface charge (according to the pH of the solution).



**Fig. 1. Iodine number test for PAA and PHA**

Thus, for manipulations for which pH<sub>zpc</sub> > pH activated carbon samples studied have positively charged surfaces while negatively charged ones are obtained for pH<sub>zpc</sub> < pH [40]. In the liquid phase, knowledge of pH<sub>zpc</sub> is of great importance in interpreting the electrostatic interactions between molecules and adsorbent material. pH at zero-point charge (pHzpc) was obtainable from the graph of pH<sub>final</sub> versus pH<sub>initial</sub> (Fig. 2) from which we infer neutral character for PAA (pHzpc=7.0) and acidic character for PHA (pHzpc=5.9).



**Fig. 2. Graph for the determination of  $pH_{zpc}$  for PAA and PHA**

### 3.3 Determination of Oxygen Containing Functional Groups

Nature and quantity of functional groups on the activated carbons were obtained from the titration of surface functional groups [29,30]. The quantification of the surface functions (basic or acidic) of the two activated carbon samples have been presented on (Table 1). The validation of our results was through Boehm titration which was carried out in triplicate measurements. Results in (Table 1) show that the two activated carbon samples PAA and PHA have different chemical properties. PAA-based CSBAC present an equivalent quantity of oxygen-based surface groups (acid and basic) therefore confirming its neutral character while PHA-based CSBAC show more acidic than basic groups, confirming its acidic character. We can therefore conclude that the quantification of the surface functional groups by the Boehm method is coherent with  $pH_{zpc}$  values obtained for each carbon sample (Fig. 2) [41]. The two carbon samples PAA and PHA contains carboxylic groups and very small quantities of lactonic groups, on the other hand, PAA-based carbon contains more phenolic groups than PHA based carbons (Table 1).

**Table 1. Quantification of surface oxygen-containing groups by the Boehm method**

Activated carbon	Carboxylic (meq g <sup>-1</sup> )	Lactonic (meq g <sup>-1</sup> )	Phenolic (meq g <sup>-1</sup> )	Total acid (meq g <sup>-1</sup> )	Total basic (meq g <sup>-1</sup> )	Total (meq.g <sup>1</sup> )	Character
PAA	0.271	0.008	0.058	0.337	0.293	0.620	Neutral
PHA	0.222	0.005	0.015	0.242	0.131	0.373	Acid

### 3.4 Fourier Transform Infrared Spectroscopy (FTIR)

FTIR analysis have been used in confronting obtained results to those from Boehm test and from pHzpc measurements. IR spectra of PAA and PHA activated carbons are represented in (Figs. 3 and 4) below.

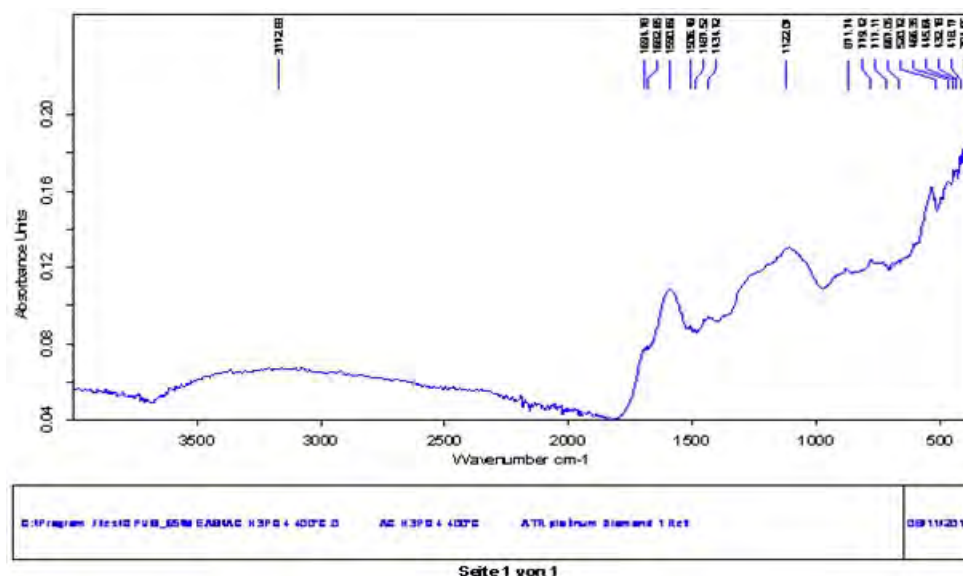


Fig. 3. FTIR spectrum for PAA

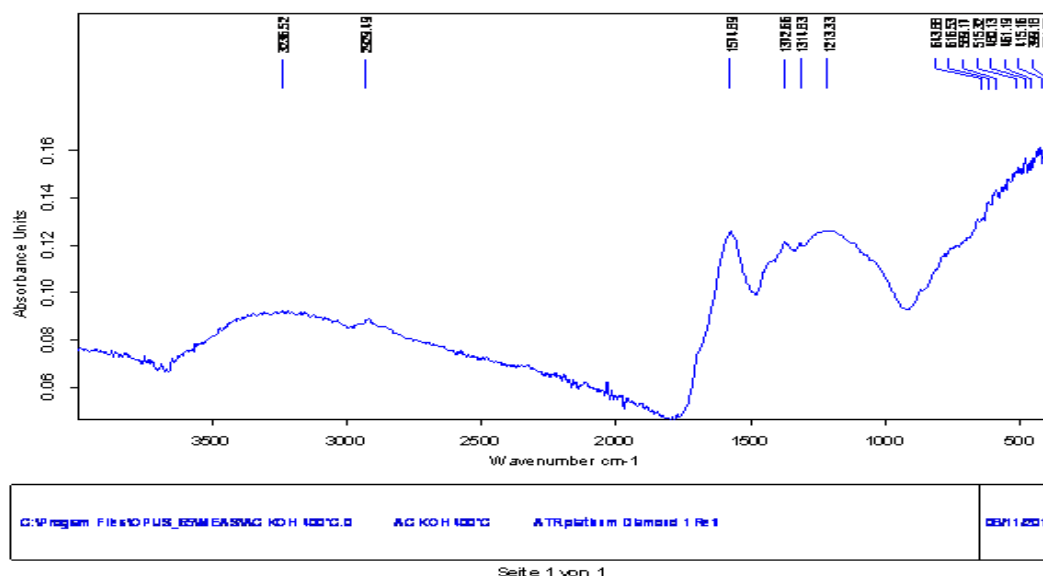


Fig. 4. FTIR spectrum for PHA

The most intense bands in the IR spectrum of phosphoric acid-based activated carbon (PHA) were: 418, 520, 667, 871, 1122, 1487, 1434, 1487, 1506, 1590, 1682, 1694, 3172 cm<sup>-1</sup>. The large absorption band observed at 3172 cm<sup>-1</sup> is attributed to



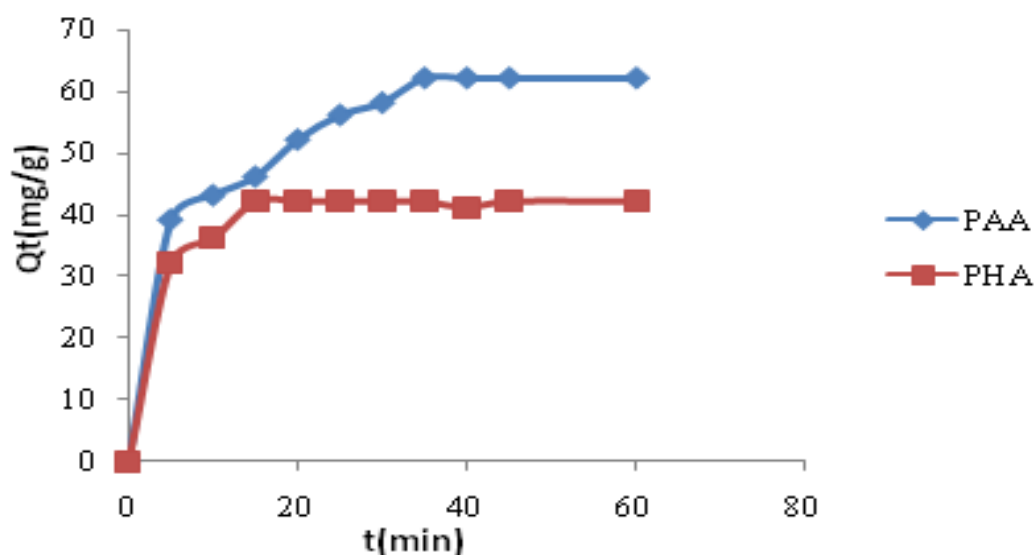
hydrogen bond-stretching and may be the characteristic peak of the carboxylic, phenolic or alcohol hydroxyl groups or water adsorbed activated carbon. Absorption bands between  $1700\text{--}1650\text{ cm}^{-1}$  with maximum at  $1694\text{ cm}^{-1}$  and  $1682\text{ cm}^{-1}$  is attributed to C=O bond stretching of the carboxylic anhydride groups. The peak observed at  $1590\text{ cm}^{-1}$  is attributed to the carbonyl functional group. The region towards  $1506, 1487, 1434\text{ cm}^{-1}$  provide some clues to the relative abundance of bending of  $\text{CH}_2$  and  $\text{CH}_3$  or of the O-H bending supported by the existence of phenols or carboxylic groups. The peak observed at  $1122\text{ cm}^{-1}$  is attributed to the ionized chemical bond,  $\text{P}^+\text{-O}^-$ , found in the esters of phosphate acids [42] and to symmetric vibrations of the P-O-P chains (polyphosphate) [43]. The absorption band from  $900\text{--}600\text{ cm}^{-1}$  can be attributed to C-O-C groups of esters or ethers.

On the IR spectrum of PHA-based CSBAC (Fig. 4), we observe a large absorption band from  $3600\text{--}2000\text{ cm}^{-1}$  and presents a maximum at  $3236\text{ cm}^{-1}$  and  $2929\text{ cm}^{-1}$ . The peak corresponding to  $3236\text{ cm}^{-1}$  is assigned to O-H stretching vibrations of hydrogen bonded hydroxyl, or carboxylic groups, and the peak situated at  $2929\text{ cm}^{-1}$  is attributed to C=O bond stretching of ketones. The spectra of PHA based CSBAC equally show a peak situated at  $1574\text{ cm}^{-1}$  due to C=C bond vibrations of aromatic rings. The shoulder at  $1371.53\text{ cm}^{-1}$  can be ascribed to N-O stretching of aliphatic nitro compounds of the activated carbon derived from sodium hydroxide activation [40]. The band between  $600\text{--}400\text{ cm}^{-1}$  corresponds to C-H bond vibrations in the aromatic ring. From the foregoing, the functional groups present on PAA-based CSBAC are phenols, carboxylic, esters or ethers while those present on PHA-based CSBAC are carboxylic, ketones, aliphatics, which are all in line with other results from the Boehm method.

### 3.5 Influence of Contact Time

During adsorption processes, the rate of mass transfer from the liquid to the solid phase is influenced by contact time between the two phases. In order to determine the effect of the contact time on the extent of adsorption, 0.1 g of the adsorbent was stirred with a 20 mL solution of Cu (II) ions of initial concentration 2400 mg/L for a time interval of 5-60 minutes for PAA and PHA at pH=4.0. The experimental results obtained for the adsorption of Cu (II) ions during various contact times are illustrated in (Fig. 5). It can be observed that the quantity adsorbed increases with time, then attains a constant value beyond which no further adsorption

took place. It can be inferred from these results that adsorption takes place in two stages: an initial rapid phase which attains saturation point within 15 and 35 minutes for PHA and PAA, attributed to the presence of free adsorption sites at the surface of the adsorbents [44]. Once the Cu (II) ions are adsorbed from solution onto these sites, they block the adsorption pores (which are of smaller sizes) from subsequent adsorption. As a consequence, adsorption speed decreases and that marks the onset of the slow second phase (step) from 35 to 60 and 15 to 16 minutes corresponding to PAA and PHA respectively. Therefore, surface adsorption sites are exhausted with time. The remaining vacant sites are difficult to be occupied by the cation due to repulsive forces between adsorbate present in solid and bulk phases [45]. We also observed from (Fig. 5) that adsorption reach equilibrium within 35 and 15 min for PAA and PHA, respectively.

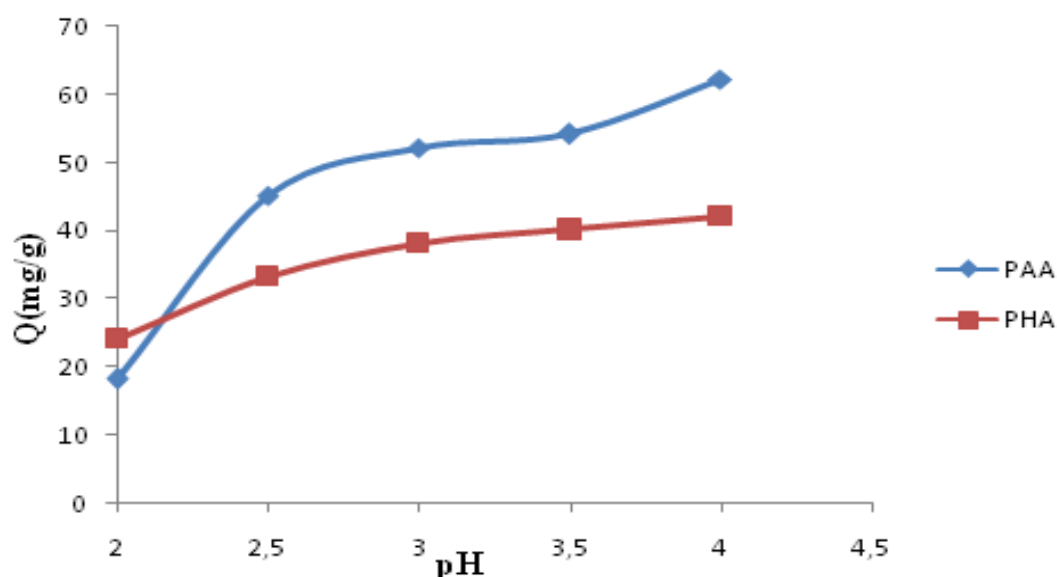


**Fig. 5. Effect of contact time on the adsorption of Cu (II) Ions on PAA and PHA**

### 3.6 Influence of pH

Sorption of metallic ions from aqueous solutions depends very much on pH as it influences surface charge, degree of ionization and the nature of the adsorbent ionic species in solution [46]. (Fig. 6) represents the effect of initial pH of the solution on the sorption of Cu (II) ions onto PAA and PHA using 2400 mg/L initial Cu (II) concentration and 0.1 g of adsorbent. pH was varied between 2 and 4 in the present study. Sorption potentials of PAA and PHA for Cu (II) ions were seen to increase

with solution pH appreciably up to pH 4.0 as shown in (Fig. 6). The optimum pH for Cu (II) ions adsorption by PAA and PHA was found to be 4.0.



**Fig. 6. Influence of pH on copper (II) ion adsorption on PAA and PHA**

At strong pH range ( $\text{pH} < 3$ ) we observed low values of adsorbed quantities. This is attributed to the fact that  $\text{H}^+$  ion concentration is high in solution which induces competition (in favor of  $\text{H}^+$ ) for free adsorption sites between Cu (II) and  $\text{H}^+$  ions [47]. Adsorbed quantities have been found to decrease as surface becomes negatively charged (excess  $\text{OH}^-$  ions) at  $\text{pH} > 4$  and this too is attributed to the precipitation of  $\text{Cu}(\text{OH})_2$  and adsorption becomes impossible [48]. From these results we can conclude that maximum adsorption/retention capacity of adsorbents for Cu (II) ions is at  $\text{pH} = 4.0$ .

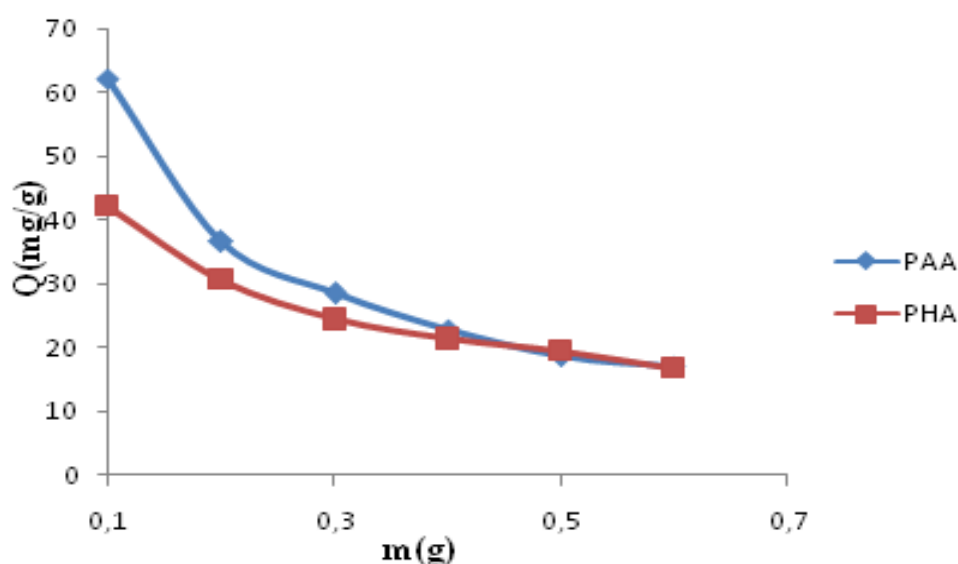
### 3.7 Influence of Adsorbent Dose

The influence of the adsorbent concentration on the removal of Cu (II) ions from aqueous solution was studied by varying their concentration from 0.1 to 0.6 g. (Fig. 7) represents the influence of adsorbent dose on the adsorption of Cu (II) ions onto PAA and PHA using 2400 mg/L initial Cu (II) ions concentration at  $\text{pH} = 4.0$ . Adsorbed quantity decreased with increasing adsorbent dose. This is explained by the fact that an increase in adsorbent dose leads to an agglomeration of unit cells and consequently a decrease in intercellular distances which in turn produces a screening effect leading to the protection of the adsorption sites of the adsorbent [49]. Furthermore,

maximum quantity adsorbed,  $Q_e=62.2$  and  $42.2$  mg/g for PAA and PHA respectively, was reached for  $0.1$  g of each of the adsorbents as presented on (Fig. 7).

### 3.8 Influence of Initial Concentration

On the basis of the results of the preceding paragraph, the analysis of the effect of the initial concentration of Cu (II) ions were hence carried out at pH 4.0 on  $0.1$  g of each adsorbent samples (both PAA and PHA), mixed with  $20$  mL of the aqueous solution at  $(27\pm1)$  °C for a duration of  $35$  and  $15$  minutes respectively for PAA and PHA. (Fig. 8) shows the variation of amount adsorbed versus concentration of Cu (II) ions for each adsorbent. The results obtained show that an increase in the initial concentration between  $900$  and  $2400$  ppm leads to a change in the quantity adsorbed from  $32.2$  mg/g to  $62.2$  mg/g for PAA and from  $29.2$  mg/g to  $42.2$  mg/g for PHA. This increase in adsorbed quantity with initial concentration of metal ion is due to the fact that an increase in the concentration of metal ion increases the collisions between the molecules of the metal and the adsorption sites. Also, with increasing metal concentrations the binding sites become more quickly saturated as the amount of adsorbent concentration remained constant [50]. This result also show that maximum adsorption capacity for both adsorbents PAA and PHA is reached at initial adsorbate concentrations of  $2400$  ppm.

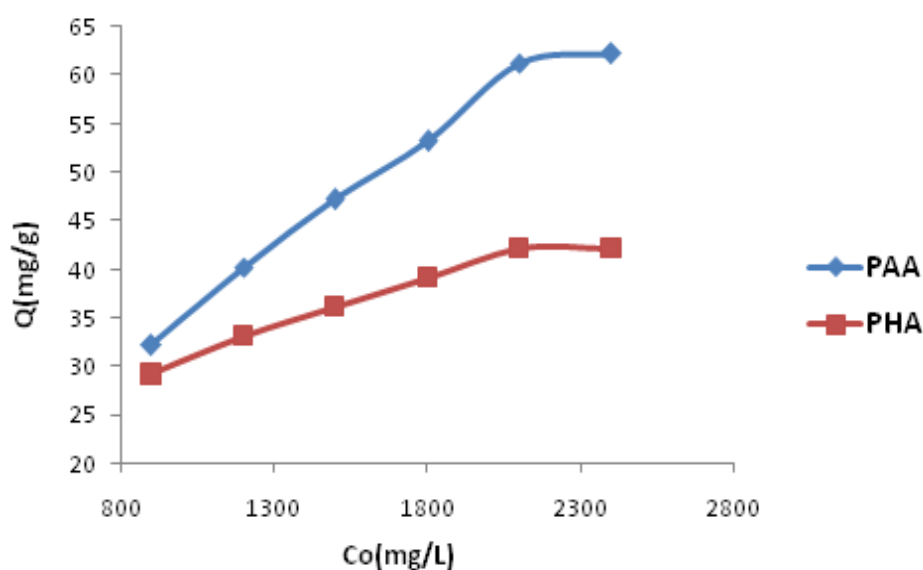


**Fig. 7. Influence of absorbent dose for the uptake of copper (II) ions on PAA and PHA**

From these results we observe that, of the two activated carbon samples studied, PAA (62.2 mg/g) adsorbs better than PHA (42.2 mg/g). This is in contradiction with the awaited results [28], because iodine number of PHA (538 mg/g) is greater than that of PAA (500 mg/g). This can then be directed toward the size of the Cu (II) ions and the micro pores.

### 3.9 Kinetic Model

Sorption performances of the CSBAC samples (PAA and PHA) were estimated through kinetic and equilibrium studies. Four Kinetic models that were applied in this study provided pieces of information on the sorption mechanisms of Cu (II) ions onto the two samples. The straight-line plots have been represented on (Figs. 9, 10, 11, 12 and Table 2) gives all the kinetic parameters deduce from the plot. Correlation coefficients,  $R^2$  obtained (0.995 for PAA and 0.998 for PHA respectively) show that the pseudo second-order model best describes the adsorption of Cu (II) ions from aqueous solutions. This implies that adsorption of Cu (II) ions onto both adsorbents may occur through a chemical process involving the valence forces of the shared or exchanged electrons [34,35]. This means that chemisorption reaction or an activated process becomes more predominant in the rate-controlling step for the system. A comparison of the  $R^2$  values for intraparticle diffusion (Fig. 12) for both samples show that the rate limiting step governing the adsorption of Cu (II) onto CSBAC is by pore diffusion for PAA but not PHA.



**Fig. 8. Effect of initial concentration on copper (II) Ion adsorption on PAA and PHA**

### 3.9.1 Pseudo first-order model

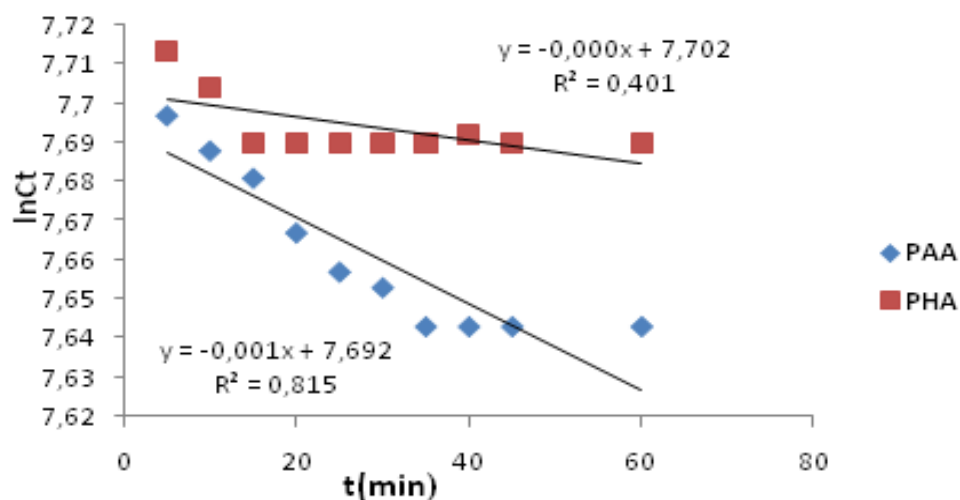


Fig. 9. Linearized pseudo-first order plots for  $C_o=2400$  mg/L,  $V=20$  mL,  $pH=4$ ,  $m=0.1$  g adsorbent

### 3.9.2 Pseudo second-order model

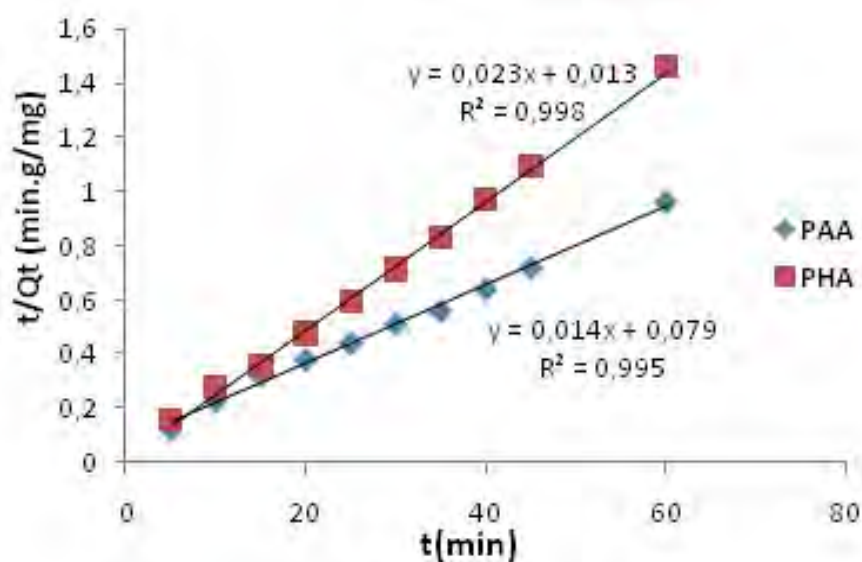


Fig. 10. Linearized pseudo-second order plots for  $C_o=2400$  mg/L,  $V=20$  mL,  $pH=4.0$ ,  $m=0.1$  g adsorbent

### 3.9.3 Elovich model

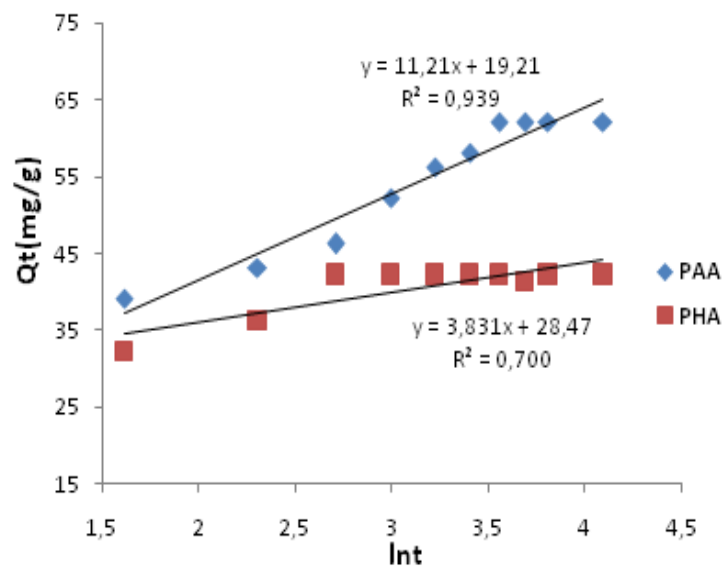


Fig. 11. Linearized elovich plots for  $C_o=2400$  mg/L,  $V=20$  mL,  $pH=4.0$ ,  $m=0.1$  g adsorbent

### 3.9.4 Intra-particulaire diffusion model

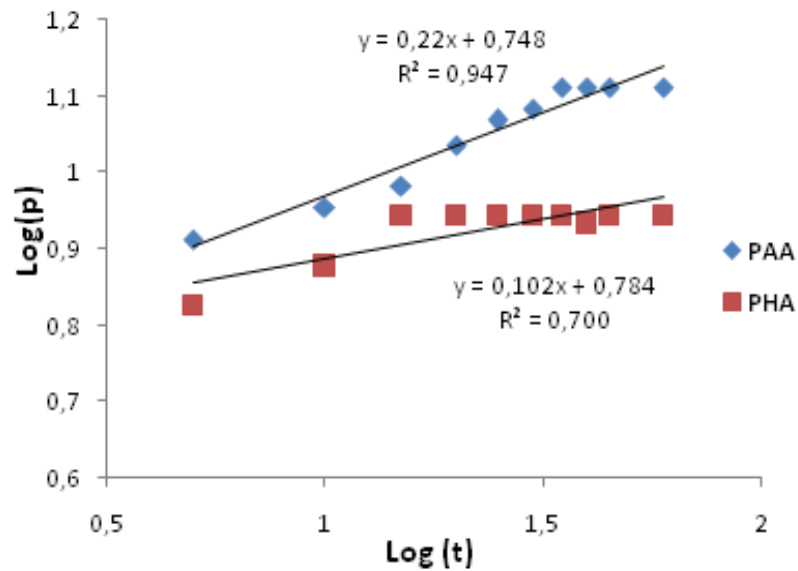


Fig. 12. Linearized intraparticle diffusion plots for  $C_o=2400$  mg/L,  $V=20$  mL,  $pH=4.0$ ,  $m=0.1$  g adsorbent



### 3.10 Adsorption Isotherms

Equilibrium adsorption isotherm is one of the most important data used in understanding the mechanism of adsorption systems. The equilibrium adsorption data were analyzed by the Langmuir, Freundlich, and Dubinin-Kaganer-Radushkevich (D-K-R) adsorption isotherm models.

**Table 2. Adsorption parameters for the different models**

Models	Parameters	Adsorbents	
		PAA	PHA
Pseudo-first order	$R^2$	0.815	0.401
	$K_1$ ( $\text{min}^{-1}$ )	0.001	0.000
Pseudo-second order	$R^2$	0.995	0.998
	$K^2$ ( $\times 10^{-3} \text{g/mg. min}$ )	2.481	40.70
	$Q_e$ (mg/g)	71.42	43.47
Elovich	$R^2$	0.939	0.700
	$\phi$ (g/mg)	0.090	0.261
	$a$ (mg/g min) $\times 10^{-9}$	62.60	4.701
Intra-particle diffusion	$R^2$	0.947	0.700
	$K_{id}$ ( $\text{min}^{-1}$ )	2.112	2.190
	$a$ (mg/g)	0.220	0.102

These isotherm models are characterized by certain constants whose values represent surface properties as well as sorbent affinities of the adsorbed species. These parameters for the two carbon samples (PAA and PHA) have been assembled in (Table 3) and the modeling of the adsorption isotherm presented on (Figs. 13, 14 and 15).

Linear curves, obtained by plotting  $C_e/Q_e$  versus  $C_e$ , indicate the validity of Langmuir isotherm and  $\ln Q_e$  versus  $\ln C_e$ , indicate the validity of Freundlich isotherm and  $\ln Q_e$  versus  $E^2$ , indicate the validity of Dubinin-Radushkevich-Kaganer isotherm. The values of the correlation coefficients from (Table 3) show that all three isotherm models describe the sorption process fairly well (for both samples) but the very best correlation for PHA samples is from Langmuir with  $R^2=0.994$ . Maximum adsorption capacity according to Langmuir (mono-layer adsorption) is equal to 58.82 mg/g. From the different values of RL (Table 4 and for  $R_L < 1$ ), we can conclude that Cu (II) ions adsorption onto PHA carbon sample is favorable within the concentration range studied [51]. (Table 3) shows that the best correlation of the experimental results is obtained with the Freundlich isotherm model with PAA ( $R^2=0.995$ ). This result suggest that Cu (II) ions are adsorbed onto the adsorbent surface of the PAA carbon in different ways. Also from the values of the parameter  $1/n$ , it comes out that adsorption is favorable for  $1/n < 1$  for the two adsorbents, which implies an increase in

the adsorption capacity and the appearance of new adsorption sites, and as such, a homogenous adsorption at the surface of PAA and PHA. The positive values of sorption energy ( $E_a=2.411$  and  $3.194$  kJ/mol) indicate that the adsorption of Cu (II) ions by PAA and PHA respectively is endothermic and the value is less than  $8$  kJ/mol. This also is indicative of weak interactions between the adsorbent (PAA and PHA) and the Cu (II) ions [52]. The  $Q_m$  values obtained for the present system in comparison with those reported in the literature for sorption of Cu (II) ions onto various adsorbents (Table 5) revealed that PAA and PHA are effective adsorbents in removing copper from aqueous solutions.

**Table 3. Isotherm models parameters of adsorption**

Models	Parameters	Adsorbents	
		PAA	PHA
Langmuir isotherm	$R^2$	0.969	0.994
	$Q_{\max}$ (mg/g)	166.66	58.82
	$K_L$ ( $\times 10^{-4}$ L/mg)	2.877	11.83
Freundlich isotherm	$R^2$	0.995	0.980
	$1/n$	0.722	0.375
	$K_F$ (L/g)	0.252	2.363
D-K-R isotherm	$R^2$	0.950	0.954
	$K_D$	0.086	0.049
	$Q_{\max}$ (mg/g)	66.75	43.81
	$E_a$ (kJ/mol)	2.411	3.194

**Table 4. Langmuir isotherm with separation factor ( $R_L$ )**

Concentration (ppm)	900	1200	1500	1800	2100	2400
Adsorbents		$R_L$				
PAA	0.794	0.743	0.698	0.658	0.623	0.591
PHA	0.484	0.413	0.360	0.319	0.287	0.260

**Table 5. Comparison of adsorption capacity of copper (II) with other adsorbents**

Adsorbents	$Q_m$ (mg/g)	References
Watermelon shell	111.1	[18]
Orange peel, sawdust bagasse	3.19; 3.12; 2.89	[19]
Palm oil empty fruit bunch	0.84	[21]
Kolubara lignite	4.045; 3.908; 2.625	[22]
PAA	62.2	Present Study
PHA	42.2	Present Study

### 3.10.1 Langmuir isotherm

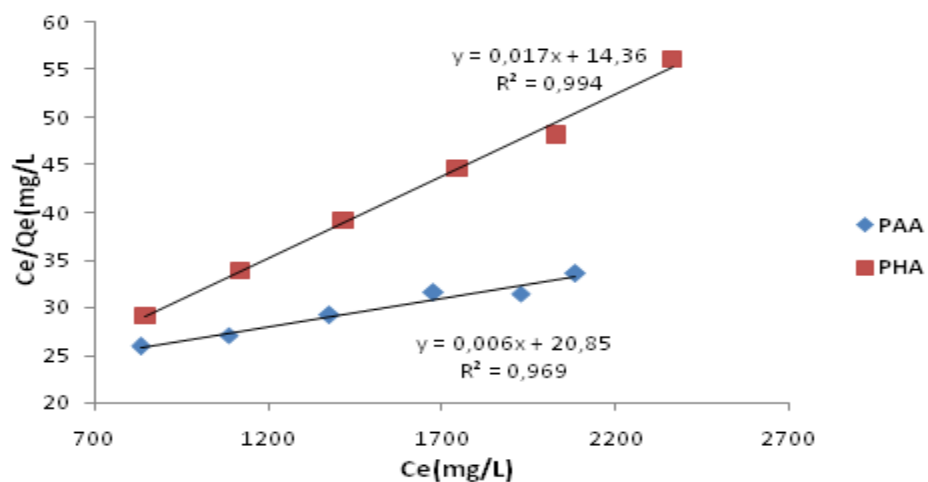


Fig. 13. Linear plot of langmuir model, for  $C_0=2400$  mg/L,  $V=20$  mL,  $pH=4.0$ ,  $m=0.1$  g adsorbent

### 3.10.2 Freundlich adsorption isotherm

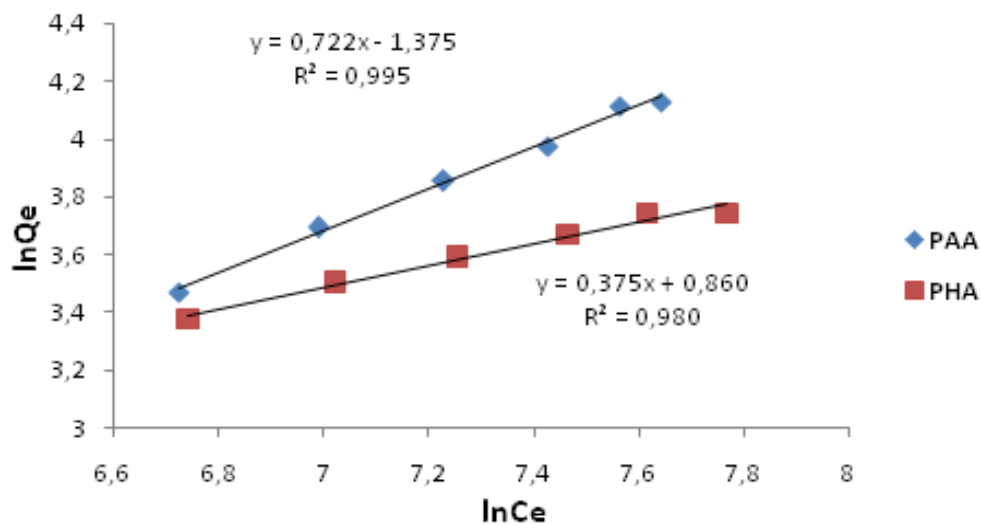
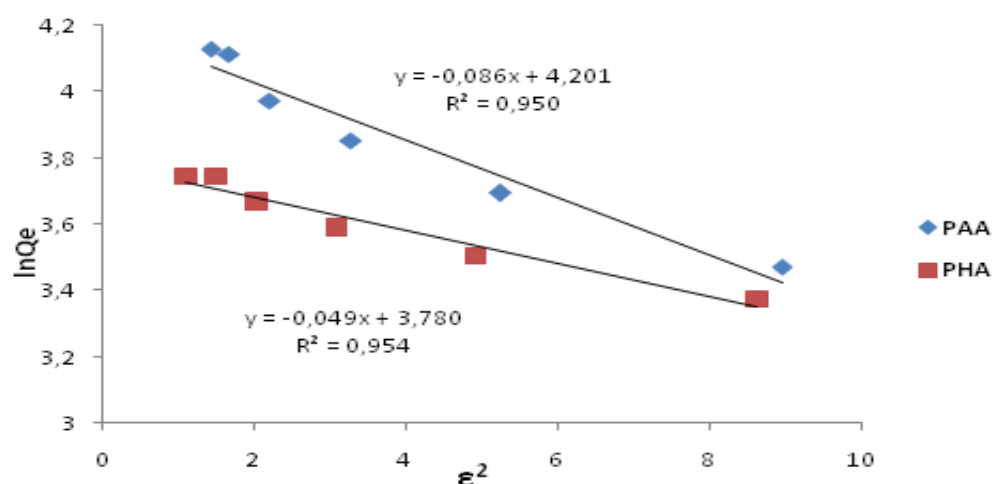


Fig. 14. Linear Plot of the model of freundlich for  $C_0=50$  mg/L,  $V=20$  mL,  $pH=4.0$ ,  $m=0.1$  g adsorbent

### 3.10.3 Dubinin et radushkevich kaganer (DRK) isotherm model



**Fig. 15. Linear transform of the model of D-K-R for  $C_0=2400$  mg/L,  $V=20$  mL,  $pH=4.0$ ,  $m=0.1$ g Adsorbent**

## 4. CONCLUSION

A basic investigation on the adsorption of Cu (II) ions from aqueous solution by cocoa shell-based activated carbon (CSBAC) was carried out under batch mode. Sorption of Cu (II) ions were influenced by various parameters such as contact time, adsorbent dosage, initial pH and initial Cu (II) ions concentration within the range 900-2400 mg/L. The maximum removal of Cu (II) ions observed at pH 4.0 and sorbent dose of 0.1 g were 62.2 mg/g for PAA and 42.2 mg/g for PHA for an initial metal ion concentration of 2400 ppm. Iodine number for both PAA and PHA samples were obtained as 500 mg/g and 538 mg/g respectively. Results revealed by titration via Boehm method showed predominance of acidic functional groups on the surface of PAA (0.337 meq/g) and basic groups on PHA (0.103 meq/g). FTIR analysis for both the raw cocoa shells and activated carbon showed that hydroxyl, carbonyl, aliphatic, ethers, alcohol, phenol and carboxylic groups were present on their surfaces. A pH at zero-point charge (pH<sub>zpc</sub>) of 7.0 and 5.9 were obtained for PAA and PHA samples respectively. Sorption equilibrium time was observed in 35 minutes for PAA and 15 minutes for PHA. X-ray fluorescence showed that the chemical composition of the oxide level in raw material (cocoa shell) is composed mainly of potassium oxide ( $K_2O$ ) of 83.28% followed by calcium oxide ( $CaO$ ) 4.905%. The Langmuir model for PHA and Freundlich model for PAA best described the sorption of Cu (II) ions from aqueous solution by the two adsorbents. The two

activated carbon samples both obeyed pseudo-second order kinetics. The results indicated that CSBAC can be used as an effective and low-cost adsorbent to remove Cu (II) ions from aqueous solutions.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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## ***Synthesis and Evaluation of Analgesic and Anti-Inflammatory Activities of Most Active Free Radical Scavenging Derivatives of Mangiferin***

### **ABSTRACT**

In the present study, structural modification of mangiferin was carried out for structure activity relationship studies. One new compound and three known derivatives were prepared from mangiferin. All these compounds were synthesized and purified by standard procedures, identified by using physical and spectral (IR, <sup>1</sup>H NMR, <sup>13</sup>C NMR and MS) properties. The synthesized mangiferin derivatives were tested for In vitro antioxidant properties. Benzyl and methyl substituted mangiferin showed poor antioxidant activity than mangiferin. However, mangiferin derivatives substituted with acetyl and benzoyl groups were showed potent antioxidant activity than mangiferin in lipid peroxidation, p-NDA, deoxyribose and alkaline DMSO methods. But both the compounds failed to show potent analgesic and anti-inflammatory activities. In all these methods, standard drugs showed better activity than mangiferin and its derivatives.

**Keywords:** mangiferin derivatives; antioxidant; analgesic; anti-inflammatory.

### **1. INTRODUCTION**

Mangiferin (1,3,6,7-tetrahydroxyxanthone-C2-D-glucoside) is a pharmacologically active phytochemical compounds present in large amounts in the bark, fruits, roots and leaves of *Mangifera indica* Linn. (family: *Anacardiaceae*). The plant is indicated in traditional medicine for the treatment of various diseases. The root, bark, leaves and flowers are astringent, refrigerant, styptic, vulnerary, laxative, cardi tonic, haemoptysis, haemorrhages, constipating and diabetes [1,2]. Mangiferin showed

antidiabetic [3], anticancer [4,5], antioxidant [6], anti-inflammatory [7], antiviral [8] and antimicrobial [9] activities.

Free radicals play important roles in many physiological and pathological conditions. In general, excess of free radicals caused by the imbalance between free radicals generation and scavenging may contribute to disease development. Painful stimulation increases the production of free radicals with increased lipoperoxidation. The application of antioxidants increases the antioxidative capacity and thus enhances the protection against the consequences of pain. Antioxidants are known to protect CNS against free radicals and also decrease the sensation of pain. The role of reactive oxygen species in the pathophysiology of inflammation is well-established. Free radicals can damage membranes, proteins, enzymes and DNA, increasing the risk of diseases such as cancer, Alzheimer's, Parkinson's, angiocardopathy, arthritis, asthma, diabetes, and degenerative eye diseases. Natural products, natural products derivatives, synthetic compounds with natural products-derived pharmacophore and synthetic compounds designed from natural products are also important to manage pathological conditions of those diseases caused by free radicals.

Bhatia et al. [10] reported acetylation and methylation of mangiferin. Further, Hu et al. [11] synthesized a series of substitutional benzyl mangiferin derivatives. However, literature showed that detailed pharmacological investigation of mangiferin derivatives was not reported. Hence, the structural modification of mangiferin was taken up for the development of new pharmacologically active compounds.

## **2. MATERIALS AND METHODS**

### **2.1 General**

IR spectrum was recorded using FT-IR, Perkin Elmer 8400 series instrument. NMR spectrum was obtained on a DDR X - 400 MHz and 100 MHz Bruker Daltonics, Germany. Absorbance was recorded by using Elisa Reader, Bio-Rad Laboratories Inc, California, USA, model 550. Mass spectrum was recorded by using Shimadzu MS-2010 A, Koyoto, Japan. Melting points (uncorrected) were obtained on a melting point apparatus, Lab India, Mumbai.

2,2-Diphenyl-2-picryl hydrazyl (DPPH) and 2,2'-azinobis (3-ethylbenzo-thiazoline-6-sulphonic acid) diammonium salt (ABTS) were obtained from Sigma-Aldrich Co., St. Louis, USA. Rutin and p-nitroso dimethyl aniline (p-NDA) were obtained from

Acros Organics, NJ, USA. Naphthyl ethylene diamine dihydrochloride (NEDD) was from Roch-Light Ltd., Suffolk, UK, ascorbic acid, nitro blue tetrazolium (NBT) and butylated hydroxy anisole (BHA) were from SD Fine Chemicals Ltd., Mumbai, India. H<sub>2</sub>O<sub>2</sub> and 2-deoxy-d-ribose was from Hi-Media Laboratories Pvt. Ltd., Mumbai, India. Sodium nitroprusside were from Ranbaxy Laboratories Ltd., Mohali, India. Sulphanilic acid used was from E-Merck (India) Ltd., Mumbai, India and carrageenan were obtained from Sigma Aldrich Co, St Louis, USA. Pentazocine was obtained from Ranbaxy, New Delhi, India. Diclofenac sodium was obtained from Wochardt Ltd, Mumbai, India. Rutin was obtained from Acros Organics, New Jersey, USA. Ascorbic acid was obtained from S.D. Fine Chem, Ltd., Biosar, India. All other chemicals used were of analytical grade.

## 2.2 Plant Material

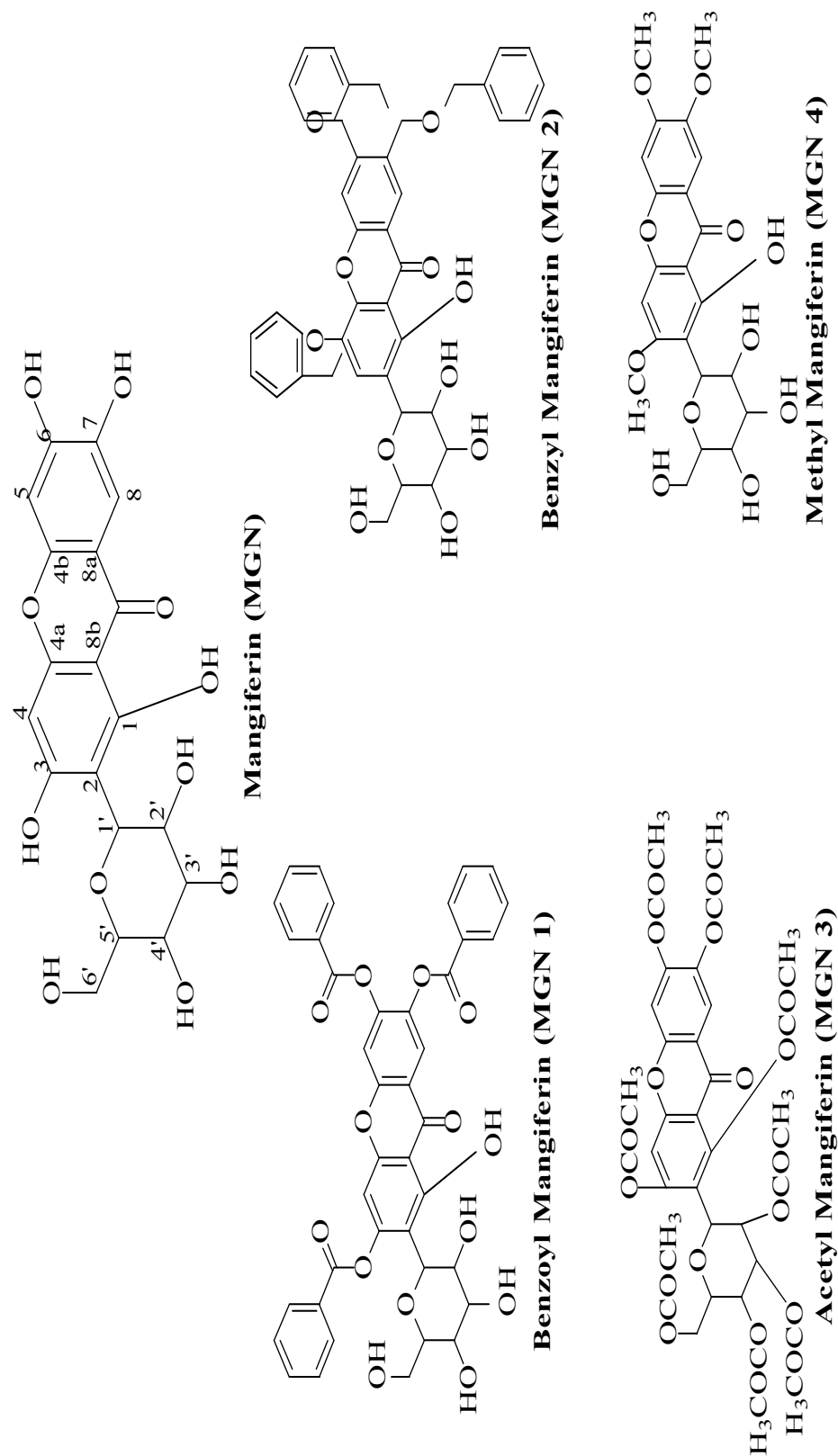
The leaves of *Mangifera indica* were collected from Namakkal, Tamilnadu, India and authenticated by Medicinal Plants Survey and Collection Unit, Ootacamund, Tamil Nadu, India, where a voucher has been deposited for further reference (Voucher No: J322/2014).

## 2.3 Extraction and Isolation of Mangiferin

Shade-dried and powdered leaves of *Mangifera indica* (1 kg) were Soxhleted for 18-20 h with petroleum ether (60-80°C). The defatted plant material was extracted with ethanol under reflux for 18-20 h. On keeping overnight a solid matter separated out, it was filtered and washed with petroleum ether repeatedly, affording yellow powder of mangiferin [3]. After repeated crystallization of the powder in aqueous ethyl acetate and methanol pale-yellow needle-shaped crystals of mangiferin were obtained (1, 3, 6, 7-tetrahydroxyxanthone-C2-D-glucoside, mp 270-272°C, yield 4.5 g, 0.45%), and exhibited violet color with ferric chloride. It was found to be homogeneous by HPTLC when separated using the solvent system ethyl acetate: methanol: water: formic acid (6:2:1:1, R<sub>f</sub> = 0.76). It was characterized by comparing its melting point, IR, NMR and MS data with literature values [12].

## 2.4 Structural Modification of Mangiferin

The structural modifications of mangiferin was carried out by using the following standard procedure.



**Fig. 1. Structure of mangiferin and its derivatives**

#### 2.4.1 Benzoylation of mangiferin

Mangiferin (0.844 g, 2 mmol), benzoyl chloride (0.560 g, 4 mmol), pyridine (0.474 g, 0.6 mmol) and basic alumina (2 g) were added in a 50 ml beaker [13]. The mixture was stirred to obtain a free flowing powder, at room temperature. Then the temperature was increased up to 70°C for 30 min. After cooling to room temperature, the product was extracted with methylene chloride (3 x 15 ml). The combined extracts were washed with water and dried over sodium sulfate. The product obtained after removal of solvent under reduced pressure was crystallized from a suitable solvent (Ethyl acetate-petroleum ether; ethanol), yielded tribenzoyl mangiferin and designated as compound MGN 1 (Fig. 1).

#### 2.4.2 Benzylolation of mangiferin

A solution of mangiferin (0.422 g, 1 mmol) in dry DMF (20 ml) was treated with benzyl chloride (0.504 g, 4 mmol) and  $K_2CO_3$  (0.1 g) with stirring at 60°C for 10 h [11]. The reaction mixture on evaporation in vacuo gave a residue and was submitted to column chromatography using dichloro methane and methanol as eluent to give tribenzyl mangiferin, designated as MGN 2.

#### 2.4.3 Acetylation of mangiferin

A solution of mangiferin (0.422 g, 1 mmol) in pyridine (0.395 g, 5 mmol) was treated with acetic anhydride (0.306 g, 3 mmol) and then stirred at 40°C for 36 h at room temperature [10]. The reaction mixture was poured into ice-cold water and extracted with chloroform soluble fractions. On evaporation in vacuo gave a residue and was submitted to column chromatography using chloroform and methanol as eluent to give octaacetyl mangiferin, designated as MGN 3.

#### 2.4.4 Methylation of mangiferin

A solution of mangiferin (0.422 g, 1 mmol) in acetone (150 ml) was treated with dimethyl sulphate (0.882 g, 7 mmol) and  $K_2CO_3$  (0.1 g) with stirring at room temperature for seven days [10]. The reaction mixture on evaporation under hood gave a residue and was submitted to column chromatography using chloroform and methanol as eluent to give trimethyl mangiferin, designated as MGN 4.



## 2.5 In vitro Antioxidant Activity

The *in vitro* antioxidant activity of mangiferin and its derivatives were carried out by using the following standard procedure.

### 2.5.1 Preparation of test and standard solutions

All the synthesized compounds including mangiferin and the standard antioxidants (ascorbic acid, rutin, butylated hydroxy anisole and alpha tocopherol) were dissolved in distilled dimethyl sulphoxide (DMSO) separately and used for the *in vitro* antioxidant assays using seven different methods except the hydrogen peroxide method. For the hydrogen peroxide method (where DMSO interferes with the method), the compounds and the standards were dissolved in distilled methanol and used. The stock solutions were serially diluted with the respective solvents to obtain lower dilutions.

### 2.5.2 In vitro antioxidant activity

The synthesized compounds and mangiferin were tested for their *in vitro* antioxidant activity using the standard methods. In all these methods, a particular concentration of the compounds or standard solution was used which gave a final concentration of 1000-0.45 µg/ml after all the reagents were added. Absorbance was measured against a blank solution containing the compounds or standard, but without the reagents. A control test was performed without the compounds or standards. Percentage scavenging and IC<sub>50</sub> values  $\pm$  S.E.M. (IC<sub>50</sub> value is the concentration of the sample required to inhibit 50% of radical) were calculated.

#### 2.5.2.1 Scavenging of ABTS radical cation

Accurately 54.8 mg of ABTS was weighed and dissolved in 50 ml of distilled water (2 mM). Potassium per sulphate (17 mM, 0.3 ml) was then added. The reaction mixture was left to stand at room temperature overnight in dark before usage. To 0.2 ml of various concentrations of the compounds MGN, MGN1-4 or standards, 1.0 ml of distilled DMSO and 0.16 ml of ABTS solution were added to make the final volume to 1.36 ml. Absorbance was measured after 20 min by spectrophotometrically at 734 nm.

#### 2.5.2.2 DPPH radical scavenging method

A 10 µl aliquot of the different concentrations of the compounds MGN, MGN1-4

and standards were added to 200  $\mu$ l of DPPH in methanol solution (100  $\mu$ M) in a 96-well microtitre plate (Tarson Products (P) Ltd., Kolkata, India). After incubation at 37°C for 20 min, the absorbance of each solution was determined at 490 nm using ELISA reader (Bio-Rad Laboratories Inc., CA, USA, Model 550) [14].

#### **2.5.2.3 Scavenging of hydrogen peroxide**

A solution of hydrogen peroxide (20 mM) was prepared in phosphate-buffered saline (PBS at pH 7.4). Various concentrations of the compounds MGN, MGN1-4 and standard in methanol (1 ml) were added to 2 ml of hydrogen peroxide solution in PBS. After 10 min the absorbance was measured at 230 nm [15].

#### **2.5.2.4 Lipid peroxidation inhibitory activity**

Lipid peroxidation inhibitory activity of all the compounds MGN, MGN1-4 and standard was carried out according to the method of Duh et al. [16]. Egg lectin (3 mg/ml, phosphate buffer, pH 7.4) was sonicated. The test sample of different concentrations was added to 1ml of liposome mixture, control was without test sample. Lipid peroxidation was initiated by adding 10  $\mu$ l of ferric chloride (400 mM) and 10  $\mu$ l L-ascorbic acid (200 mM). After incubation for 1 h at 37°C, the reaction was stopped by adding 2 ml of 0.25 N HCl containing 15% trichloro acetic acid and 0.375% thiobarbituric acid and the reaction mixture was boiled for 15 min then cooled, centrifuged and the absorbance of the supernatant was measured at 532 nm.

#### **2.5.2.5 Nitric oxide radical inhibition assay**

The reaction mixture (6 ml) containing sodium nitroprusside (10 mM, 4 ml), phosphate buffer saline (1 ml), compounds MGN, MGN1-4 and standard solutions (1 ml) were incubated at 25°C for 150 min. After incubation, 0.5 ml of the reaction mixture was removed and 1 ml of sulphanilic acid reagent (0.33% in 20% glacial acetic acid) was mixed and allowed to stand for 5 min for completion of diazotization reaction and then 1 ml of NEDD was added, mixed and allowed to stand for another 30 min in diffused light. The absorbance was measured at 540 nm against the corresponding blank solutions in a 96-well microtitre plate (Tarsons Product (P) Ltd., Kolkata, India) using ELISA reader (Bio-Rad Laboratories Inc., Model 550) [17,18].

#### 2.5.2.6 Scavenging of hydroxyl radical by deoxyribose method

Various concentrations of the compounds MGN, MGN1-4 and standard in DMSO (0.2 ml) were added to the reaction mixture containing deoxyribose (3 mM, 0.2 ml), ferric chloride (0.1 mM, 0.2 ml), EDTA (0.1 mM, 0.2 ml), ascorbic acid (0.1 mM, 0.2 ml) and hydrogen peroxide (2 mM, 0.2 ml) in phosphate buffer (pH, 7.4, 20 mM) to give a total volume of 1.2 ml. The solutions were then incubated for 30 min at 37°C. After incubation, ice-cold trichloro acetic acid (0.2 ml, 15%, w/v) and thiobarbituric acid (0.2 ml, 1%, w/v) in 0.25 N HCl were added. The reaction mixture was kept in a boiling water bath for 30 min, cooled and the absorbance was measured at 532 nm [19].

#### 2.5.2.7 Scavenging of hydroxyl radical by p-NDA method

Various concentrations of the compounds MGN, MGN1-4 and standard in distilled DMSO (0.5 ml) were added to a solution mixture containing ferric chloride (0.1 mM, 0.5 ml), EDTA (0.1 mM, 0.5 ml), ascorbic acid (0.1 mM, 0.5 ml), hydrogen peroxide (2 mM, 0.5 ml) and p-NDA (0.01 mM, 0.5 ml) in phosphate buffer (pH 7.4, 20 mM), to produce a final volume of 3 ml. Absorbance was measured at 440 nm [20].

#### 2.5.2.8 Scavenging of super oxide radical by alkaline DMSO method

To the reaction mixture containing 0.1 ml of NBT (1 mg/ml solution in DMSO) and 0.3 ml of the compounds MGN, MGN1-4 and standard in DMSO, 1ml of alkaline DMSO (1 ml DMSO containing, 5 m MNaOH in 0.1 ml water) was added to give a final volume of 1.4 ml and the absorbance was measured at 560 nm [20].

### 2.9 In vivo Analgesic and Anti-inflammatory Activities

The *in vivo* analgesic activity was carried out by using the following standard procedure.

#### 2.9.1 Animals

The animals were obtained from the animal house of Sree Siddaganga College of Pharmacy, Tumkur, India, maintained under standard conditions (12 h light/dark cycle;  $25 \pm 3^\circ\text{C}$ , 45-65% humidity) and had free access to standard rat feed and water *ad libitum*. All the animals were acclimatized to laboratory conditions for a week before commencement of the experiment. The experiments were performed

during the light portion between 07:00-18:00 h to avoid circadian influences. Animal studies were performed according to the prescribed guidelines of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Government of India, India.

### **2.9.2 Analgesic activity**

Three different sets of mice were randomized into eight groups, each containing six animals and used in three different models for the evaluation of analgesic activity. Different doses of compounds MGN 1 and MGN 3 were prepared as suspensions in Tween-80 (1% v/v in saline). Two doses of mangiferin, MGN 1 and MGN 3 (10 and 20 mg/kg) were selected based on an earlier study [21].

Group I were treated with Tween-80 (1% v/v in saline) as normal vehicle control. Groups II-VII were treated with mangiferin, MGN 1 and MGN 3 at 10 and 20 mg/kg, respectively and Group VIII animals were treated with standard pentazocine at 20 mg/kg. All the treatments were administered intraperitoneally.

### **2.9.3 Eddy's hot-plate method**

Mice were treated and placed on Eddy's hot plate kept at a temperature of  $55 \pm 0.5^{\circ}\text{C}$ . A cut off period of 15 sec was observed to avoid damage to the paw. Reaction time and the type of response were noted using a stopwatch. The response is in the form of jumping, withdrawal of the paws or licking of the paws. The latency was recorded before and after 15, 30 and 45 min following the treatments. The percentage protection was calculated using the formula,  $\text{protection (\%)} = (t-n/t) \times 100$ , where,  $t$  = reaction time of treated group and  $n$  = reaction time of normal group [22].

### **2.9.4 Tail immersion method**

In this method [23], 5 cm of the end of the mice tail was immersed in warm water maintained at  $55 \pm 0.5^{\circ}\text{C}$ . The tail withdrawal reflex was recorded before and after 60 min following the treatments. The percentage protection was calculated as per hot plate method.

### **2.9.5 Acetic acid induced writhing method**

In the acetic acid induced writhing [22] in mice an intraperitoneal injection of acetic acid (1%, 10 ml/kg) was given 30 min after the treatments. The response is in

the form of abdominal contractions, trunk twist and extension of hind limb. The number of writhing in each mouse was counted for 20 min from the injection of acetic acid. The percentage protection was calculated using the formula,  $\text{protection (\%)} = (c-t/c) \times 100$ , where,  $t$  = reaction time of treated group and  $c$  = reaction time of control group.

## **2.10 Anti-Inflammatory Activity**

The *in vivo* anti-inflammatory activity was carried out by using carrageenan induced paw edema method.

### **2.10.1 Carrageenan induced paw edema in rats**

Swiss albino rats (150-200 g) were divided into eight groups with six animals in each group. Group I was served as control and received Tween-80 (1% v/v in saline). Groups II-VII were received the treatments as described in analgesic activity. Group VIII was treated as positive control and received standard diclofenac (20 mg/kg). All the treatments were administered intraperitoneally. The initial hind paw volume of rats was determined volumetrically by using a plethysmometer [24]. A solution of carrageenan in saline (1%, 0.1 ml/rat) was injected subcutaneously into the right hind paw 30 min after the treatments. The animals in the control group received the vehicle only. Paw volumes were measured up to 6 h at intervals of 30, 60, 120, 180 and 360 min and percent increase in edema between the control and treated groups were compared. The percentage protection was calculated as acetic acid induced writhing method.

## **2.11 Statistical Analysis**

The values were expressed as mean  $\pm$  SEM. The statistical analysis was carried out by one way analysis of variance (ANOVA) followed by multiple comparison using the Dunnet's test.  $P$  values  $< 0.05$  were considered as significant.

## **3. RESULTS**

### **3.1 Structural Modification of Mangiferin**

The following results were obtained from various instrumental analysis of mangiferin and its derivatives.

### **3.1.1 2-b-D-glucopyranosyl-1,3,6,7-tetrahydroxy-9H-xanthen-9-one, mangiferin (MGN)**

Mangiferin was isolated from the leaves of *Mangifera indica*, found to be homogenous by HPTLC when separated using the solvent system ethyl acetate: methanol: water: formic acid (6:2:1:1,  $R_f=0.76$ ). Obtained as pale-yellow needle shaped crystals, mp 270-272°C; yield-1 4.5 g, 0.45%; IR  $\nu_{\max}$  (KBr) cm: 3367 (OH), 1651 (C=O), 1622 and 1585 (aromatic C=C), 1199 and 1095 (C-O), 1051, 829, 588;  $^1\text{H}$  NMR (400 MHz, DMSO) 5: see (Table 1); negative ESI-MS: m/z calculated for 422.08, Found: 444 for  $[\text{M} + \text{Na} - \text{H}]$ .

### **3.1.2 2-b-D-tetrahydroxyglucopyranosyl-3,6,7-tribenzoyl-1-hydroxy-9H xanthen-9-one (MGN 1)**

Obtained as yellow crystals, mp 181-183°C; yield 0.78 g, 56.07%; IR  $\nu_{\max}$  (KBr)  $\text{cm}^{-1}$ : 3352 (OH), 1747, 1742 (carbonyl ester), 1618 (C=O), 1600 and 1556 (aromatic C=C), 1259 and 1091 (C-O), 1022, 821, 705, 567;  $^1\text{H}$  NMR (400 MHz, DMSO) 5: see (Table 1); negative ESI-MS: m/z calculated for 734.16, Found: 755 for  $[\text{M} + \text{Na} - 2\text{H}]$ .

### **3.1.3 2-b-D-tetrahydroxyglucopyranosyl-3,6,7-tribenzyl-1-hydroxy-9H-xanthen-9-one (MGN 2)**

Obtained as yellow powder, mp 137-139°C; yield 0.53 g, 82.68%; IR  $\nu_{\max}$  (KBr)  $\text{cm}^{-1}$ : 3392 (OH), 1647 (C=O), 1608 and 1577 (aromatic C=C), 1190 and 1080 (C-O), 1024, 808, 734, 696;  $^1\text{H}$  NMR (400 MHz, DMSO) 5: see (Table 1); negative ESI-MS: m/z calculated for 692.23, Found: 689 for  $[\text{M} - 3\text{H}]$ .

### **3.1.4 2-b-D-tetraacetoxyglucopyranosyl-1,3,6,7-tetraacetoxy-Hxanthen-9-one (MGN 3)**

Obtained as white amorphous powder, mp 141-143°C; yield 0.60 g, 79.58%; IR  $\nu_{\max}$  (KBr)  $\text{cm}^{-1}$ : 1751 (Carbonyl ester), 1651 (C=O), 1620 (C=C), 1224 and 1055 (C-O), 1039, 920, 839, 601;  $^1\text{H}$  NMR (400 MHz, DMSO) 5: see (Table 1); negative ESI-MS: m/z calculated for 758.17, Found: 755 for  $[\text{M} - 3\text{H}]$ .

### **3.1.5 2-b-D-tetrahydroxyglucopyranosyl-3,6,7-trimethoxy-1-hydroxy-9H-xanthen-9-one (MGN 4)**

Obtained as white amorphous powder, mp 193-195°C; yield 0.40 g, 86.58%; IR  $\nu_{\max}$  (KBr)  $\text{cm}^{-1}$ : 3367 (OH), 1647 (C=O), 1606 (C=C), 1217 and 1064 (C-O), 1022, 819, 759, 619, 576;  $^1\text{H}$  NMR (400 MHz, DMSO)  $\delta$ : see (Table 1); negative ESI-MS:  $m/z$  calculated for 464.13, Found: 464.

### **3.2 In vitro Antioxidant Screening of Mangiferin and Its Derivatives**

Mangiferin showed potent antioxidant activity with IC<sub>50</sub> values  $1.72 \pm 0.07$ ,  $0.09 \pm 0.01$ ,  $8.39 \pm 1.09$  and  $32.58 \pm 0.34$   $\mu\text{g/ml}$  in DPPH, ABTS, H<sub>2</sub>O<sub>2</sub> and nitric oxide methods, respectively. Mangiferin failed to show potent activity in rest of the methods. Benzoyl (MGN 1) and acetyl (MGN 2) substituted mangiferin were showed potent to moderate activity in all the methods. MGN 1 and 3 showed better activity than mangiferin in deoxyribose, p-NDA and lipid peroxidation methods. In alkaline DMSO method, only MGN 1 exhibited potent activity (Table 2). In p-NDA, lipid peroxidation and alkaline DMSO methods, MGN 1 showed better activity than the standards. Mangiferin substituted with acetyl and benzoyl groups was beneficial for the activity. Based on these results, MGN 1 and 3 along with mangiferin were chosen for comparing their in vivo analgesic and anti-inflammatory activities.

### **3.3 Analgesic Activity of Selected Mangiferin Derivatives**

In the hot plate method, a significant increase in the response time was observed for mangiferin and MGN 1 at both the doses after 15, 30 and 45 min, MGN 3 at 20 mg/kg after 30 and 45 min, when compared to control. Similar results were observed for standard pentazocine at 20 mg/kg. MGN 1 showed better results than mangiferin. However, the standard pentazocine produced better results compared to the other treated groups. The percentage protection after 45 min for all the compounds ranged between 51.59 to 72.45% (Table 3). A significant increase in the tail withdrawal reflex was observed for MGN 1 at both the doses and mangiferin at 20 mg/kg. MGN 1 showed better activity than mangiferin. The percent protection was found to be 9.11 to 55.34%.



Table 1. <sup>1</sup>H NMR spectrum of mangiferin and its derivatives

Proton	Reported	MGN	MGN 1	MGN 2	MGN 3	MGN 4
1-OH	13.76 (1H)	13.50 (1H)	13.50 (1H)	13.50 (1H)	-	13.50 (1H)
6-OH	10.55 (1H)	10.80 (1H)	-	-	-	-
7-OH	10.55 (1H)	10.80 (1H)	-	-	-	-
3-OH	9.86 (1H)	9.80 (1H)	-	-	-	-
3''4'-OH	4.86 (2H)	4.90 (2H)	4.95 (2H)	4.90 (2H)	-	4.90 (2H)
6'-OH	4.49 (1H)	4.49 (1H)	4.50 (1H)	4.50 (1H)	-	4.49 (1H)
2'-OH	3.87 (1H)	4.60 (1H)	4.65 (1H)	3.75 (1H)	-	3.75 (1H)
8-H	7.38 (1H)	7.40 (1H)	7.45 (1H)	7.45 (1H)	7.40 (1H)	7.45 (1H)
5-H	6.86 (1H)	6.90 (1H)	7.00 (1H)	7.30 (1H)	6.90 (1H)	6.65 (1H)
4-H	6.37 (1H)	6.40 (1H)	6.50 (1H)	6.75 (1H)	6.40 (1H)	6.65 (1H)
1'-H	4.60 (1H)	4.60 (1H)	4.85 (1H)	4.70 (1H)	4.90 (1H)	4.60 (1H)
2'-H	4.05 (1H)	4.05 (1H)	4.00 (1H)	4.00 (1H)	4.00 (1H)	3.95 (1H)
6'a-H	3.69 (1H)	3.69 (1H)	4.50 (1H)	3.40 (1H)	4.00 (1H)	3.65 (1H)
6'b-H	3.42 (1H)	3.41 (1H)	4.60 (1H)	3.20 (1H)	4.00 (1H)	3.30 (1H)
3'-H	3.18 (1H)	3.18 (1H)	4.60 (1H)	3.40 (1H)	5.80 (1H)	3.30 (1H)
4'-H	3.18 (1H)	3.18 (1H)	4.85 (1H)	3.20 (1H)	5.30 (1H)	3.30 (1H)
5'-H	3.18 (1H)	3.18 (1H)	4.90 (1H)	3.20 (1H)	5.20 (1H)	3.30 (1H)
CH <sub>3</sub> CO	-	-	-	-	1.20-2.00(24 H)	-
Benzene ring	-	-	7.20-8.30 (15H)	7.30 -7.50 (15H)	-	-
-CH <sub>2</sub>	-	-	-	5.25-5.40 (6H)	-	-
-OCH <sub>3</sub>	-	-	-	-	-	4.60-4.90 (9H)
Total number of protons	18	18	30	36	34	24

Table 2. *In vitro* antioxidant activity of mangiferin and its derivatives using standard methods

Compound	IC <sub>50</sub> values±SEM (µg/ml) by methods				
	DPPH	ABTS	Deoxyribose	p-NDA	H <sub>2</sub> O <sub>2</sub>
DMSO					
Mangiferin	1.72±0.07	0.09±0.01	502.20±3.20	106.84±0.07	8.39±1.09
MGN 1	23.80±0.89	0.65±0.02	87.58±2.21	24.13±1.05	23.57±0.34
MGN 2	>1000	2.41±0.08	>1000	>1000	215.02±3.11
MGN 3	36.47±0.81	3.71±0.14	406.30±2.85	31.53±3.72	81.23±1.05
MGN 4	>1000	2.23±0.06	>1000	>1000	>1000
Ascorbic acid	4.92±0.28	11.25±0.49	-	>1000	193.45±2.30
Rutin	8.91±0.10	0.52±0.04	-	205.54±3.25	32.35±1.02
BHA	-	-	83.46±4.34	-	65.21±2.97
					110.02±3.41

Average of three determinations

Table 3. Analgesic activity of mangiferin and its derivatives using standard methods

Treatment (dose, mg/kg, i.p.)	Hot plate test			Tail immersion		Acetic acid induced writhing No. of writhing (% Protection)
	Latency period, sec (% Protection)		Latency period, sec (% Protection)	No. of writhing (% Protection)		
	15 min	30 min				
Control	2.32±0.25	2.27±0.26	2.43±0.27	4.39±0.60	43.83±2.32	
Mangiferin (10)	3.21±0.25(27.73)	4.58±0.47 <sup>a</sup> (50.44)	6.46±0.71 <sup>b</sup> (62.38)	5.70±0.50(22.98)	23.33±2.99 <sup>a</sup> (46.77)	
Mangiferin (20)	4.97±0.32 <sup>a</sup> (53.32)	5.46±0.54 <sup>a</sup> (58.42)	7.35±0.95 <sup>a</sup> (66.94)	8.69±0.49 <sup>a</sup> (49.48)	16.17±2.33 <sup>a</sup> (63.11)	
MGN 1 (10)	3.90±0.47 <sup>a</sup> (40.51)	4.75±0.45 <sup>a</sup> (52.21)	7.14±0.50 <sup>a</sup> (65.97)	7.64±0.60 <sup>a</sup> (42.54)	24.17±2.93 <sup>a</sup> (44.85)	
MGN 1 (20)	6.16±0.72 <sup>a</sup> (62.34)	6.66±0.27 <sup>a</sup> (65.92)	8.82±0.51 <sup>a</sup> (72.45)	9.83±0.89 <sup>a</sup> (55.34)	17.33±1.69 <sup>a</sup> (60.46)	
MGN 3 (10)	3.08±0.19(24.68)	3.85±0.46(41.04)	5.02±0.42(51.59)	4.83±0.41(9.11)	27.50±2.32 <sup>a</sup> (37.26)	
MGN 3 (20)	3.61±0.33(35.73)	4.58±0.50 <sup>a</sup> (50.44)	5.79±0.44 <sup>a</sup> (58.03)	7.04±0.81(37.64)	23.50±2.69 <sup>a</sup> (46.38)	
Pentazocine (20)	5.11±0.32 <sup>a</sup> (54.60)	6.85±0.50 <sup>a</sup> (66.86)	10.61±1.14 <sup>a</sup> (77.10)	10.21±1.00 <sup>a</sup> (57.00)	7.67±1.45 <sup>a</sup> (82.50)	

Values are given as means±S.E.M. for groups of six animals each. Dunnett's test, values are statistically significant at \*P<0.001, \*\*P<0.01, \*\*\*P<0.05 between control and treated groups

Values are given as mean±S.E.M. for groups of six animals each, Dunnett's test, values are statistically significant at \*P<0.001, <sup>a</sup>P<0.01, <sup>b</sup>P<0.05 between control and treated groups

Table 4. Anti-inflammatory activity of mangiferin and its derivatives against carrageenan induced paw edema in rats

Treatment (dose, mg/kg, i.p.)	Paw volume, ml after min (% Protection)				
	0	30	60	120	180
Control					
Mangiferin (10)	0.84±0.02	1.63±0.04	1.77±0.05	1.90±0.07	1.96±0.07
Mangiferin (20)	0.91±0.04	1.51±0.07(7.36)	1.60±0.06(9.60)	1.56±0.03 <sup>a</sup> (17.89)	1.52±0.08 <sup>a</sup> (22.45)
MGN 1 (10)	0.98±0.08	1.39±0.04 <sup>a</sup> (14.72)	1.46±0.04 <sup>a</sup> (17.51)	1.43±0.06 <sup>a</sup> (24.74)	1.38±0.05 <sup>a</sup> (29.59)
MGN 1 (20)	0.98±0.05	1.55±0.04(4.90)	1.57±0.04(1.30)	1.59±0.04 <sup>a</sup> (16.32)	1.55±0.09 <sup>a</sup> (20.92)
MGN 3 (10)	1.00±0.06	1.40±0.04 <sup>a</sup> (14.10)	1.40±0.06 <sup>a</sup> (20.90)	1.41±0.04 <sup>a</sup> (25.79)	1.36±0.03 <sup>a</sup> (30.61)
MGN 3 (20)	0.95±0.05	1.58±0.03(3.07)	1.67±0.06(5.65)	1.60±0.07 <sup>a</sup> (15.79)	1.55±0.07 <sup>a</sup> (28.17)
Diclofenac (20)	1.02±0.03	1.51±0.06(7.36)	1.55±0.04(12.43)	1.57±0.04 <sup>a</sup> (17.37)	1.45±0.08 <sup>a</sup> (26.02)
	0.89±0.04	1.22±0.05 <sup>a</sup> (25.15)	1.25±0.05 <sup>a</sup> (29.38)	1.30±0.03 <sup>a</sup> (31.58)	1.16±0.02 <sup>a</sup> (40.82)

Values are given as mean ± S.E.M. for groups of six animals each, Dunnett's test, values are statistically significant at \*P<0.001, <sup>a</sup>P<0.01, <sup>b</sup>P<0.05 between control and treated groups

Injection of acetic acid into control mice produced  $43.83 \pm 2.32$  writhes. Pre treatment with mangiferin and its derivatives at both the doses significantly reduced the number of writhes (Table 3). Mangiferin at both the doses showed better activity than its derivatives. The percent protection was found to be 37.26 to 63.11%. However, the standard pentazocine showed better and significant results than all other treated groups.

### 3.4 Anti-Inflammatory Activity of Selected Mangiferin Derivatives

In carrageenan induced paw edema in rats, mangiferin and MGN 1 produced significant activity at 20 mg/kg dose during 30 to 360 min measurements, compared to the control. Mangiferin, MGN 1 at 10 mg/kg and MGN 3 at 20 mg/kg showed significantly reduced paw edema after 120, 180 and 360 min (Table 4). However, the standard diclofenac at 20 mg/kg also produced similar and better results than the tested samples. The percent protection was found to be 28.17 to 37.09 after 360 min measurements.

## 4. DISCUSSION

Chemical modification of mangiferin for obtaining compounds with better activity has also been tried. One new and three known mangiferin derivatives were prepared and characterized.

Mangiferin on benzoylation, showed an intense ionic peak at  $m/z$  755 for  $(M+Na-2H)$  of tribenzoyl derivative in its positive mode ESI-MS spectrum. In its IR spectrum, it exhibited characteristic absorption bands at 3352 (OH), 1747, 1742 (ester carbonyl), 1618 (C=O), 1600 and 1556 (C=C of aromatic ring) and at  $1091\text{ cm}^{-1}$  (C-O). The presence of signals at  $\delta$  7.20-8.30 (15 H) indicated the presence of benzoyl groups in the molecule. Further disappearance of -OH group signals at 3, 6 and 7<sup>th</sup> position in  $^1\text{H}$  NMR suggesting the position of the benzoylation in the hydroxyl groups of the basic molecule.

Mangiferin on benzoylation, showed intense ionic peaks at  $m/z$  689, 599 and 510 for tribenzyl, dibenzyl and monobenzyl derivatives in their negative mode ESI-MS spectrum. In its IR spectrum it exhibited characteristic absorption bands at 3392 (OH), 1647 (C=O), 1608 and 1577 (C=C of aromatic ring) and at  $1080\text{ cm}^{-1}$  (C-O). The presence of three signals at  $\delta$  5.40, 5.30 and 5.25 each for two protons accompanied with the aromatic protons at  $\delta$  7.30, 7.40 and 7.50 suggests the presence of a tribenzyl derivative of mangiferin.

Mangiferin on acetylation, showed an intense ionic peak at  $m/z$  611, 653, 695 and 755 for  $[M-3H]$  ion of tetra acetyl, penta acetyl, hexa acetyl and octa acetyl derivatives, respectively in its positive mode ESI-MS spectrum. In its IR spectrum, it exhibited characteristic absorption bands at 1751 (ester carbonyl), 1651 ( $C=O$ ), 1620 ( $C=C$  of aromatic ring) and at  $1055\text{ cm}^{-1}$  ( $C-O$ ). The  $^1H$  NMR values showed signals at  $\delta$  1.20-2.00 (24 H) indicating the formation of an octa acetyl derivative. The position of the acetylation in the octa acetyl derivative is at all the  $-OH$  groups, which is evident from the downfield shift of the corresponding protons in the  $^1H$  NMR spectrum. The hydroxyl group signals disappeared in the acylated spectrum.

Mangiferin on methylation, showed an intense ionic peak at  $m/z$  450, and a pseudo molecular ion peak at  $m/z$  464 for  $[M]^+$  ion and analyzed for  $C_{22}H_{24}O_{11}$  in its positive mode ESI-MS spectrum. In its IR spectrum, it exhibited characteristic absorption bands at 3367 (OH), 1647( $C=O$ ), 1606 ( $C=C$  of aromatic ring) and at  $1064\text{ cm}^{-1}$  ( $C-O$ ). The presence of signals at  $\delta$  4.60-4.90 (9 H) suggests a trimethyl derivative of mangiferin. The signals of the remaining protons are same as that of mangiferin. This suggests that methylation occurred in the xanthone nucleus (C-3, 6 and 7).

All the synthesised mangiferin derivatives were screened for their *in vitro* antioxidant activity using various standard methods. Mangiferin showed better activity in DPPH, ABTS,  $H_2O_2$  and nitric oxide methods when compared to all the derivatives. Furthermore, mangiferin was poorly active in lipid peroxidation, p-NDA, deoxyribose and alkaline DMSO methods. A possible reason for these results is that mangiferin has ability to scavenge free radicals formed in the initial step of lipid peroxidation as has been noticed previously in rat liver microsomes [25]. MGN 1 and MGN 3 showed potent activity than mangiferin in lipid peroxidation, p-NDA, deoxyribose and alkaline DMSO methods revealed that acetyl and benzoyl group substitution is beneficial for the activity. However, methyl and benzyl mangiferin abolishes the antioxidant activity in most of the methods. Based on these results, compounds MGN 1 and MGN 3 along with mangiferin were chosen for comparing their *in vivo* analgesic and anti-inflammatory activities with mangiferin.

#### 4. CONCLUSION

In analgesic and anti-inflammatory studies MGN 1 and MGN 3 did not produce significant activity when compared to mangiferin. However, MGN 1 showed slightly better results than mangiferin in analgesic models, but it failed in acetic acid induced writhing and anti-inflammatory studies. Further studies are required to confirm its mechanism of action.

## COMPETING INTERESTS

Authors declare that there are no competing interests.

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## ***Anti-Inflammatory Effects of New Flavonoids from Streptomyces sp. BT01 in Lipopolysaccharide-Stimulated RAW 264.7 Murine Macrophages via Inhibition of NF-Kappa B Activation***

### **ABSTRACT**

Most flavonoids are known to have anti-oxidant, anti-bacterial and analgesic properties. In this study, the new flavonoids, 7-methoxy-3,3',4',6-tetrahydroxyflavone (1) and 2',7-dihydroxy-4'5'-dimethoxyisoflavone (2) isolated from *Streptomyces* sp. BT01 inhibited the pro-inflammatory mediators including cytokines by blocking nuclear factor-kappaB (NF- $\kappa$ B) signalling in lipopolysaccharide (LPS)-stimulated RAW 264.7 cells. These flavonoids suppressed mRNA and protein expression of inducible nitric oxide synthase (iNOS) and cyclooxygenase-2 (COX-2) in LPS-stimulated RAW 264.7 cells. The molecular mechanism was associated with the inhibition of NF- $\kappa$ B activation. These results suggest that these flavonoids have anti-inflammatory effects by suppressing expression of iNOS, COX-2 and cytokines by blocking the NF- $\kappa$ B signalling in LPS-stimulated RAW 264.7 cells.

**Keywords:** anti-inflammatory effects; flavonoids; RAW 264.7; *Streptomyces* sp.

### **1. INTRODUCTION**

Flavonoids are a family of substances whose members have many interesting biological properties including anticancer, antimicrobial, antiviral, antithrombotic, anti-inflammatory, and immunomodulatory activities [1,2,3,4]. Of these biological activities, the anti-inflammatory capacity of flavonoids has long been emphasized in oriental medicine. The excessive activation of macrophages can induce the production of several kinds of pro-inflammatory enzymes and cytokines. Pro-inflammatory enzymes, which are the mediators of inflammation, include inducible forms of nitric



oxide synthase (iNOS) which makes nitric oxide (NO) from L-arginine. NO is involved in various biological processes, including inflammation [5,6]. Cyclooxygenase-2 (COX-2) is the enzyme that converts arachidonic acid to prostaglandins which are involved in inflammatory response. Pro-inflammatory cytokines, such as tumor necrotic factor (TNF)- $\alpha$ , interleukin (IL)-1 $\beta$ , and IL-6, are mainly produced in macrophages activated by Gram negative bacteria-derived lipopolysaccharide (LPS) [7]. TNF- $\alpha$  is thought to be one of the most important mediators of inflammatory diseases. It is elevated in some pathogenic conditions and possesses potential toxic effect that results in hypersensitivity reactions with chronic inflammation [8,9]. IL-1 $\beta$  is a multifunctional cytokine that is responsible for various processes including host defense, inflammation and response to injury. It is produced by many cell types, predominantly by macrophage [10,11]. IL-6 is a cytokine produced by a number of normal and transformed cells. It is believed to be an endogenous mediator of LPS-induced fever [12,13,14].

In recent years, people began to use natural product compounds from plants and microorganisms to prevent and treat inflammatory responses by inhibiting inflammatory cytokines, such as TNF- $\alpha$ , IL-1 $\beta$ , and IL-6, and this has become an important area of investigation. During our recent investigations of the anti-inflammatory compounds, lansai C and lansai D were isolated from *Streptomyces* sp. SUC1 which had anti-inflammatory activity [15,16]. We report here the anti-inflammatory properties of two new flavonoids, 7-methoxy-3,3',4',6-tetrahydroxyflavone (1) and 2',7-dihydroxy-4',5'-dimethoxyisoflavone (2) by investigating their effects on the inhibition of production of NO, prostaglandin E<sub>2</sub> (PGE<sub>2</sub>), TNF- $\alpha$ , IL-1 $\beta$ , and IL-6 and also expression of iNOS and COX-2 in LPS-activated macrophage RAW 264.7 cells. These two new flavonoids were found to have significant, dose-related inhibitory effects on LPS-induced NO, PGE<sub>2</sub>, TNF- $\alpha$ , IL-1 $\beta$ , and IL-6 production.

## 2. MATERIALS AND METHODS

### 2.1 Microorganisms

*Streptomyces* sp. BT01 was isolated from the root tissues of *Boesenbergia rotunda* (L.) Mansf. by the surface-sterilization technique [17]. The characteristics of *Streptomyces* sp. BT01 were observed. For morphological characteristics, presence of aerial mycelium, spore mass colour, distinctive reverse colony colour, diffusible pigment, sporophore and sporechain morphology were recorded after 10 days incubation on International Streptomyces Project-2 (ISP-2) medium. Diaminopimelic

acid isomers and sugars from whole-cell extract were analysed for chemotaxonomic studies as report in a previous study [18].

## 2.2 Extraction and Purification of Active Compounds

A spore suspension of *Streptomyces* sp. BT01 was prepared in distilled water from cultures grown on International Streptomyces Project-4 (ISP-4) medium at 30°C for 10 days. The suspension,  $10^8$  spores per 100 ml of liquid medium, was added to ISP-2 broth in each 500 ml Erlenmeyer flask. Cultures were kept on an orbital shaker at 30°C for 48 h and used as seed stocks. For large production of culture filtrates, the strain BT01 was grown in a modified 3000 ml glass container containing 1500 ml of ISP-2 broth, and incubated in an orbital shaker for 5 days at the same condition. The 5-day-old cultures were filtrated by Whatman paper No.1 under vacuum. The mycelial mats were washed with distilled water and separated by centrifugation at 8500 g for 20 min. The culture filtrate and mycelial mats of the strain BT01 were extracted three times with 1/3 volumes of ethyl acetate. This organic solvent was pooled and then taken to dryness under flash evaporation at 40°C. The yield of dry material per litre was about 753 mg, which was dissolved in 10 ml of chloroform and fraction-ated on column chromatography (Merck silica gel 60, 35-70 mesh) with hexane, di-ethyl ether and methanol. The combined fractions eluted with 50% diethyl ether in hexane, 100% diethyl ether, and 5% methanol in diethyl ether (286 mg) were further separated by MPLC (400 x 40 mm column, Merck LiChroprep Si 60, 25-40 m, UV-detection, 254 nm) to afford fraction A (57 mg) and fraction B (104 mg). Final purification of fraction A and B were achieved by prep TLC (Merck, Si gel 60, 0.5 mm; dichloromethane : diethyl ether = 75: 25) to give 16 mg of compound 1 from fraction A and 28.5 mg of compound 2 from fraction B.

## 2.3 Characterisation of the Compounds

The structures of purified compounds have been identified using NMR and mass spectral data. The melting point of the compounds was determined on a Buchi-540 melting point apparatus. Optical rotations were measured on a Perkin-Elmer 241 polarimeter, IR spectra on a Perkin-Elmer 1 spectrometer,  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra on a Bruker DRX 500 spectrometer, and EI-MS and FAB-MS respectively on a Hewlett-Packard 5989 B and a Finnigan/Thermo Quest Mat 95 XL mass spectrometer.

## 2.4 Anti-inflammatory Activity

Murine macrophage RAW 264.7 cell line obtained from American Type Culture Collection (ATCC, Maryland, USA), was maintained in Dulbecco's Modified Eagle Medium (DMEM) supplemented with 10% heat inactivated fetal bovine serum (FBS), penicillin G (100 IU/ml), streptomycin (100 µg/ml), and L-glutamine (2 mM) and incubated at 37°C in a humidified atmosphere containing 5% CO<sub>2</sub>. Cells (1x10<sup>6</sup> /ml) were pre-incubated for 2 h with compound 1 or 2 (5, 10 and 20 µg/ml) and further cultured for 24 h (for pro-inflammatory cytokine, mediator and NO production) and 2, 6, 9, 12, and 24 h (for RT-PCR analysis) and 9 h (for protein expression) with LPS (1 µg/ml) in 6-well plates. Supernatants were removed at the allotted times and PGE<sub>2</sub>, TNF-α, IL-1β, and IL-6 levels were quantified by immunoassay kits according to the manufacturer's protocols (Assay Designs' Correlate-EIA™, Stressgen, USA), respectively, for Nitrite concentration in the supernatant, an indicator of NO production, was measured by a microplate assay method based on the Griess reaction [19], and the cells were used for RT-PCR analysis and protein expression.

## 2.5 Western Blot Analysis

Cellular proteins were extracted from control and compound 1 or 2-treated RAW 264.7 cells. The washed cell pellets were resuspended in lysis buffer (50 mM HEPES pH 7.0 250 mM NaCl, 5 mM EDTA, 0.1% Nonidet P-40, 1 mM phenylmethylsulfonylfluoride, 0.5 mM dithiothreitol, 5 mM NaF, 0.5 mM Na orthovanadate) containing 5 µg/ml each of leupeptin and aprotinin and incubated for 15 min at 4°C. Cell debris was removed by microcentrifugation, followed by quick freezing of the supernatants. Protein concentration was determined by BioRad protein assay reagent according to the manufacturer's instruction, 40-50 µg of cellular proteins from treated and untreated cell extracts were electroblotted onto nitrocellulose membrane following separation on a 10% sodium dodecyl sulfate (SDS) - polyacrylamide gel electrophoresis. The immunoblot was incubated overnight with blocking solution (5% skimmed milk) at 4°C, followed by incubation for 4 h with a 1:500 dilution of monoclonal anti-iNOS and COX-2 antibody (Santacruz, CA, USA). Blots were again washed two times with PBS and incubated with a 1:1000 dilution of horseradish peroxidase-conjugated goat anti-mouse IgG secondary antibody (Santacruz, CA, USA) for 1 h at room temperature. Blots were again washed three times in Tween 20/Tris-buffered saline (TTBS) and then developed by 3,3'-diaminobenzidine (DAB) (Sigma-Aldrich,

USA) solution (0.2 M DAB, 2.5 mM  $\text{NiCl}_2$ ) and  $\text{H}_2\text{O}_2$  (final concentration of 0.002%) for 10 min at room temperature. After signal development, the nitrocellulose membrane was washed several times in water and dried overnight on blotting paper. The signal intensity of the specific proteins were evaluated by ImageJ and calculated as the relative amounts comparing with the LPS-treated group.

## 2.6 Cytotoxicity Assay

3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) cytotoxicity assay was performed according to the method previously described [20]. MTT solution was added at a concentration of 50  $\mu\text{g}/\text{ml}$  into each well, which also contain 5, 10, 20 and 40  $\mu\text{g}/\text{ml}$  of compound 1 or 2. After 24 h of incubation at  $37^\circ\text{C}$ , the medium was discarded and the formazan blue, which formed in the cells, was dissolved in 50  $\mu\text{l}$  DMSO. The optical density values were measured at 570 nm using an AS10000 microplate reader (Hewlett-Packard spectracount, USA). The optical density of formazan formed in control (untreated) cells was taken as 100% of viability.

## 2.7 Preparation of Total mRNA and RT-PCR

RAW 264.7 cells were cultured in the presence of each compound in combination with LPS in 6-well plates and control for 6 h (for dose effect test) or at the allotted times (2, 6, 9, 12, and 24 h for time-course effect test). Total cellular RNA was isolated using the RNeasy mini kit (Qiagen) following the manufacturer's instructions. Total RNA (1  $\mu\text{g}$ ) was reverse-transcribed into cDNA using AccuPower RT-PCR Premix (Bioneer, Daejeon, Korea). The PCR primers used in this study were represented in Table 1. The  $\beta$ -actin gene was used as a constitutively expressed housekeeping gene for controls to determine the uniformity of the reverse transcriptions. PCR reactions were performed using Applied Biosystems 2720 thermal cycler (CA, USA) and an AccuPower RT-PCR Premix (Bioneer) according to the manufacturer's protocols. After amplification, products of the PCR reaction were separated on a 1% (w/v) triacetate/EDTA agarose gel, stained with 2% (w/v) ethidium bromide. The band was photographed under UV light using Kodak Image Station 440 (Kodak, Japan). The amount of mRNA was evaluated by ImageJ. The signal intensity of the specific mRNAs were normalised by a comparison with that of  $\beta$ -actin and calculated as the relative amounts comparing with the LPS-treated group.

**Table 1. Primers used in RT-PCR analysis**

Gene <sup>a</sup>	Primer sequences (5' → 3')	PCR product size (bp)
TNF- $\alpha$	TNF- $\alpha$ -f: TTGACCTCAGCGCTGAGTTG TNF- $\alpha$ -r: CCTGTAGCCCACGTCGTAGC	364
IL-1 $\beta$	IL-1 $\beta$ -f: CAGGATGAGGACATGAGCACC IL-1 $\beta$ -r: CTCTGCAGACTCAAACCTCCAC	447
IL-6	IL-6-f: GACTCCAGAAGACCAGAGG IL-6-r: TGCTGGTGACAACCACGGCC	308
iNOS	iNOS-f: CCCTCCGAAGTTTCTGGCAGCAGC iNOS-r: GGCTGTCAGAGCCTCGTGGCTTTGG	496
COX-2	COX-2-f: CCCAGAGCTCCTTTTCAACC COX-2-r: ATTTGGCACATTTCTTCCCC	240
$\beta$ -Actin	$\beta$ -Actin-f: GTGGGCCGCCCTAGGCACCAG $\beta$ -Actin-r: GGAGGAAGAGGATGCGGCAGT	603

<sup>a</sup>TNF- $\alpha$ , Tumor necrosis factor- $\alpha$ ; IL-1 $\beta$ , Interleukin-1 $\beta$ ; IL-6, Interleukin-6; iNOS, Inducible nitric oxide synthase; COX-2, Cyclooxygenase-2

## 2.8 Determination of NF- $\kappa$ B Activation

To evaluate effects of compound 1 or 2 on the NF- $\kappa$ B activation, after incubation with LPS (1  $\mu$ g/ml) in the presence or absence of the compounds (5, 10 and 20  $\mu$ g/ml for dose effect test) for 0.5 h or at the allotted times (0.25, 0.5, 1 and 2 h for times-course effect test), RAW 264.7 cells ( $2 \times 10^6$  cells) were washed with ice-cold PBS/phosphatase inhibitor solution and were directly lysed with the complete lysis buffer at the time interval. Proteins were separated by centrifugation (12,000 g for 20 min at 4°C) and stored at -80°C until analysis. Activated p65 subunits of NF- $\kappa$ B were determined by Trans AM ELISA kit (Active Motif, CA, USA). Whole-cell extracts (containing 10  $\mu$ g total protein) were used. Absorbance was measured at 450 nm with a reference wavelength of 620 nm with an AS10000 microplate reader (Hewlett-Packard spectracount, USA).

## 2.9 Statistical Analysis

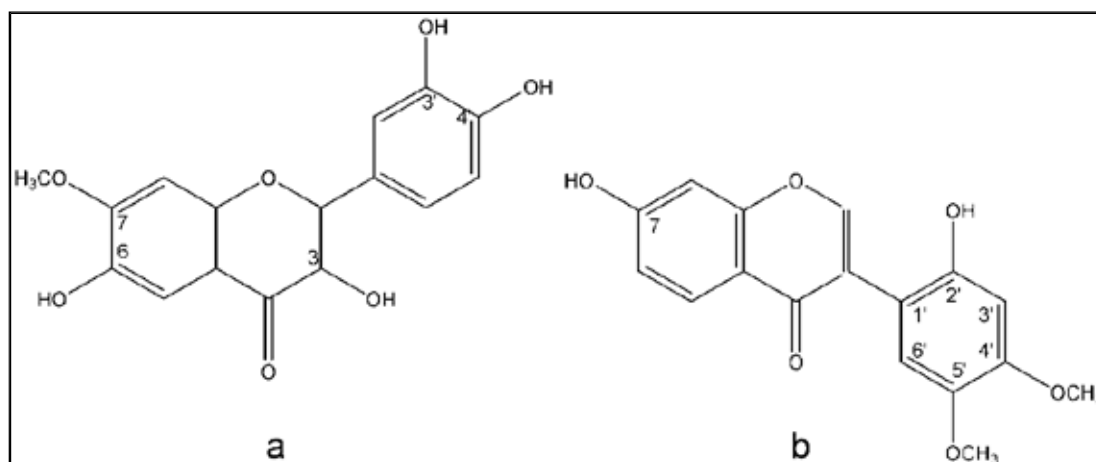
All data are expressed as mean  $\pm$  standard error of mean (S.E.M.) from at least three independent tests. The data were analyzed by the analysis of variance followed by the Duncan's multiple range test. All of the statistical analyses were performed by means of SPSS software with a probability level of  $P < 0.05$  or 0.01 (SPSS for Windows, ver. 14.0; SPSS Inc., Chicago, IL, USA).

## 3. RESULTS

### 3.1 Isolation of the Compounds from *Streptomyces* sp. BT01

In the present study, 7-methoxy-3,3',4',6-tetrahydroxyflavone (1) and 2',7-dihydroxy-4',5'-dimethoxyisoflavone (2) were isolated from the ethyl acetate extracts

from the culture of *Streptomyces* sp. BT01 by using silica gel column chromatography and thin-layer chromatography. Their structures as indicated in Fig. 1 were elucidated in previous report [18]. Their spectral data were reported as follows:



**Fig. 1. Chemical structures of 7-methoxy-3,3',4',6-tetrahydroxyflavone (1)(a) and 2',7-dihydroxy-4'5'-dimethoxyisoflavone (2)(b)**

Compound 1, identified by NMR and mass spectral data as 3,3',4',6-tetrahydroxy-7-methoxyflavone ( $C_{16}H_{12}O_7$ ), was yellow crystals having: mp 315-317°C (from methanol), UV:  $\lambda_{\max}$  nm ( $\log \epsilon$ ) = 239 (4.290), 257 sh (4.262), 349 (4.454).  $\lambda_{\max}$  nm (+  $AlCl_3$ ) ( $\log \epsilon$ ) = 235 (4.586), 276 (4.179), 360 (3.93), 431 (4.394).  $\lambda_{\max}$  nm (+  $AlCl_3/HCl$ ) ( $\log \epsilon$ ) = 228 sh (4.269), 267 (4.257), 357 sh (3.973), 419 (4.454). IR  $\nu_{\max}$   $cm^{-1}$ : 3596, 3511, 3333, 3117, 1636, 1609, 551, 1508, 1497, 1435, 1393, 1289, 1223, 1169, 1123, 1038. EI-MS  $m/z$ : 316 ( $M^+$ , 100%), 301 (22), 273 (35), 167 (13), 150 (16), 149 (24), 137 (39), 135 (21), 128 (14), 123 (16), 120 (13), 95 (18), 69 (42), 63 (17), 53 (31), 51 (26). HR -MS:  $C_{16}H_{12}O_7$ , found: 316.0580, calcd: 316.0588.  $^1H$ -NMR ( $DMSO-d_6$ , 200 MHz)  $\delta$ : 3.91 (3H, s, 7- $OCH_3$ ), 6.86 (1H, d,  $J=8.4$  Hz, H - 5'), 7.20 (1H, s, 8-H), 7.29 (1H, s, 5-H), 7.54 (1H, dd,  $J=8.4, 2.2$  Hz, 6'-H), 7.70 (1H, d,  $J=2.2$  Hz, 2'-H), 9.00 (1H, s, 3-OH), 9.24 (1H, s, 3'-OH), 9.53 (1H, s, 4'-OH), 9.72 (1H, s, 6-OH).  $^{13}C$ -NMR ( $DMSO-d_6$ , 75.4 MHz)  $\delta$ : 56.54 (7- $OCH_3$ ), 100.46 (C- 8), 106.9 (C-5), 115.00 (C-10), 115.33 (C-2'), 115.86 (C-5'), 119.94 (C-6'), 123.01 (C-1'), 137.39

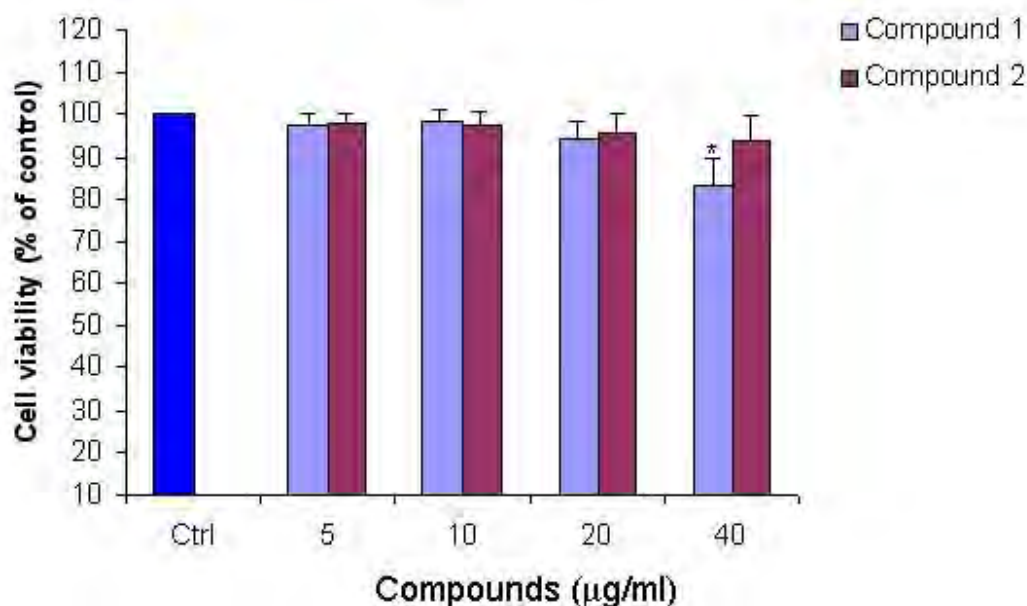
(C-3), 145.04 (C-6), 145.36 (C-3'), 145.45 (C-2), 147.48 (C-4'), 150.22 (C-9), 153.96 (C-7), 171.91 (C-4).

Compound 2, identified by NMR and mass spectral data as 2',7-dihydroxy-4',5'-dimethoxyisoflavone (C<sub>17</sub>H<sub>14</sub>O<sub>6</sub>), was yellow crystals having: mp 237-239°C (from methanol), UV:  $\lambda_{\text{max}}$  nm (log  $\epsilon$ ) = 248 sh (4.312), 264 sh (4.211), 301 (4.256). IR  $\nu_{\text{max}}$  cm<sup>-1</sup>: 3414, 2940, 1705, 1616, 1562, 1512, 1458, 1343, 1300, 1246, 1188, 1103. EI-MS  $m/z$ : 314 (M<sup>+</sup>, 100%), 299 (85), 271 (19), 239 (22), 200 (20), 187 (28), 137 (30), 107 (24), 92 (22), 69 (57), 63 (36), 53 (25), 51 (33). HR-MS: C<sub>17</sub>H<sub>14</sub>O<sub>6</sub>, found: 314.0799, calcd: 314.0730. <sup>1</sup>H-NMR (DMSO-*d*<sub>6</sub>, 200 MHz)  $\delta$ : 3.66 (3H, s, 5'-OCH<sub>3</sub>), 3.72 (3H, s, 4'-OCH<sub>3</sub>), 6.52 (1H, s, 3'-H), 6.81 (1H, s, 6'-H), 6.87 (1H, d,  $J$ =2.1 Hz, 8-H), 6.92 (1H, dd,  $J$ =8.7, 2.1 Hz, 6-H), 7.94 (1H, d,  $J$ =8.7 Hz, 5-H), 8.22 (1H, s, 2-H), 8.99 (1H, s, 7-OH), 10.80 (1H, br, 2'-OH). <sup>13</sup>C-NMR (DMSO-*d*<sub>6</sub>, 50 MHz)  $\delta$ : 55.65 (4'-OCH<sub>3</sub>), 56.66 (5'-OCH<sub>3</sub>), 101.53 (C-3'), 102.27 (C-8), 110.08 (C-1'), 115.42 (C-6), 116.02 (C-6'), 116.70 (C-10), 121.64 (C-3), 127.44 (C-5), 141.70 (C-5'), 149.81 (C-2'), 149.90 (C-4'), 155.24 (C-9), 157.64 (C-9), 162.79 (C-7), 175.42 (C-4).

### 3.2 Effects of the Compounds on Cell Viability

Fig. 2 shows the cell viability at 5, 10, 20 and 40  $\mu\text{g/ml}$  of compound 1 and 2. After 24 h of incubation, concentration of 40  $\mu\text{g/ml}$  of the compound 1 significantly decreased cell viability to about 83% ( $P < 0.05$ ), whereas concentration of the compounds ranging from 5 to 20  $\mu\text{g/ml}$  did not exhibit any cytotoxic effect. Therefore, concentrations of the compounds were selected from 5 to 20  $\mu\text{g/ml}$  for study on anti-inflammatory effects.



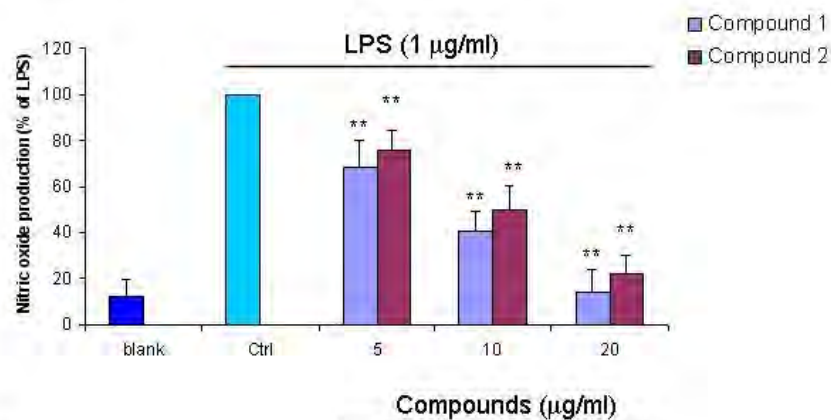


**Fig. 2. Effect of the compound 1 and 2 on cell cytotoxicity. The RAW 264.7 cells were treated with indicated concentrations of the compounds (5-40 µg/ml) for 24 h, and the results are expressed by percentages of surviving cells over control cells using MTT assays**

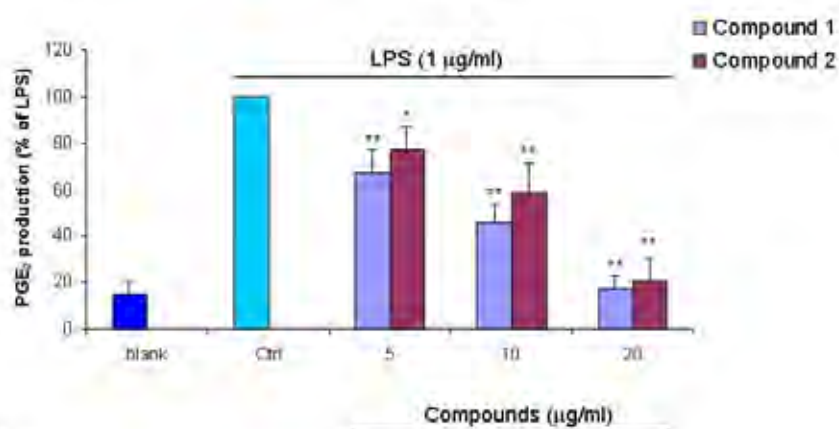
*\*P < 0.05 compared with the LPS-only treatment*

### **3.3 Effects of the Compounds on the Production of NO, PGE<sub>2</sub>, TNF-α, IL-1β, and IL-6 in LPS-stimulated RAW 264.7 Cells**

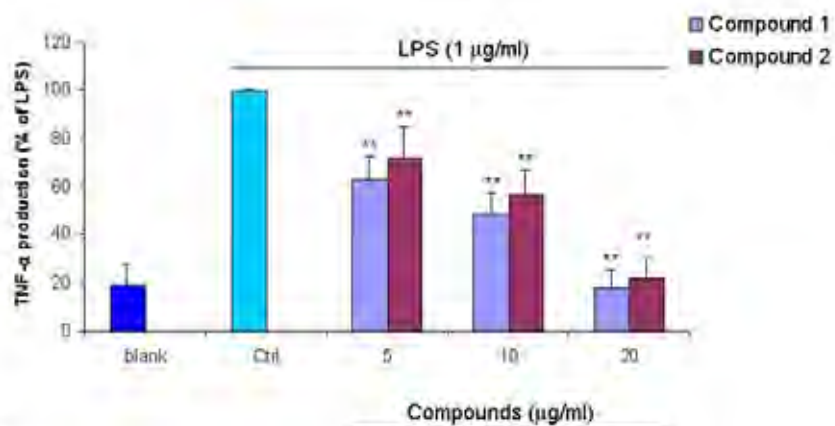
Fig. 3a, 3b, 3c, 3d, and 3e show the effects of compounds on NO, PGE<sub>2</sub>, TNF-α, IL-1β, and IL-6 production in LPS-stimulated RAW 264.7 cells. ELISA assays were used for detection of the mediator and pro-inflammatory cytokines, and Greiss's reaction was used to estimate the NO generation. In the absence of LPS, very low amounts of NO, mediator and those pro-inflammatory cytokines were detected in the culture supernatants of RAW 264.7 cells. Upon stimulation with LPS (1 µg/ml), NO production was markedly increased (Fig. 3a). We also found significant increases of the mediator and pro-inflammatory cytokines in the presence of LPS-stimulation (Fig. 3b to 3e). However, pretreatment with the compound 1 and 2 for 2 h could significantly reduce the production of NO, PGE<sub>2</sub>, TNF-α, IL-1β, and IL-6 in a dose-dependent manner (Fig. 3b to 3e).



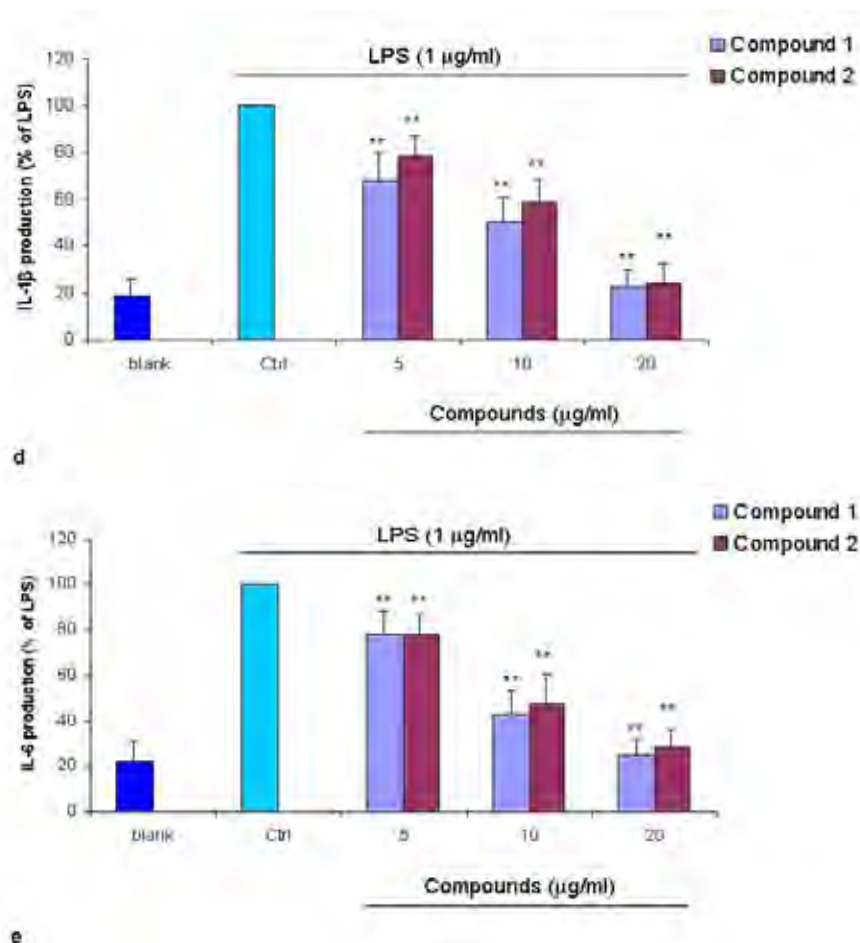
a



b



c



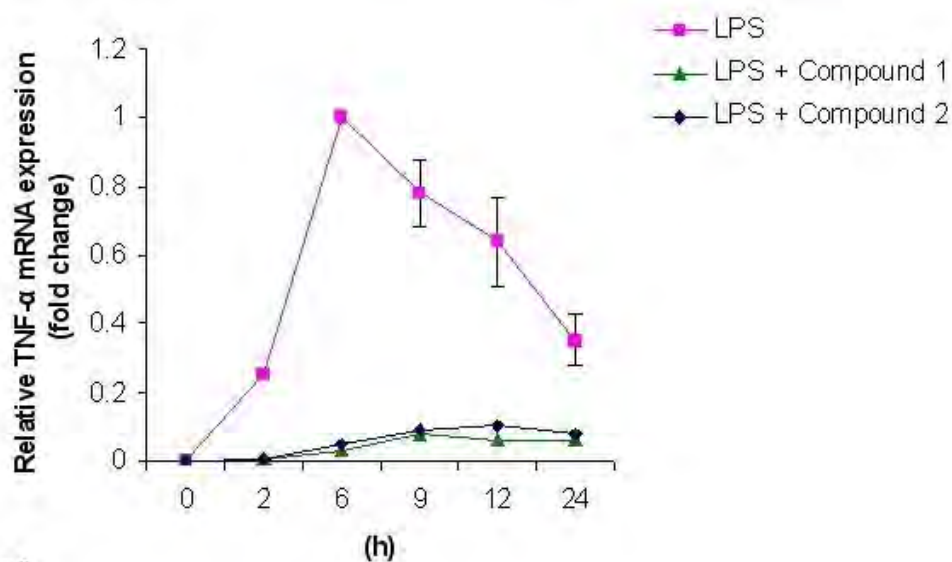
**Fig. 3. Suppressive effects of the compound 1 and 2 on LPS-induced NO, PGE<sub>2</sub>, TNF- $\alpha$ , IL-1 $\beta$ , and IL-6 production in RAW 264.7 cells. Cells were pretreated with/without indicated concentrations of the compound 1 and 2 for 2 h then stimulated with LPS (1  $\mu$ g/ml) for 24 h. Control values were obtained in the absence of LPS or the compounds. The values are presented as percentages of NO (a), PGE<sub>2</sub> (b), TNF- $\alpha$  (c), IL-1 $\beta$  (d), and IL-6 (e) comparing with LPS-treated cells, respectively. The data were expressed as the means  $\pm$  SDs for three independent experiments**

*\*  $P < 0.05$ , \*\* $P < 0.01$  compared with the LPS-only treatment*

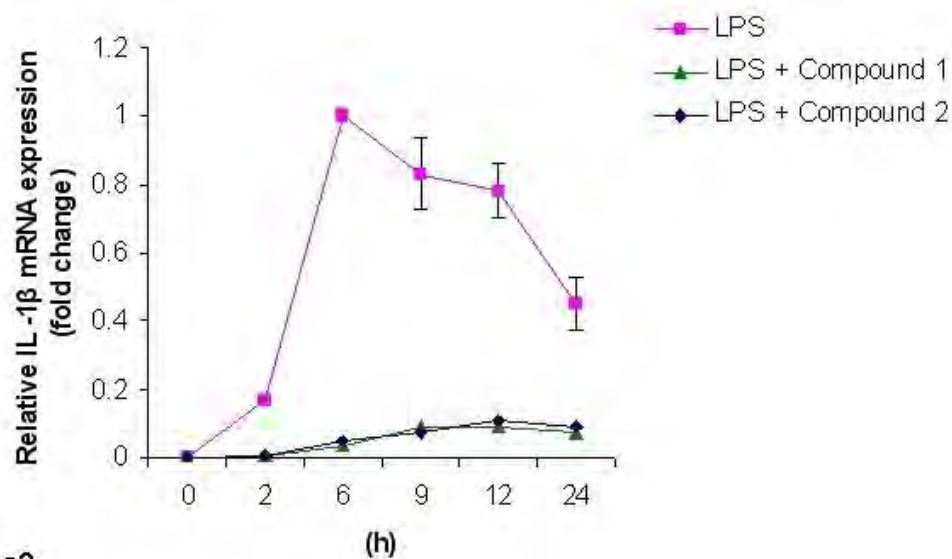
### **3.4 Effects of the Compounds on TNF- $\alpha$ , IL-1 $\beta$ , IL-6, iNOS and COX-2 mRNA Expression in LPS-stimulated RAW 264.7 Cells**

Fig. 4 shows the effects of the compounds 1 and 2 on mRNA expression of TNF- $\alpha$ , IL-1 $\beta$ , IL-6, iNOS and COX-2 in LPS-stimulated RAW 264.7 cells. Time- and dose-effect of the compounds on the mRNA expression of TNF- $\alpha$ , IL-1 $\beta$ , IL-6, iNOS and COX-2 was measured in RAW 264.7 cells stimulated with LPS in the presence or absence of the compounds using RT-PCR. The mRNA expression reached a peak level at about 6 h for TNF- $\alpha$ , IL-1 $\beta$ , and IL-6, and 9 h for iNOS and COX-2.

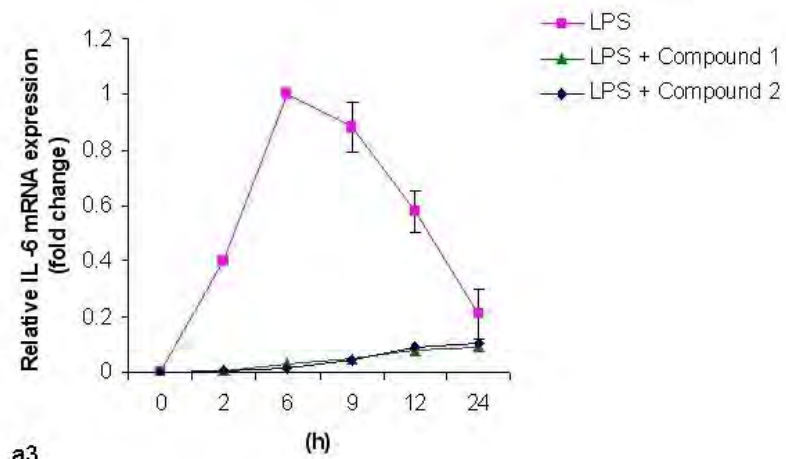
Pretreatment of the compound 1 and 2 at 20  $\mu\text{g/ml}$  could block the expression of these mRNAs at all of indicated time points (Fig. 4a). We also observed that pretreatment of various concentrations of the compound 1 and 2 on the inhibition of LPS-induced mRNA levels of those five genes was a dose-dependent manner (Fig. 4b and Fig. 5).



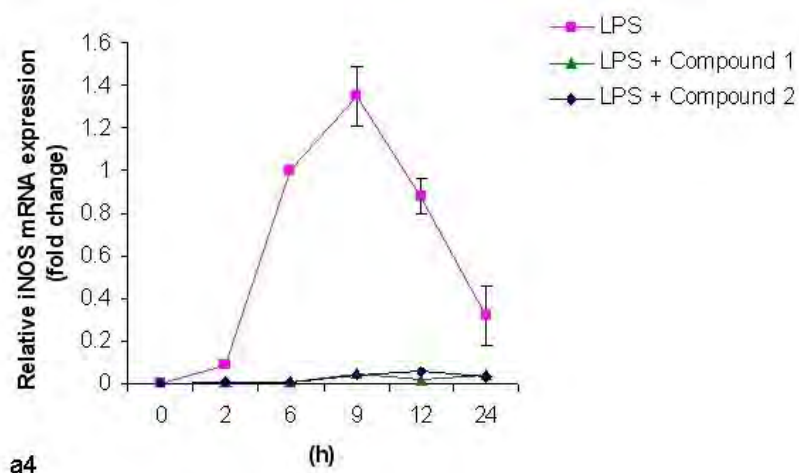
a1



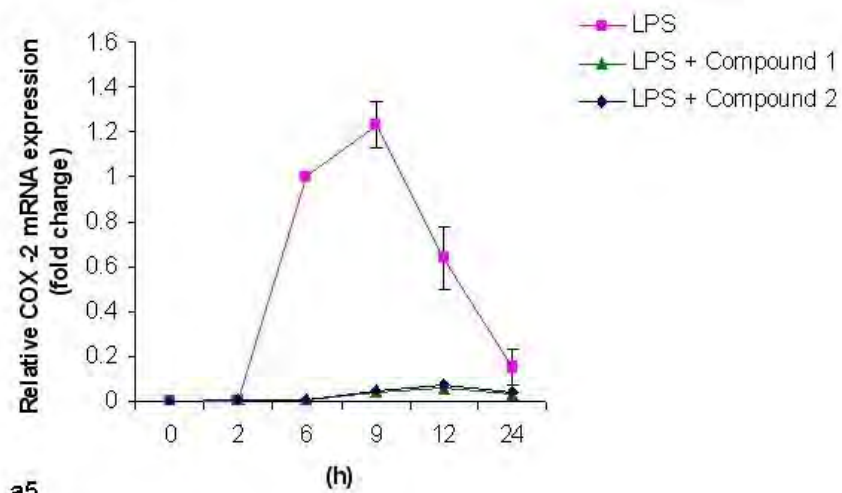
a2



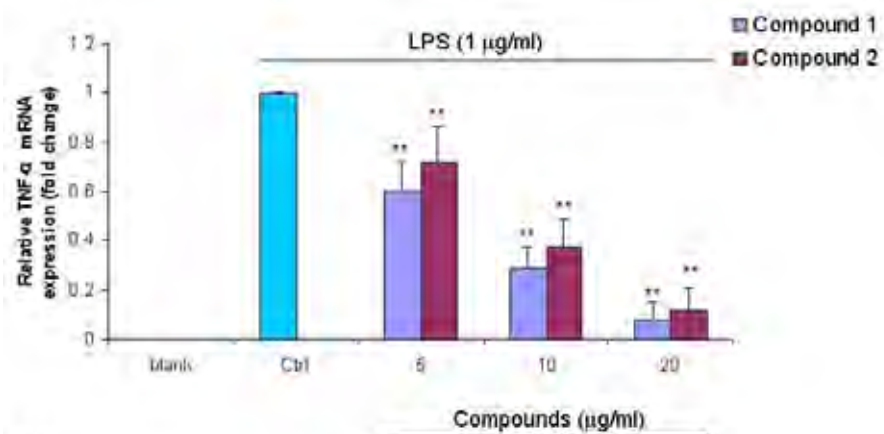
a3



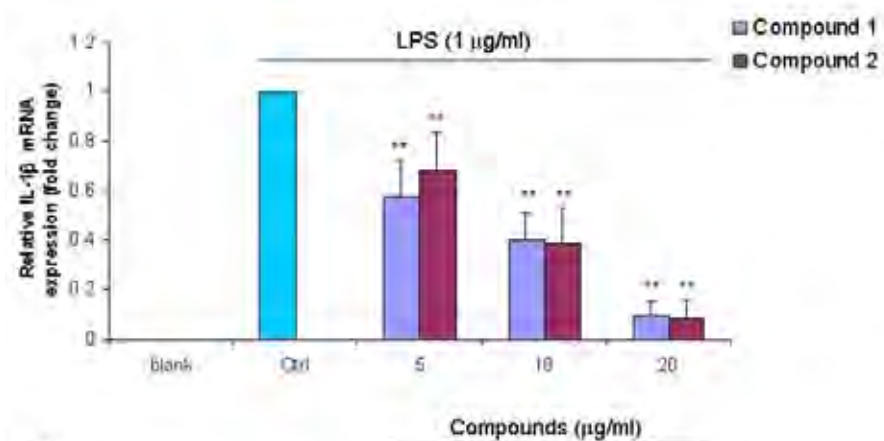
a4



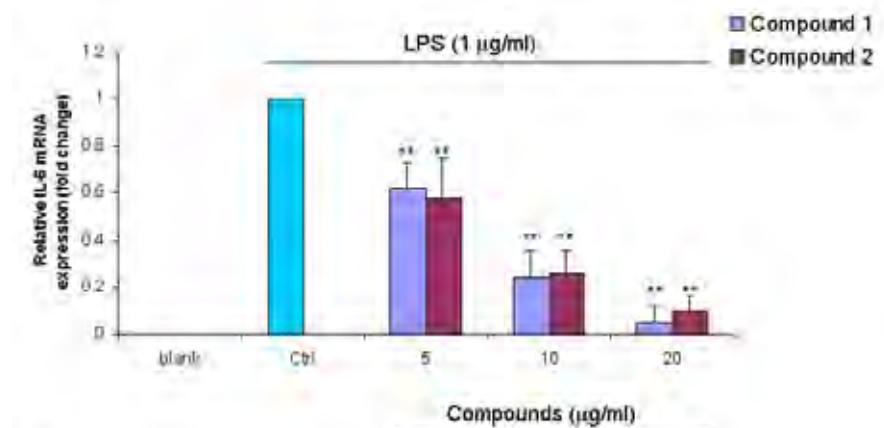
a5



b1

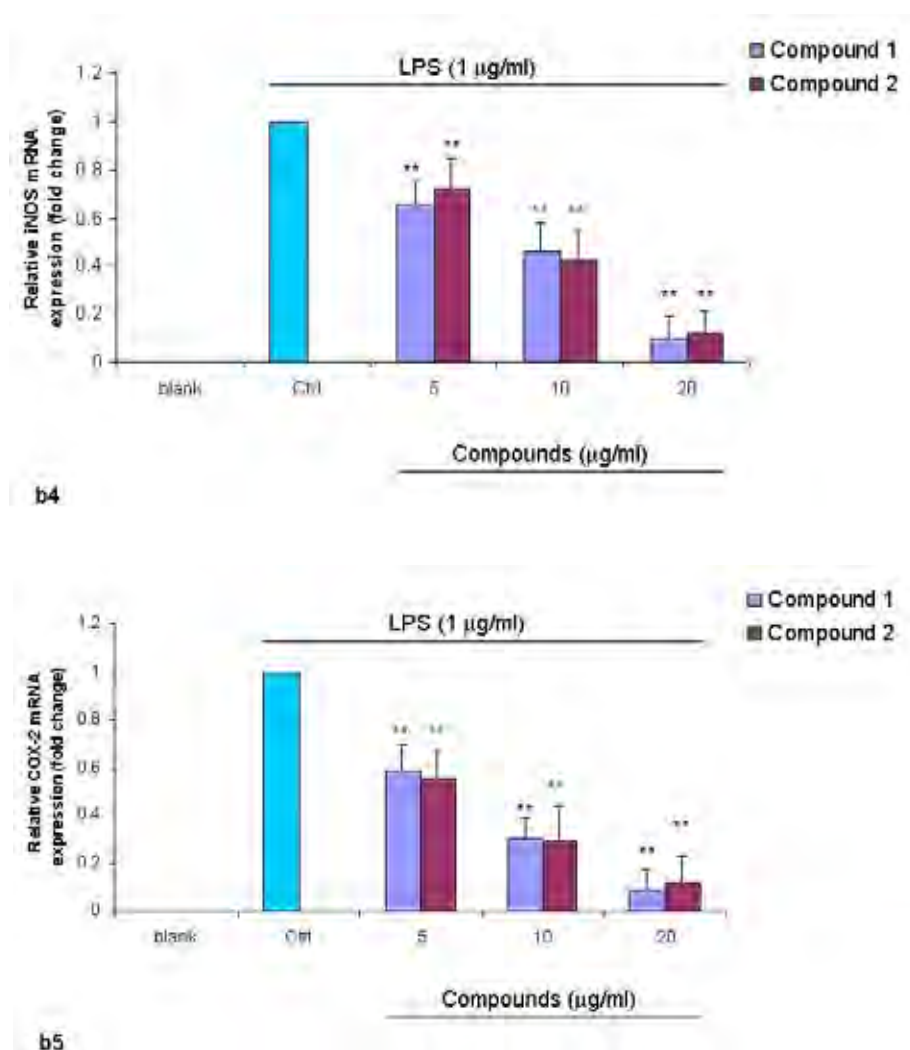


b2



b3

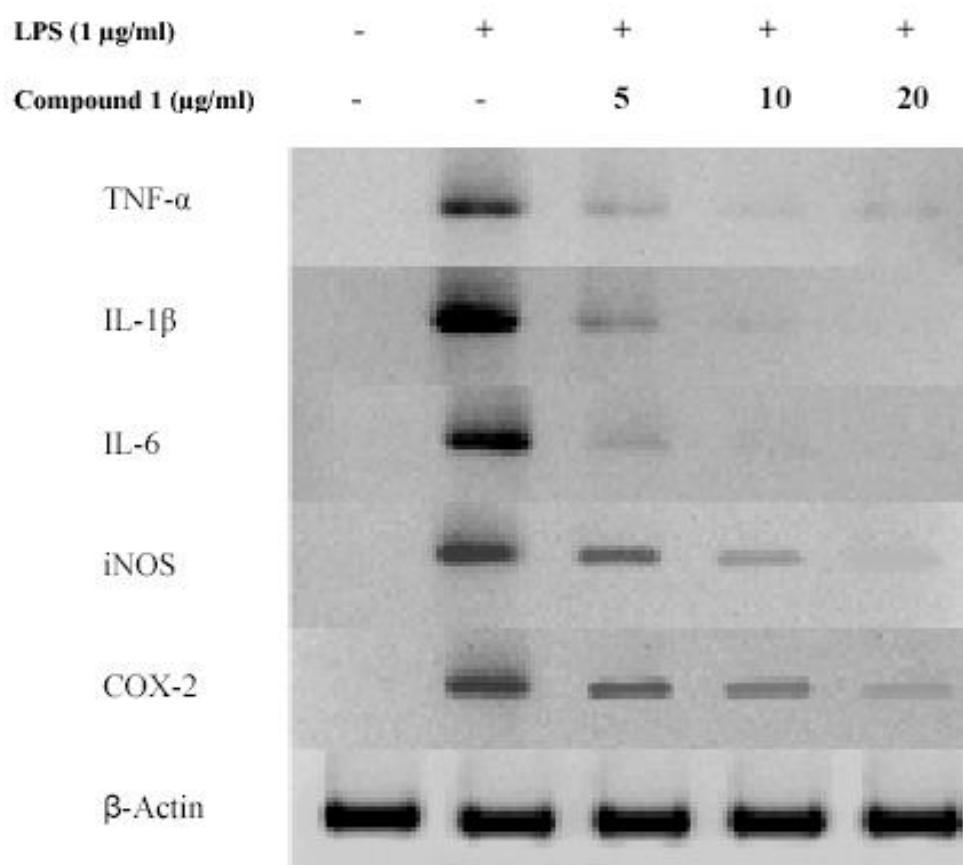




**Fig. 4. Suppressive effects of the compound 1 and 2 on LPS-induced mRNA expression of  $\text{TNF-}\alpha$ ,  $\text{IL-1}\beta$ ,  $\text{IL-6}$ ,  $\text{iNOS}$  and  $\text{COX-2}$  in RAW 264.7 cells. Time-course (a1-a5) and dose-dependent (b1-b5) inhibitory effect of the compound 1 and 2 were measured on LPS-induced  $\text{TNF-}\alpha$ ,  $\text{IL-1}\beta$ ,  $\text{IL-6}$ ,  $\text{iNOS}$  and  $\text{COX-2}$  mRNA expression in RAW 264.7 cells were measured using RT-PCR. (a1-a5) Cells were pretreated with the compounds (20 µg/ml) or not for 2 h, then stimulated with LPS (1 µg/ml) at various time points. (b1-b5) Dose-effect relationship was measured after 6 h stimulation with LPS (1 µg/ml). Results were expressed as a target gene expressions ratio comparing with the LPS-treated group. The data were the means  $\pm$  SDs for three independent experiments**

**\*\* $P < 0.01$  compared with the LPS-only treatment**

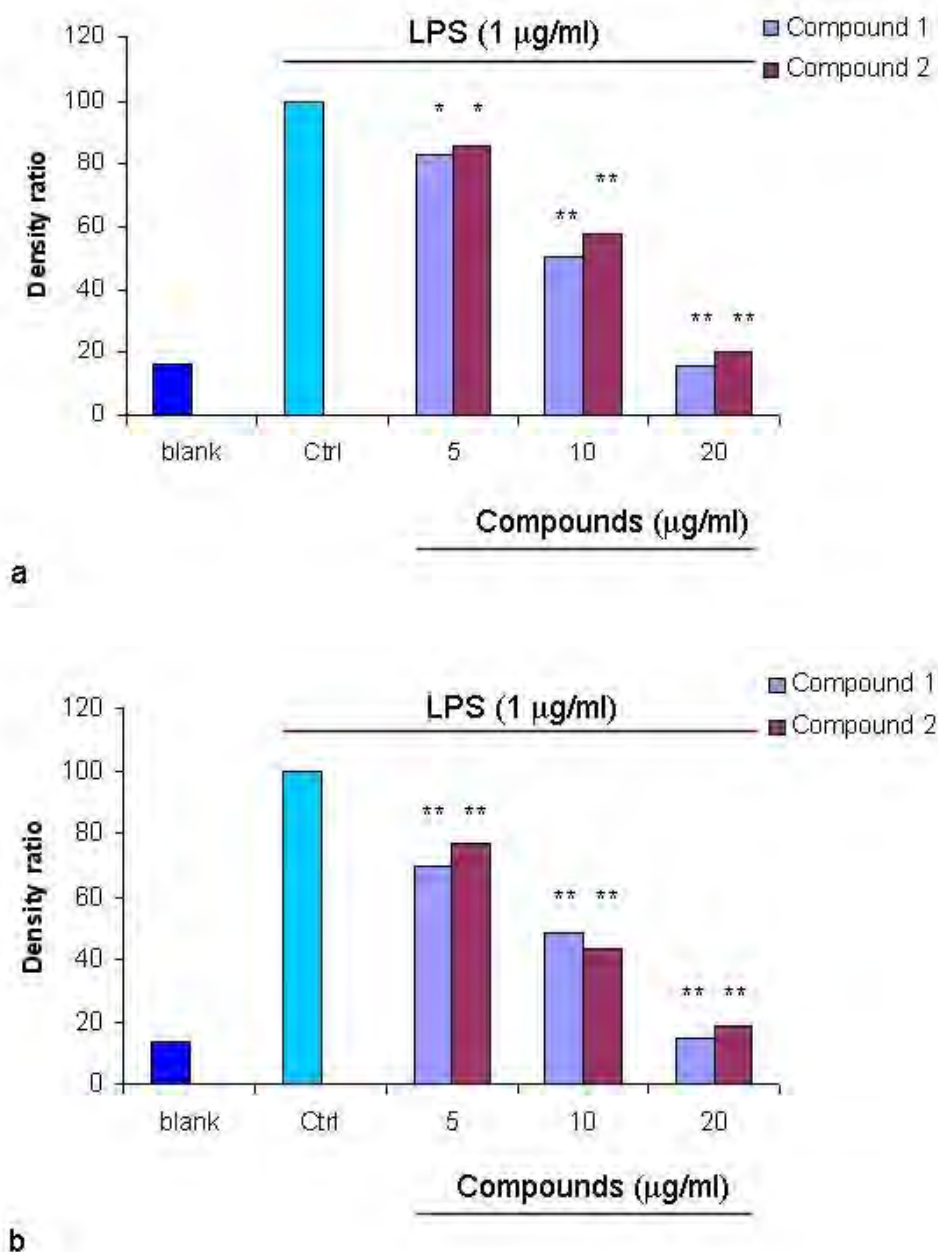




**Fig. 5. Suppressive effects of compound 1 on LPS-induced mRNA expression of proinflammatory cytokines, inducible nitric oxide synthase (iNOS) and cyclo-oxygenase-2 (COX-2) in RAW 264.7 cells.** The cells were pretreated with different concentrations (5, 10, 20 µg/ml) of compound 1 for 2 h and then incubated with or without 1 µg/ml of LPS for 6 h, total mRNA was isolated, and the mRNA levels of proinflammatory cytokines, iNOS and COX-2 were examined by RT-PCR

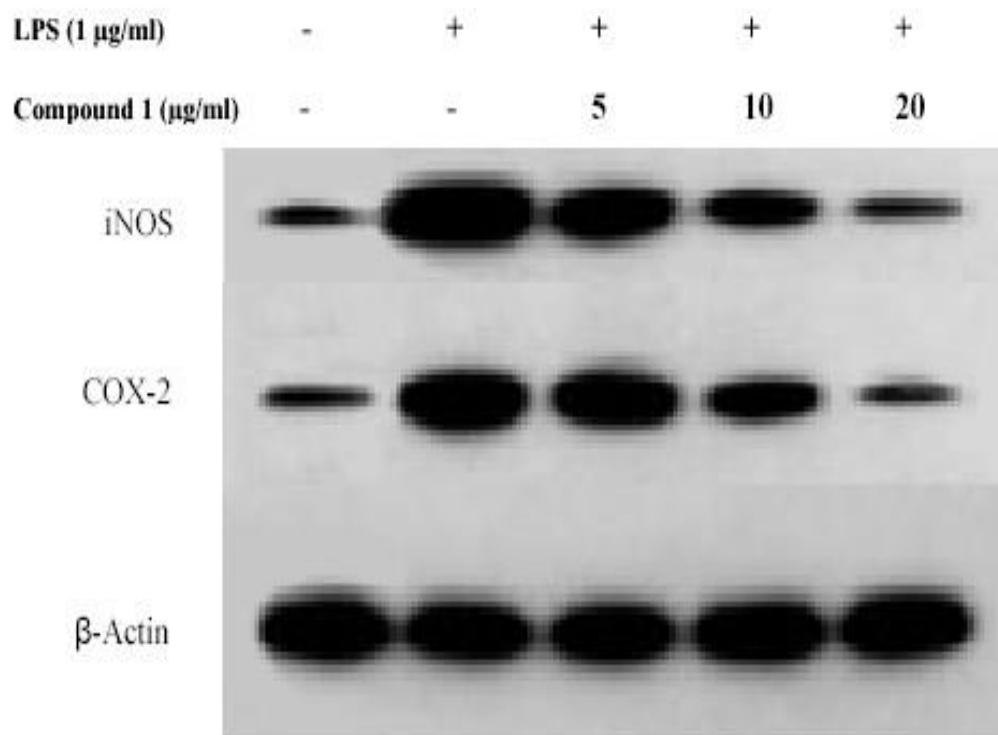
### **3.5 Effects of the Compounds on iNOS and COX-2 Production in LPS-stimulated RAW 264.7 Cells**

The iNOS and COX-2 productions of the compound 1 and 2 pretreatment in RAW 264.7 cells stimulated with LPS were performed by Western blot analysis. The relative intensity of iNOS and COX-2 bands were significantly increased upon LPS treatment and this induction was effectively inhibited in a dose-dependent manner by the compound 1 and 2 treatment (Fig. 6a and 6b). Similarly, in the case of mRNA expression of iNOS and COX-2. LPS-activated macrophages increased the protein expression of iNOS and COX-2 when compared to the untreated control group (Fig. 7).



**Fig. 6. Suppressive effects of the compound 1 and 2 on LPS-induced protein expression of iNOS and COX-2 in RAW 264.7 cells. RAW 264.7 cells were pretreated with the compounds for 2 h and then stimulated with LPS (1 µg/ml) for 9 h. The cells were lysed, and the lysates were examined by Western blot for (a) iNOS and (b) COX-2. Results were expressed as a protein expressions ratio comparing with the LPS-treated group. The data were the means  $\pm$  SDs for three independent experiments**

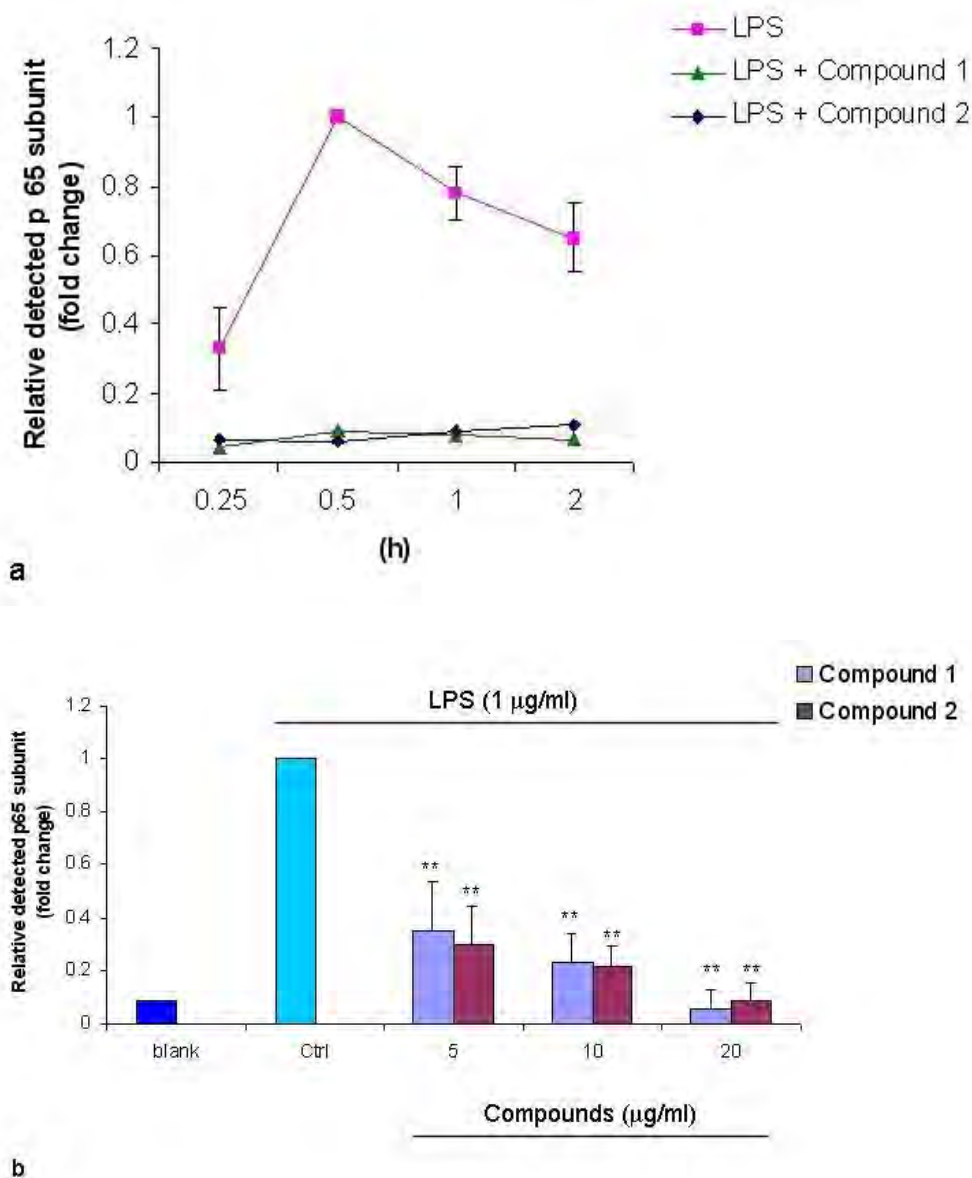
*\*P < 0.05, \*\*P < 0.01 compared with the LPS-only treatment*



**Fig. 7. Suppressive effects of compound 1 on LPS-induced protein expression of iNOS and COX-2 in RAW 264.7 cells.** The cells were pretreated with different concentrations (5, 10, 20 µg/ml) of compound 1 for 2 h and then incubated with or without 1 µg/ml of LPS for 9 h. Protein samples were analyzed by Western blot with specific antibodies as described in materials and methods

### **3.6 Effects of the Compounds on NF-κB Activation in LPS-stimulated RAW 264.7 Cells**

Only the LPS treatment significantly increased NF-κB as a transcription factor in RAW 264.7 cells, when compared to untreated LPS ( $P < 0.01$ ). The compound 1 and 2 treatment with LPS significantly decreased the activation of NF-κB in a dose- and time-dependent manner ( $P < 0.01$ ), when compared to only LPS treatment (Fig. 8a and 8b).



**Fig. 8. Suppressive effects of the compound 1 and 2 on LPS-induced NF-κB activation in RAW 264.7 cells. Time-course (a) and dose-dependent (b) inhibitory effect of the compound 1 and 2 were measured on LPS-induced NF-κB activation in RAW 264.7 cells were measured using ELISA. (a) Cells were pretreated with the compounds (20 μg/ml) or not for 2 h, then stimulated with LPS (1 μg/ml) at various time points. (b) Dose-effect relationship was measured after 0.5 h stimulation with LPS (1 μg/ml). Results were expressed as a target gene expressions ratio comparing with the LPS-treated group. The data were the means ± SDs for three independent experiments**

**\*\* $P < 0.01$  compared with the LPS-only treatment**

#### 4. DISCUSSION

Previously, it was reported that the ethyl acetate extract of *Streptomyces* sp. BT01 culture possessed antibacterial activity [18]. The extract was purified by column chromatography and thin-layer chromatography. Two new flavonoids, 7-methoxy-3, 3',4',6-tetrahydroxyflavone (1) and 2',7-dihydroxy-4',5'-dimethoxyisoflavone (2) (Fig. 1) were obtained from the extracts. Flavonoids have biological activities including anti-inflammatory, anticancer, antimicrobial, antiviral, immunomodulatory, and antithrombotic activities [21]. In the present study the results demonstrated that the flavonoids isolated from *Streptomyces* sp. BT01 could inhibit inflammatory responses in LPS-induced RAW 264.7 macrophages.

It is known that macrophage plays an important role in the immune system as well as the inflammatory process. The activated macrophages can secrete a variety of inflammatory mediators and cytokines, including NO, PGE<sub>2</sub>, TNF- $\alpha$ , IL-1 $\beta$ , and IL-6 [22]. However, chronic inflammation causes the increase of pro-inflammatory mediators and cytokines. These are active in the pathogenesis of various chronic inflammatory diseases such as multiple sclerosis, Parkinson's disease, Alzheimer's disease and colon cancer [23]. NO is a major product regulated by three distinct NOS isoforms: neuronal NOS (nNOS), endothelial NOS (eNOS) and inducible NOS (iNOS). iNOS not only exists in healthy tissues, but also expressed after exposure to specific stimulants such as LPS and cytokines. The iNOS produces NO until the enzyme is decomposed [24]. Prostaglandins (PGs) play beneficial roles in almost every system and regulate different physiological processes including cell growth, ovulation, immunity, nerve growth and development and bone metabolism [25]. There are two major isoforms of cyclooxygenase; COX-1 and COX-2. COX-1 is expressed constitutively in many tissues and is associated with the synthesis of PGs involved in normal kidney and gastrointestinal function [26]. COX-2 is not detected in normal tissues, but is excessively induced by a variety of physiopathological conditions affecting tissues, such as growth factors, oncogenes, inflammatory stimuli and other ligands [27].

Many flavonoids for example; 4-methoxyhonokiol, poncirin genistein and apigenin inhibited LPS-induced expression of iNOS, COX-2 and cytokines through the inactivation of NF- $\kappa$ B in RAW 264.7 cells [28,29,30,31,32,33]. Thus, the regulation of iNOS and COX-2 is important in the inflammatory response. The present study examined the effect of the compound 1 and 2 on the expression of iNOS and COX-2 at the protein and mRNA levels. The results showed that the compound 1 and 2 dose-

dependently suppressed the expression of iNOS and COX-2 at both the protein and mRNA levels in LPS-stimulated RAW 264.7 cells.

NF- $\kappa$ B is a major factor regulating the expression of inflammation-induced enzymes and cytokines such as iNOS, COX-2, TNF- $\alpha$ , IL-1 $\beta$ , and IL-6, which include the NF- $\kappa$ B binding sites in their promoters, and has attracted attention as a new target for treating inflammatory diseases [34,35,36]. Therefore, the suitable regulation of NF- $\kappa$ B may be beneficial in treating many inflammatory disorders. Earlier studies had demonstrated that various natural compounds including curcumin, green tea polyphenols, resveratrol and lactones inhibited NF- $\kappa$ B activation. Curcumin suppresses NOS by decreasing iKK and NF- $\kappa$ B activation in LPS-stimulated RAW 264.7 cells [37]. Green tea polyphenols and resveratrol inhibit NF- $\kappa$ B activation by suppressing IKK [38]. The extract from the root of *Panax notogingeng* inhibited LPS-induced inflammatory mediators, including iNOS and COX-2 by blocking I- $\kappa$ B degradation in the cytosol and the nuclear translocation of the NF- $\kappa$ B p65 subunit [39]. The present results showed that the compound 1 and 2 inhibited LPS-induced gene expression and overproduction of TNF- $\alpha$ , IL-1 $\beta$ , IL-6, iNOS and COX-2. The compound 1 and 2 significantly inhibited the activation of NF- $\kappa$ B in a dose and time-dependent manner, in accordance with the suppressive effects on TNF- $\alpha$ , IL-1 $\beta$ , IL-6, iNOS and COX-2 production. The NF- $\kappa$ B plays a key role in the transcriptional up-regulation of the LPS-induced TNF- $\alpha$ , IL-1 $\beta$ , IL-6, iNOS and COX-2 [40,41,42]. These findings indicate that the suppression of NF- $\kappa$ B activation by the compound 1 and 2 is a possible mechanism of action for their anti-inflammatory activity.

In addition to cellular regulation affected by flavonoids, the various protein kinases such as protein kinase C (PKC) and mitogen-activated protein kinase (MAPK) have been reported to be involved in signal transduction [21]. Through the inhibition of these enzymes, DNA-binding capacity of transcription factors such as NF- $\kappa$ B or activator protein-1 (AP-1) is regulated, and the expression rate of the gene target is controlled. Therefore, suppressing or inhibiting the activation of other inflammation-linked transcription factors. Signal transductions by these compounds should be studied further.

## 5. CONCLUSION

Our study confirmed the *in vitro* anti-inflammatory effects of two new flavonoids, 7-methoxy-3,3',4',6-tetrahydroxyflavone (1) and 2',7-dihydroxy-4'5'-dimethoxyisofla-

vone (2) isolated from *Streptomyces* sp. BT01. We also observed that these compounds could inhibit the production of NO, PGE<sub>2</sub>, TNF- $\alpha$ , IL-1 $\beta$ , and IL-6 in LPS-stimulated RAW 264.7 cells. These compounds were able to regulate the mRNA expression of TNF- $\alpha$ , IL-1 $\beta$ , IL-6, iNOS and COX-2 in a time- and dose-dependent manner. These effects seem to be mediated by inhibiting the activation of NF- $\kappa$ B. We also found that these compounds could inhibit NF- $\kappa$ B activation in LPS-stimulated RAW 264.7 cells. These findings proved anti-inflammatory property of the new flavonoids isolated from *Streptomyces* sp. BT01. Hence, these flavonoids might be promising chemotherapeutic agents against inflammatory diseases.

### ACKNOWLEDGEMENTS

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### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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## ***Resistance to Thaumasite Form of Sulphate Attack of Blended Cement Mortars***

### **ABSTRACT**

This study concerns the resistance against thaumasite form of sulphate attack on Portland cement reference with high volume ground granulated blast-furnace slag, fly ash and ground basaltic pumice exposed to tap water (5% magnesium sulphate) for ten years. The separate and intergrinding methods, two fineness (250 m<sup>2</sup>/kg and 500 m<sup>2</sup>/kg) and 30% proportions of each of the different additives were employed in equal amounts by weight. The development of the microstructure and the secondary minerals in the plain and blended cements were studied via polarising microscopy on thin sections and on undisturbed lumps of specimens by scanning electron microscope (SEM-EDAX) analysis. A series of mechanical tests of cement mortars were undertaken on all specimens. The development of the microstructural features and the formation of the secondary minerals in pores were coherent to the increase in sulphate resistance. The presence of thaumasite together with ettringite in some specimens reflects the incomplete transformation phase of hydration. However, despite the numerous studies conducted on the relation of hydration and hydrolysis with reference to cement hardening, the hydration-bound hardening phenomenon coupled with thaumasite morphology and matrix and/or pore space orientations are recommended for further investigation. The use of the pozzolans/ground granulated blast furnace slag and basaltic pumice improved the sulphate resistance of the cement mortars, where specimen E yielded the highest sulphate resistance-highest TSA resistance.

**Keywords:** microstructure; magnesium sulphate resistance; thaumasite/ettringite.

## 1. INTRODUCTION

Recently, there has been a growing demand towards the use of supplementary cementitious materials, be it natural, waste, or by-products, the production of composite cements because of ecological, economical, and diversified product quality reasons. Slag, a by-product of the transformation of iron ore into pig-iron in a blast furnace, is one of these materials in use of cement manufacturing dating to as far back as 1880 [1-3]. Since then, its use has expanded due to its various advantages over other cementitious materials. As a primary advantage, slag has a relatively constant chemical composition compared to fly ash, silica fume and natural pozzolan [4-8].

Durability of concrete in underground structures depends on chemical properties of soil and groundwater. A sulphate or an acid environment caused by industrial wastes, or chemical residues in reclaimed ground, is one of the most severe conditions for durability of concrete. Unfortunately, underground or underwater concrete structures can sometimes be exposed to sulphates and acids, since water-soluble sulphate widely exists in soil, groundwater, streams, and seawater [9-12]. It has been recognised for a long time that sulphate induces damage to concrete. Some researchers have reported that the use of low water/cement ratio and the use of admixtures, such as air entraining agents to protect the chemical attack of a rich mixture, additive, or Ground Blast furnace slag (GBFS), would be the most effective treatment in reducing sulphate-inducing damage [13,14]. Deterioration of concrete by sulphate attack is commonly observed in structures exposed to soils or groundwater containing a high concentration of sulphate ions. To mitigate this attack, concrete codes recommend a concrete mixture with low water/cement ratio and sulphate resistant pozzolanic cement [15].

The European Cement Standards and The Turkish standards [16,17] allow the use of many different mineral admixtures in the production of CEM II, III, IV and V. It is necessary to note that Portland composite and composite cements contain at least two different mineral admixtures besides the Portland cement clinker. The total amount of these mineral admixtures is allowed up to 50% [18]. The durability of mortars can be greatly affected by environmental conditions, one of the most destructive effects coming from sulphates (soil, groundwater and seawater).

Wearing effects of chemical materials to concrete can be in various ways, acids induce dissolving salts in water to react with calcium hydroxide. Salts in concrete increase permeability and reduce resistance against harmful effects, whereas sulphates cause distensions and cracking in concrete. This damage depends on the cations taking part in building gypsum and ettringite or the decomposition of CSH gels. The majority of these wearing reactions depend on the increase of the  $C_3A$  content in concrete with high negative effects [19]. An example for the negative effects of  $C_3A$ . Commonly, 15% silica ash is added together with pumice in order to reduce the amount of  $C_3A$ . However, by creating an initial resistance against damage, silica ash and pumice reduce permeability as an operative effect along with highly active calcium hydroxide [20].

The sulphate wearing, concerning increases in volume and cracks of concrete, is reduced by the use of low ratios of tricalcium aluminate cements or suitable amounts of pumice as additives. Tricalcium aluminate indirectly decreases by the addition of pumice, and fills the pores in concrete as a connective component by joining with lime [21].

Calcium, sodium, magnesium and ammonium sulphate cause significant amounts of expansion in concrete consequently decreasing the strength. Calcium sulphate reacts with calcium aluminate to form ettringite, and in turn, causes expansion in concrete, whereas, ammonium sulphate is responsible for the highest corrosion in concrete bodies [22]. Moreover, sodium sulphate reaction has been reported to cause expansion and cracking in concrete by initial ettringite and gypsum formation followed by the ultimate development of thaumasite [23].

A long-known and major sulphate attack in concretes and mortars is caused by the formation of thaumasite, which forms under low temperatures as well as room temperatures (25 degrees C) and at wet, alkaline conditions extensively experienced at buried concrete structures [24]. For the development of the thaumasite form of sulphate attack (TSA) in concrete the presence of a carbonate source is indispensable for an alkaline environment [25]. This can be supplied to the concrete structure from the ingredients of the concrete or from outside sources like groundwater, surface water or seawater which is also the source of sulphate [26,27]. Some recent studies revealed the absence of TSA at 5 and 25 degrees Celsius in blends containing limestone additives treated with sulphate solutions [28,29]. TSA is also reported to occur in Portland cement-based materials at low temperatures (below 15°C) at the presence of sulfates, carbonates, and moisture. Consequently, the dissolution-precipitation mechanism in concrete concerns most processes and

phenomena including the temperature of the reactive environment occurring during the TSA process [30].

We have opted to reveal in this paper the durability/resistance of the separate and intergrinded blended cements with the incorporation of some additives within a 10-years time span under the effect of a  $\text{MgSO}_4$  solution at room temperature with special attention on TSA. The fineness of the control cement (clinker + gypsum) was maintained at constant values of approximately 250 and 500  $\text{m}^2/\text{kg}$ . Similar Blaine values were determined for the blended cement (clinker + slag + fly ash + pumice + gypsum) and the control specimen.

## 2. MATERIALS AND METHODS

### 2.1 Materials

Ground basaltic pumice (GBP), obtained from the widespread Delihalil cinder cone system in Osmaniye, Turkey, is one of the main additives used in this study. It contains glass shards, mineral phases and some volcanic materials [31]. The clinker, ground granulated blast-furnace slag (GGBFS) and the fly ash (FA)-were obtained from the Adana Cement Plant, the Iskenderun cement grinding plant and the Afsin-Elbistan energy plant respectively.

#### 2.1.1 Physical and chemical properties of the additives

Slag and Pumice were the high silica, alumina, magnesium and iron (in pumice only) containing additives of the mortars studied, and the fly ash was the material rich in calcium, and sulphur in particular (Table 1). The physical properties of the materials used varied slightly in specific gravity and for the two fineness ranges. The specific surface areas were the same in each mixture (Table 2). The uniform blended cement mixture was obtained by two different methods. The first was by grinding of the mixture separately for ten minutes. And for the second, blended cement mixture ratios were determined and ground. The B and C group samples were ground separately, whereas the D and E group samples were ground together.

**Table 1. Total elemental contents of the additive materials**

Contents	$\text{SiO}_2$	$\text{Al}_2\text{O}_3$	$\text{Fe}_2\text{O}_3$	$\text{CaO}$	$\text{MgO}$	$\text{SO}_3$	L.I
Slag	39.65	12.77	1.67	32.91	7.40	1.44	0.01
Flyash	44.09	22.07	4.40	20,95	1.65	2.56	2.24
Pumice	43.89	14.11	12.10	9.27	8.94	-	0.48
Clinker	20.29	5. 57	3. 85	64.75	1.96	0.89	



**Table 2. Physical properties of the additives**

<b>Contents</b>	<b>Specific gravity (kg/cm<sup>3</sup>)</b>	<b>Specific surface area (m<sup>2</sup>/kg)</b>	<b>200 <math>\mu</math>m fraction (%)</b>	<b>90 <math>\mu</math>m fraction (%)</b>
Slag	2.89	250 and 500	0.09	0.3
Flyash	2.85	250 and 500	0.08	0.2
Pumice	2.97	250 and 500	0.06	0.2
Clinker	3.19	250 and 500	0.09	0.3

## **2.2 Methods**

### **2.2.1 Physical and chemical methods**

The specific gravity and the specific surface area were determined by a method developed in accordance with ASTM-C204. The ball mill grindability tests were conducted in a standard Ball mill for the 90 micron test sieve. The basaltic pumice, the slag and the clinker were reduced down to the same fineness by crushing in the roll crusher. The 3.36 mm specimens were used as feed materials for the tests. The more grindable gypsum tends to be concentrated in the finer particle size fractions of the product during the grinding process. Particle size distribution was measured by laser diffraction. Blaine fineness values were determined according to the ASTM-C204 [4].

Total elemental contents of additives and blends (Table 3) were determined by the wet combustion method. The size fractions of 90 and 200 microns were separated through Standard ASTM. The chemical analyses are put after the physical for consistency with the subtitle which mentions the physical properties first and chemical second.

### **2.2.2 Blended cements preparation, mortar formation and curing**

The blended cements were prepared using a clinker, 5% gypsum by weight, GGBS, FA and GBP. Equal amounts of additives (30%, by weight) were incorporated into these blends. Cement paste and mortars were prepared using plain Portland cement (A), GGBS, FA and GBP by two types of grinding processes (intergrinding and separate grinding) at two Blaine values (250 m<sup>2</sup>/kg and 500 m<sup>2</sup>/kg) (Table 3). The first grinding method was conducted by grinding the mixture separately for ten minutes at a non-marble grinder, and the second included the grinding of triple mixture ratios. The B and C group samples were ground separately, whereas the D and E group samples were ground together.

The mortar specimens of the plain Portland cement (A1, A2) and the blended cements (B, C, D and E) were prepared according to the Rilem-Cembureau method at laboratory conditions ( $20\pm 2^{\circ}\text{C}$  and  $50\pm 5\%$  relative humidity). Following the 24-hour demolding, the specimens were kept in water until they were tested. Six specimens with dimensions 40 mm×40 mm×40 mm, obtained from the specimens used in the flexural strength tests, were tested under the same laboratory conditions as those applied in the flexural strength test. The compressive strength tests were carried out using a 20000 kN capacity automatic compression machine according to EN 196-1 [4].

**Table 3. The composition of the studied cements**

Cement	Composition (% percentages by weight)					Blaine ( $\text{m}^2/\text{kg}$ )
	Clinker	GBFS	FA	GBP	Gypsum	
A <sub>1</sub>	95	0	0	0	5	250
A <sub>2</sub>	95	0	0	0	5	500
B (separate grinding)	65	10	10	10	5	250
C (separate grinding)	65	10	10	10	5	500
D (intergrinding)	65	10	10	10	5	250
E (intergrinding)	65	10	10	10	5	500

### 2.2.3 Experimental setup

Sulphate durability, compressive strength and microstructure studies (by polarising and scanning electron microscopy) were conducted on standard 40 x 40 x 160 mm prismatic mortar specimens treated in a  $\text{MgSO}_4$  solution for a 10-year period at stable pH levels. The solution was replaced at regular periods. Compressive strength of the mortar specimens was determined after the 10-year treatment period. Although the sulphate contents of natural or polluted waters may vary in amounts, the sulphate of most stream and lake water systems seldomly exceeds the 100 mg/l limit. Numerous studies have mentioned the increase in sulphate resistance of cement, and rapid experimental methods were developed to determine the behaviour of additives.

Mixtures and control specimens of mortars were tested according to ASTM C 1012 standards for compressive strength. Here mixtures were tested via twelve parallel specimens based on the TS EN 24 Standards after treatment for 24 hours in laboratory conditions. After 24 hours, specimens were kept in lime-rich tap water for 28 days; the durability of mixtures was determined on these specimens, and the remaining specimens were kept in tap water and magnesium sulphate

solutions. The pH of the Mg solution was periodically checked by a pH-meter to attain consistency in alkalinity (for the first 6 months varied from pH 8 to 11 after that date it was kept consistent from pH 11.5 to 12). Samples were then stored in boxes and the solution was stirred from time to time to avoid sulphate accumulation on the surface. After the 10-year treatment period, both durability and microstructure of the specimens were determined. The utilization of the pozzolans in mortars can cause cracking and weakening due to expansion by alkali–silica reaction (ASR). In this study, ASR expansion and properties of strength were analysed in terms of pozzolan used, in anticipation of reducing ASR expansion.

#### **2.2.4 Micromorphology (microstructure/fabric) and mineralogy (x-ray diffraction and x-ray fluorescence)**

Thin sections were prepared according to FitzPatrick [32] from epoxy resin impregnated blocks. Undisturbed lumps of mortar were studied by sub-microscopy (scanning electron microscopy-SEM) on selected cement prisms, which were exposed to sulphate degradation for 10 years and cut into cubes of approximately 10 mm<sup>2</sup>, one side of which was polished flat. The lumps taken from the specimens were placed in vacuum desiccators for a minimum period of 10 minutes. Sample surfaces were coated with gold using a BIO-RAD Polar Division SEM coating system and the microstructure of the specimens was studied by a JEOL JEM–8,40 SEM with a TRACTOR–TN 5502 model Energy Dispersion Spectrometer (EDS) used for point and area chemical analyses. A Bruker D8 General Area Detector for diffractometry and copper target with a scanning angle from 38 to 90 2-theta was used for XRD analysis conducted on the same, but ground specimens used for SEM. X-ray diffraction was conducted on the ground powder samples of all specimens from 5 to 65 2-theta in order to determine the secondary minerals formed in the blends. The powdered specimen E was rescanned from 5 to 65 2-theta and its elemental contents were determined by XRF primarily to better distinguish the proximate thaumasite and ettringite peaks obtained by XRD analysis. This was also an attempt to explain the nature of the vitrified-like surfaces on the edges of specimen E determined by the SEM.

### 3. RESULTS AND DISCUSSION

#### 3.1 Compressive Strength of Mortars Immersed in Magnesium Sulphate

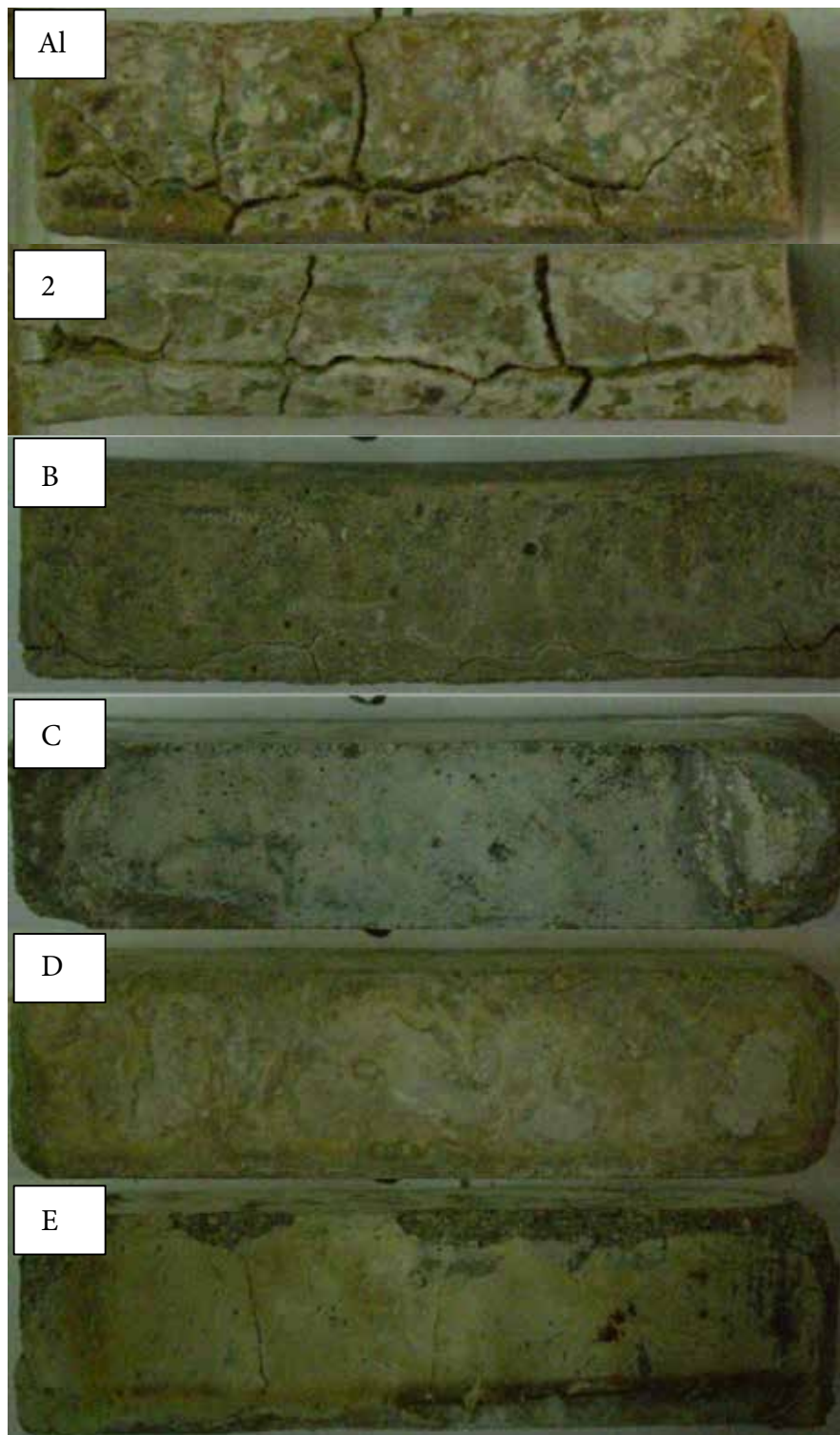
The separately produced blended cement specimens (B and C) were determined to have lower resistance to sulphate than the interground, where specimen C was higher than specimen B in terms of compressive strength (Table 4). The control specimens (A1 and A2) were found to completely crumble at the end of the 10-year period (Fig. 1). The intergrinding process was responsible for the 10-year high sulphate resistance due to different grinding periods and additives [6].

**Table 4. Compressive strength of mortars (MPa)**

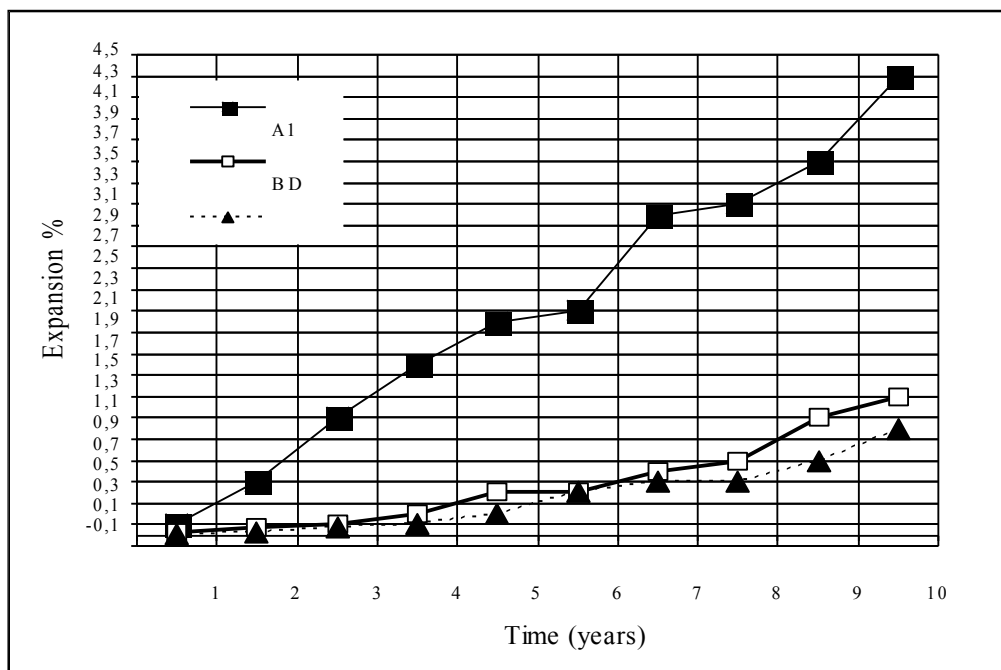
Specimens	28 days	10 years	
		Tap water	%5 MgSO <sub>4</sub>
A <sub>1</sub>	52.1	66.1	Crumbled-
A <sub>2</sub>	58.4	69.4	Crumbled-
B	36.2	56.9	22.1
C	52.3	67.1	27.4
D	37.5	58.1	22.6
E	54.2	69.6	29.4

#### 3.2 Expansion of the Specimens

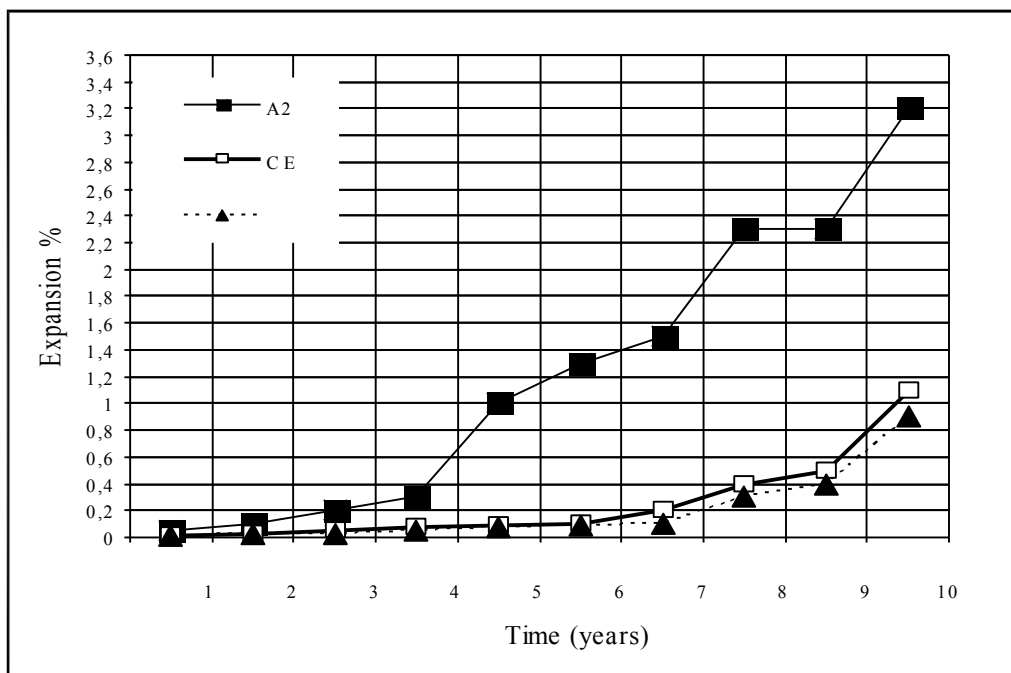
The expansion–time history curve that was made by measurements complying with ASTM C 1260 in terms of the specimens of 250 Blaine and of 500 Blaine is shown in Figs. 2 and 3. Fig. 2 shows the variation of expansion of hardened mortars with two Blaine values. The expansion of the mortars made with blended cements with separately ground finer specimens was lower than that of the control specimens (A1 and A2) at all tested ages. The control cement mortar expanded by more than 4,5% in 10 years. The expansion of the hardened blended cement mortars was affected not only by the finenesses of the cements, but in some cases, also by the grinding method. Specimen group E had the lowest expansion in 10 years and the expansions of samples A2, B and D were 3.4%, 1,1 and 0.8%, respectively (Fig. 2). The Blaine specific surface area is the most significant property causing interground specimens to have lower expansion than their separately ground counterparts.



**Fig. 1. The blended cement mortars after ten years**



**Fig. 2. Expansion time histories for mortar bars (250 Blaine)**



**Fig. 3. Expansion time histories for mortar bars (500 Blaine)**

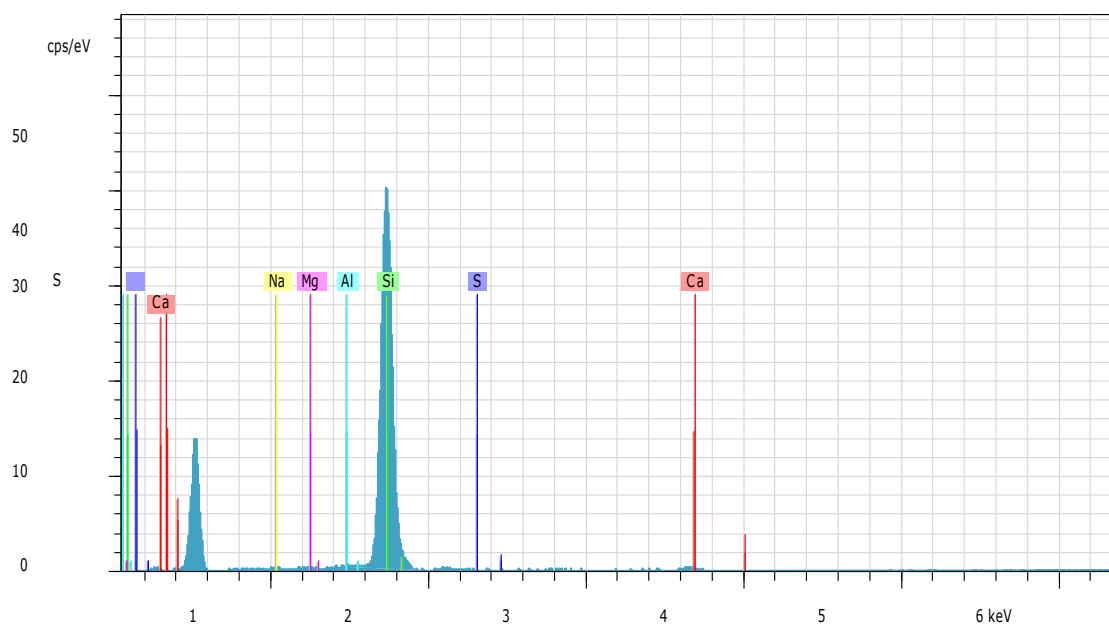
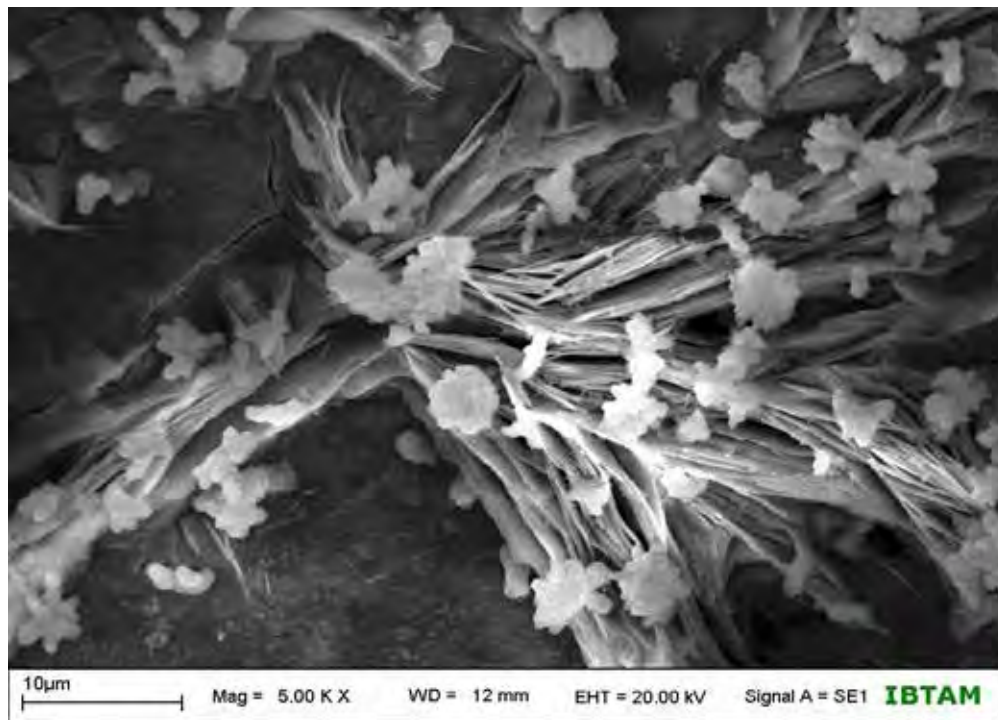
### 3.3 Micromorphology (Microstructure/Fabric) and Mineralogy

#### 3.3.1 Submicroscopy

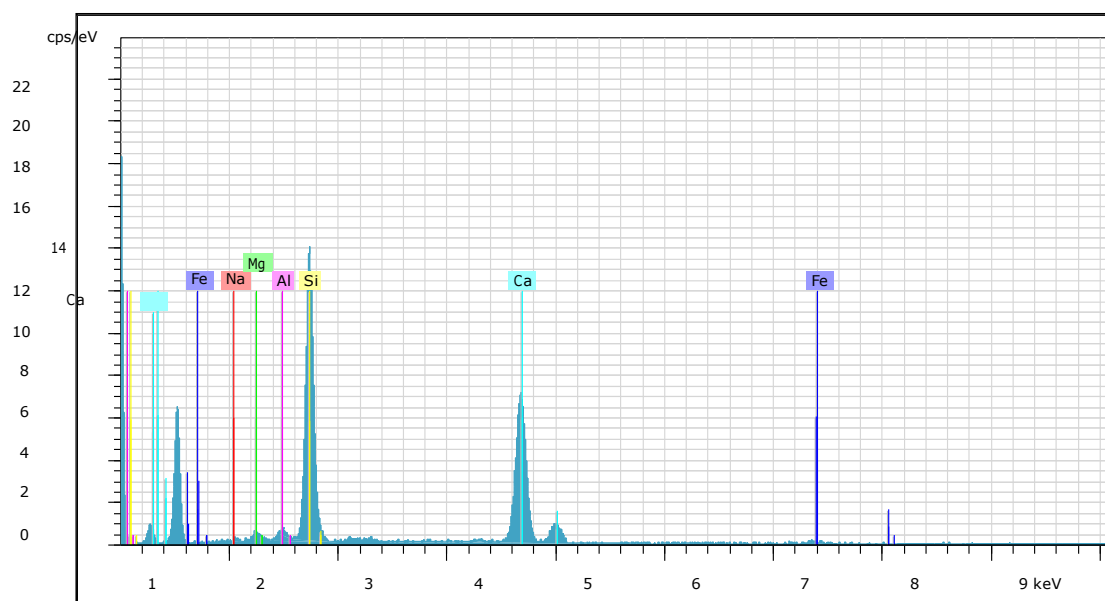
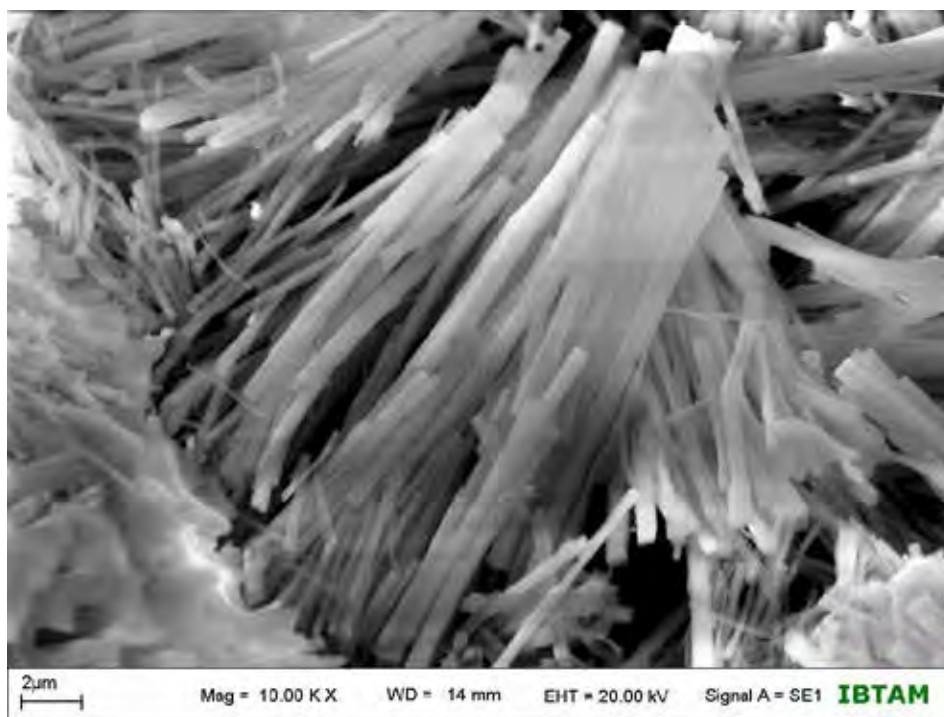
The crumbling of the A1 and A2 specimens after the 10-year period was most likely due to the formation of the bladed/tabular minerals along cracks and in micropores (Fig. 4 and 5). The presence of high amounts of silica, most likely liberated from the solution of quartz grains under high pH conditions, documents the formation of thaumasite, as bladed and wedge clustered radially oriented fibrous crystals, in specimen A1. However, the low amounts of aluminum with calcium may point out to the formation of ettringite together with the well-defined dominant fibrous thaumasite in specimen A2 (Figs. 4 and 5).

The highest durability determined in the 10-year tap water treated A2 specimen seems to contradict the crumbling of the  $\text{MgSO}_4$  treated A2 specimen. Despite the higher contents of calcium and carbonate ions in the tap water (208 mg/l), this phenomenon may be attributed to the more active ionic effects of magnesium and sulphate added to the solution. The sulphate in this context maintains the electroneutrality, due to the counterdiffused OH ions, consequently increasing the pH (33). Calcium, in turn, is most likely widely incorporated into the mineral structure, primarily for calcite formation, during the pH-controlled high alkaline curing process, consequently remaining inert throughout the 10-year period. The well crystallised and oriented rhombohedral calcite crystals of uniform shape with rare rounded vaterite (fine popcorn calcite) on quartz and cracked matrix surfaces in specimen B and D respectively, most likely indicate the long-period of curing under constant pH conditions (Figs. 6 and 9). The fine popcorn calcite along with the unstable vaterite may also be the cause for the low durability of the mixed specimens. The increased durability of specimen C to B and E to D, after treatment, is primarily due to the increased fineness of specimens C and E and the relevant fabric development (Table 5). As reported previous study of Binici [6] Blaine specific surface area is the most significant property causing interground specimens to have longer dormant periods (the period in which sulfates have no important effect) than their separately ground counterparts. Moreover, the higher durability in specimen C may be attributed to the re-oriented fabric due to the presence of the in-situ formed and closely packed/interlocked coarser aggregates of calcite with gypsum, CSH structures and bundles of thaumasite and/or ettringite fibers (Figs. 7 and 8). However, the increased durability of specimen E may be due to the frequently distributed aggregates of calcite, gypsum and CSH structures which also align on micro-topographic edges of the smooth/vitrified-like matrix surfaces as thick domains (Fig. 10).

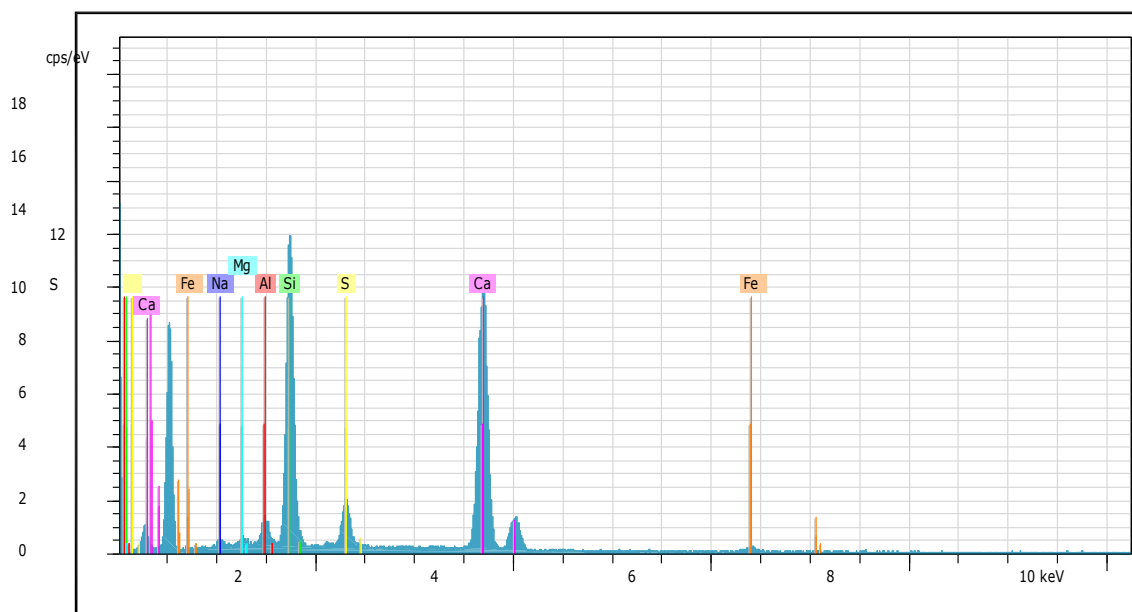
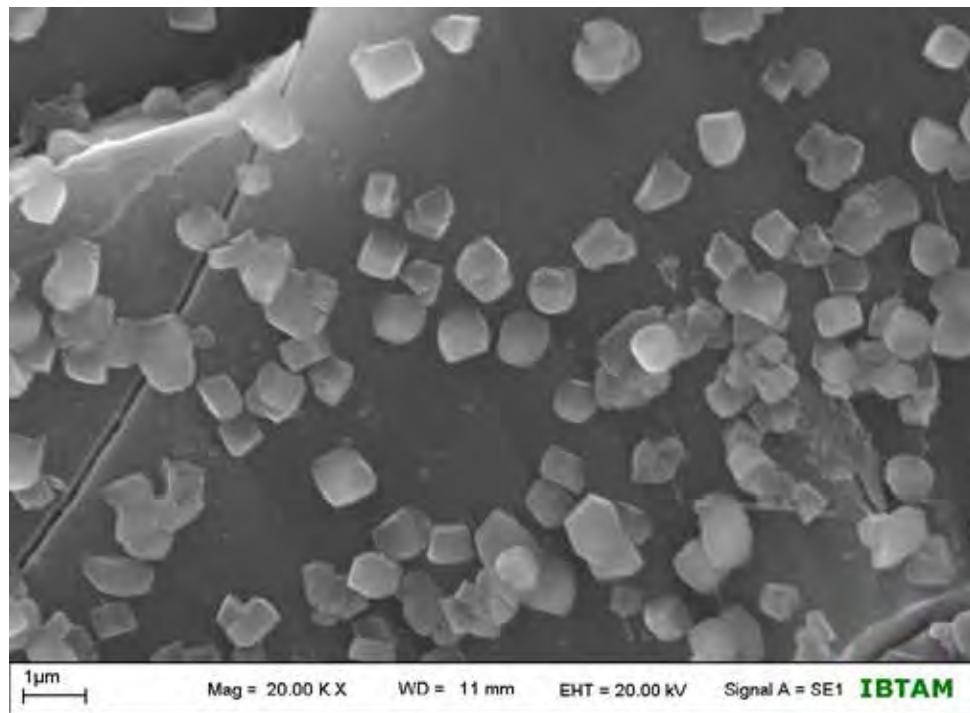




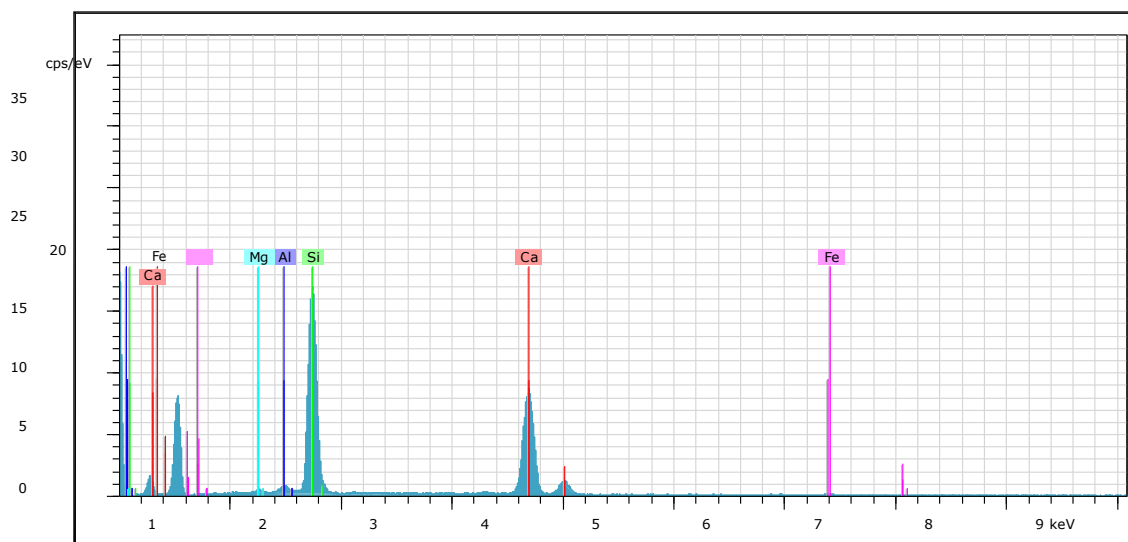
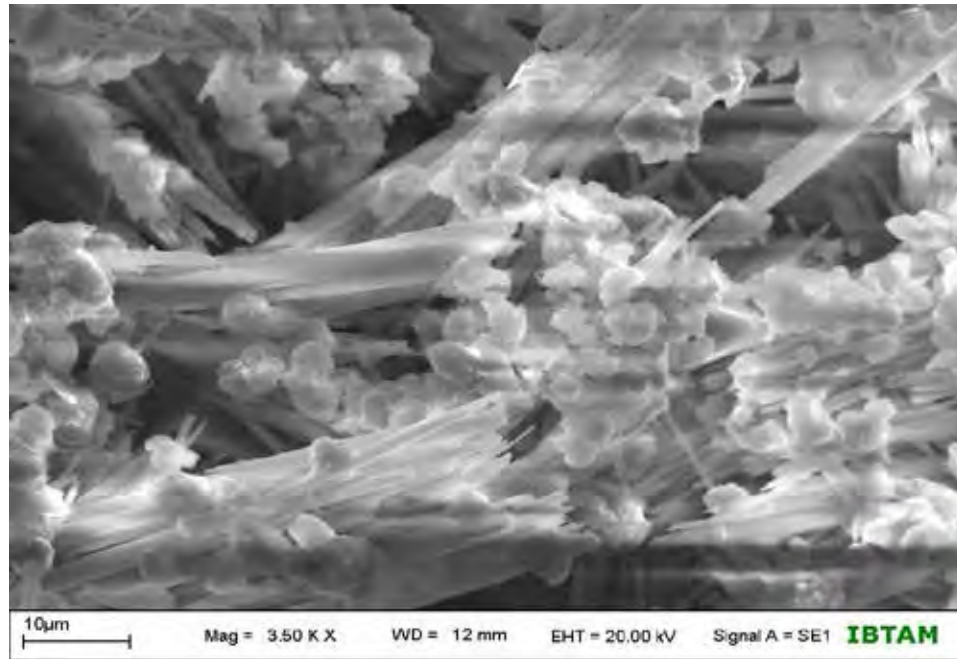
**Fig. 4. A1 control specimen cured in magnesium sulphate solution with bladed-radial acicular thaumasite crystals and CSH-gypsum-calcite aggregates in matrix (SEM) (a) and elemental contents by EDAX (b)**



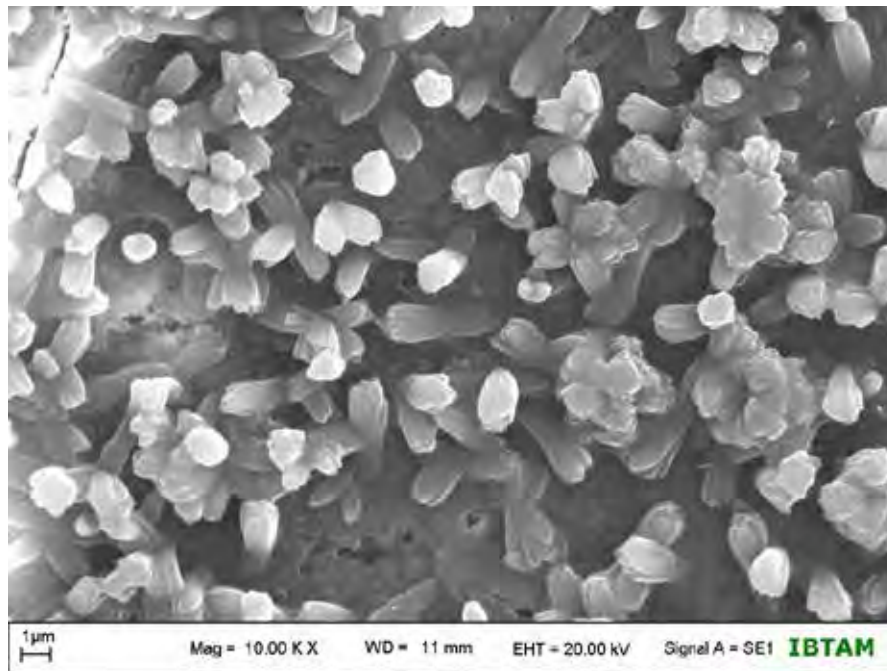
**Fig. 5. A2 control specimen cured in magnesium sulphate solution with tabular minerals (SEM) (a) and elemental contents by EDAX (b)**



**Fig. 6. Specimen B cured in magnesium sulphate solution with very fine 'pop corn' calcite and gypsum formed on quartz surface (SEM) (a) and elemental contents by EDAX (b)**



**Fig. 7. Specimen C cured in magnesium sulphate solution. Bundles of randomly oriented thaumasite/ettringite fibers are closely packed/interlocked with clusters/aggregates of calcite and CSH structures (SEM) (a) and elemental contents by EDAX (b)**



**Fig. 8. Individual closely packed/interlocked coarser aggregates of calcite with gypsum, C-S-H structures and bundles of thaumasite and/or ettringite fibers (specimen C)**

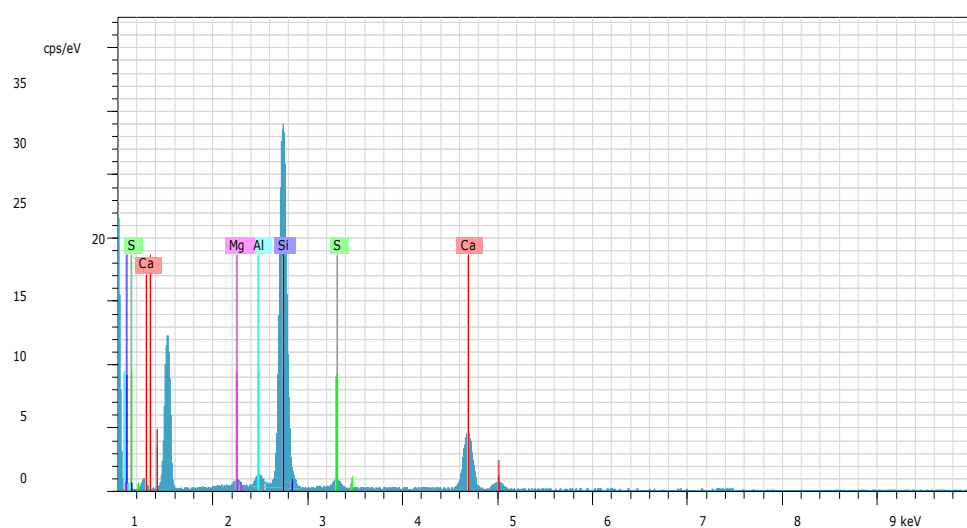
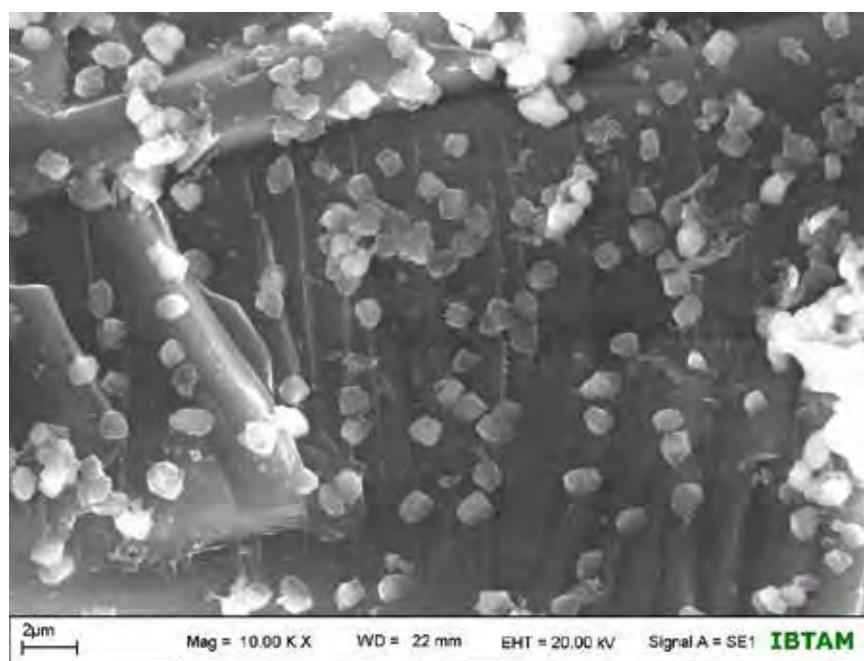
### 3.3.2 Polarised microscopy

The thin sections of the selected specimens cured in  $\text{MgSO}_4$  at room temperature conditions have revealed the presence of the CSH structures and the particular orientations of co-existing thaumasite and ettringite in the concrete blends. Yellowish domains of CSH structures, high first order bright yellow and low second order red to gray/blue thaumasite and grayish ettringite is frequent throughout the matrix of specimen A2 ( Fig 11 ). Specimen A2 also reveals the presence of the tabular grains of thaumasite and ettringite that are also lining/forming along quartz grains and sinuous cracks [30] (Fig. 12 ). The flyash spherules of specimen B are also surrounded by in-situ forming thaumasite, ettringite and popcorn calcite as haloes most likely decreasing the strength of the mix as stated by Sibbick et al. [24,30] (Fig. 13).

### 3.3.3 Mineralogy

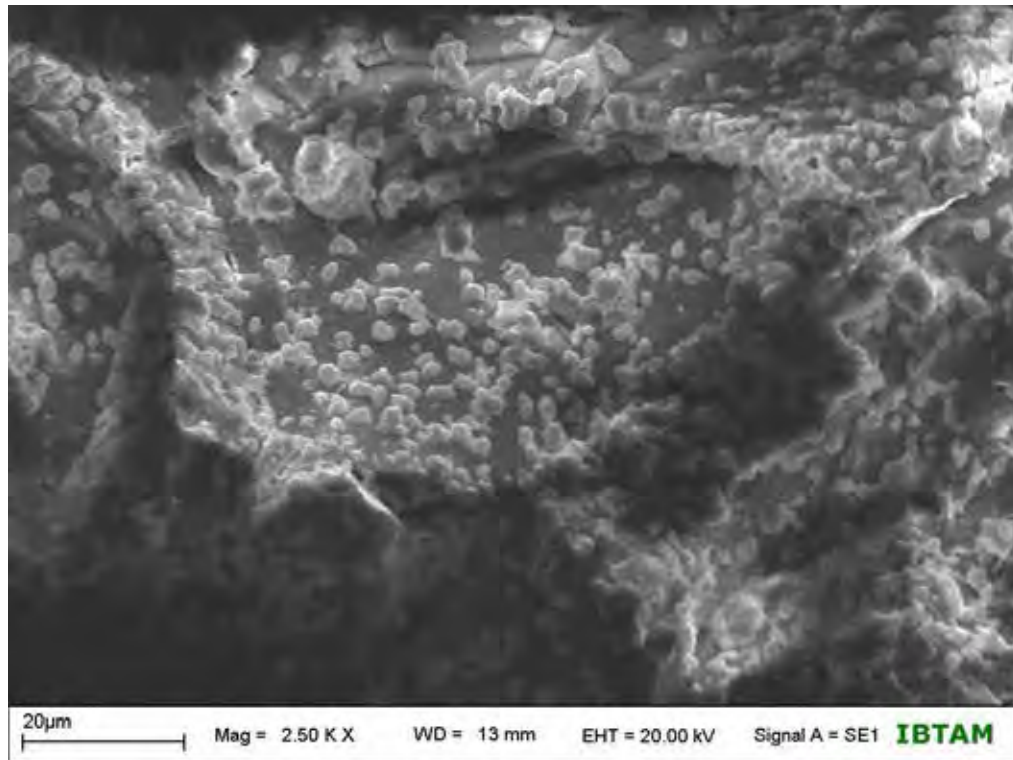
There is an increase in ettringite ( $3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{CaSO}_4 \cdot 31\text{H}_2\text{O}$ )/thaumasite ( $\text{CaSiO}_3 \cdot \text{CaCO}_3 \cdot \text{CaSO}_4 \cdot 15\text{H}_2\text{O}$ ) (9.8, 5.6 Angstrom-contemporaneous peaks), ettringite (5.2, 4.7, 3.6, Angstrom), calcite/ettringite (3.8, 3.0 Angstrom-overlapping peaks) and thaumasite (3.5, 3.4 Angstrom) in specimen B (Fig. 14) and especially more prominently in specimen E (Fig. 15) compared to the lower contents in other specimens. The presence of higher amounts of silica and calcium compared to lower

contents of alumina (Tables 5, 6 and Figs. 6, 7, 9 and 11) confirm the formation of thaumasite together with ettringite. Gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) (7.6 Angstrom) is also simultaneously transformed to ettringite and thaumasite during this process as a sequence of sulphate phase transformation especially in specimen E. The presence of portlandite ( $\text{Ca}(\text{OH})_2$ ) (4.9 Angstrom) in some specimens, as a mineral forming during the concrete curing process at low temperatures, may contain evidence of incomplete calcination during the concrete production or incomplete hydration on-going before and/or during the curing process.



**Fig. 9. Specimen D cured in magnesium sulphate solution. Popcorn Calcite on fractured mineral surface (a) and elemental contents by EDAX (b)**



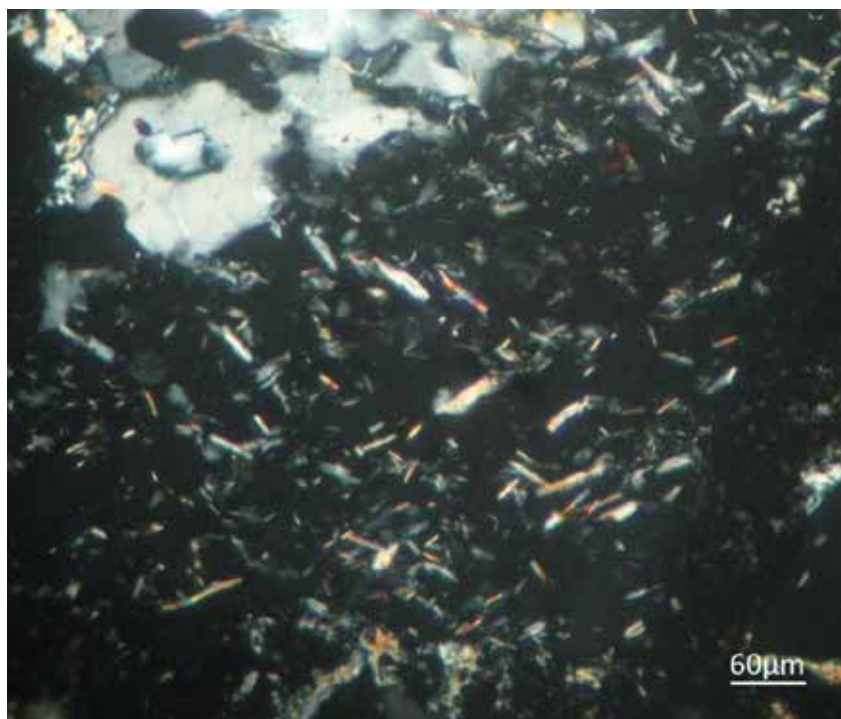


**Fig. 10. Specimen E cured in magnesium sulphate solution. Grains of popcorn calcite with aggregates and domains of calcite, gypsum and structures aligning or randomly oriented on fractured and smooth/vitrified-like surfaces (a and b)**

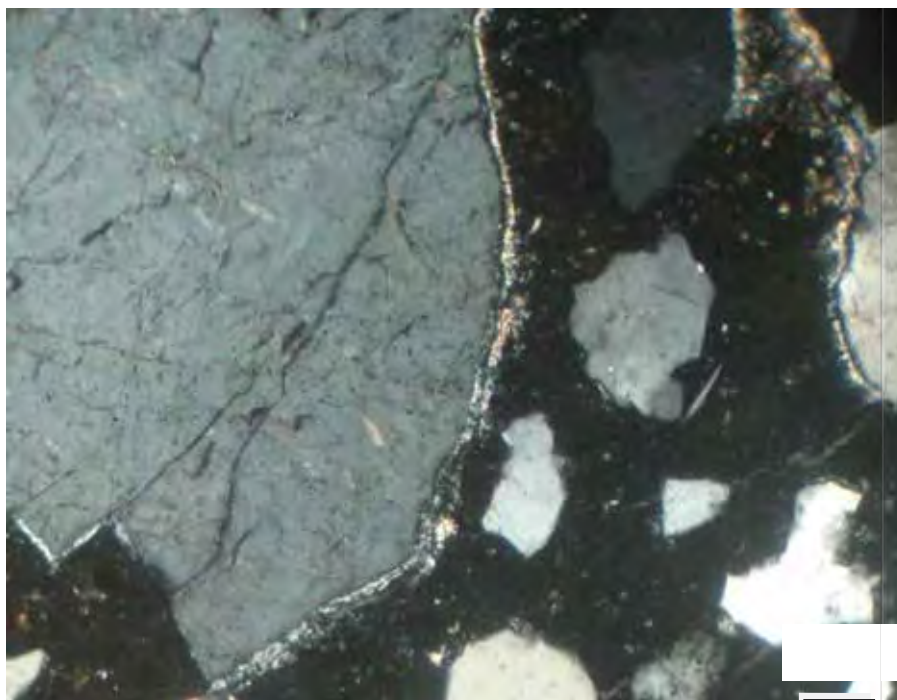
The co-existing peaks of ettringite (9.8 Å) and thaumasite (5.6 Å) after the 10-year curing indicates an on-going and incomplete process of concretisation, which is ultimately anticipated to reach an ettringite-free thaumasite content. The detection of some of the weak and occasionally overlapping peaks of vaterite (popcorn calcite-polymorph of calcite- $\text{CaCO}_3$ ) (3.55, 2.71, 2.10 Å) which readily alter to calcite may also be the indicators of the beginning of the last-stage reaction as the pH of the cement pore fluids drops from 13 to neutral [30].

All these manifest the on-going transformation of the CSH gels and  $\text{Ca}(\text{OH})_2$  (portlandite) to ettringite and ultimately to thaumasite. Anorthite ( $\text{CaAl}_2\text{Si}_2\text{O}_8$ ) (4.09 and 3.28 Å) in specimen E is most likely a secondary formation rather than a flyash ingredient. The absence of quartz may be due to its dissolution in specimen E during the uncontrollable pH process fluctuating between 8 to 13. This may have occurred during the curing process of specimen E that favoured the formation of the calcium and silica rich anorthite and subsequent formation of thaumasite. The vitrified-like surfaces observed by the SEM images of specimen E are most likely part of the quartz grains that resisted dissolution.





**Fig. 11.** Yellowish domains of CSH structures, tabular thaumasite (yellowish-red to grayish-blue) and ettringite (grayish) grains in matrix



**Fig. 12.** Domains of thaumasite and ettringite surrounding larger grains and forming along mineral cracks of quartz

**Table 5. Major chemical components of samples after detereoration**

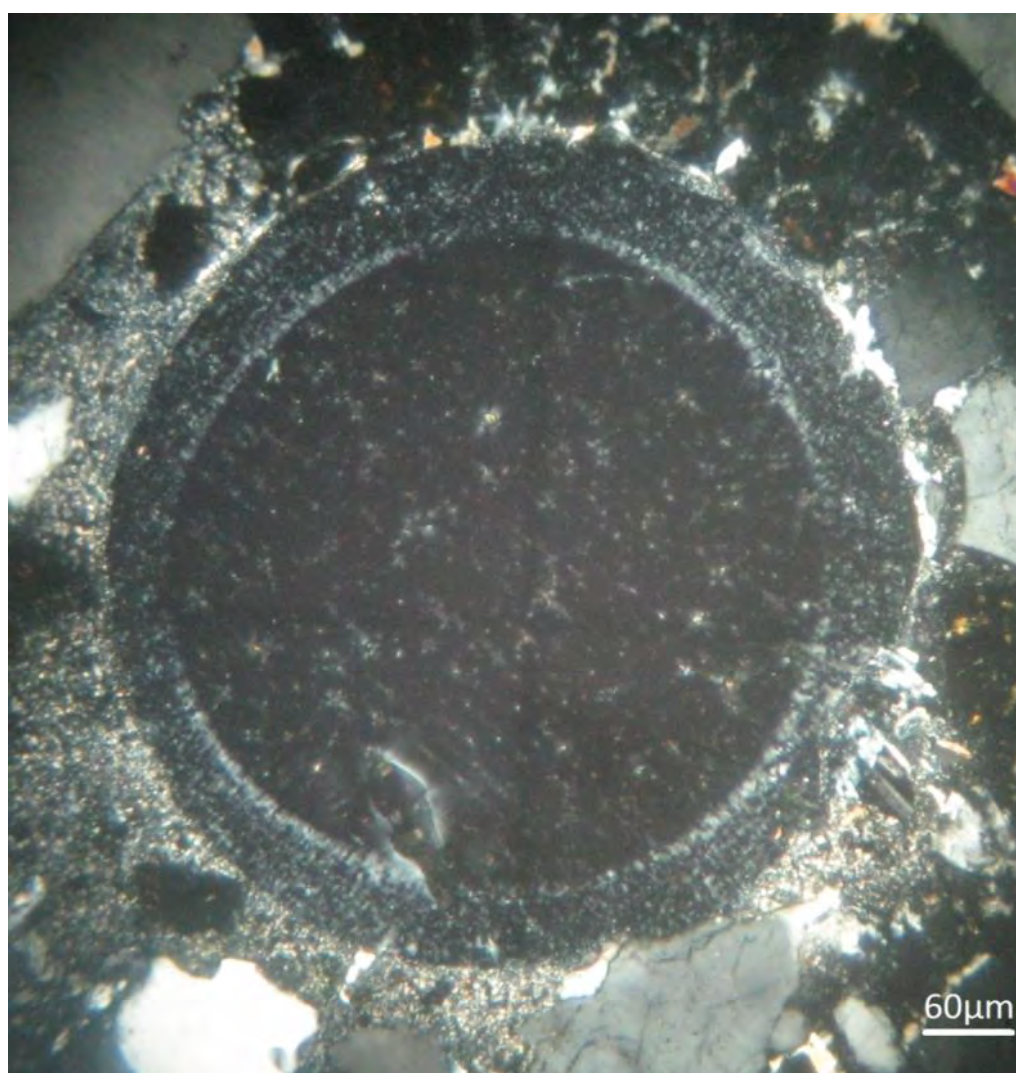
Sample	Element	Wt %	Atm %	Error
A1	Na	0.40	0.50	0.0
	Mg	0.26	0.31	0.0
	Al	1.13	1.18	0.1
	Si	94.57	95.21	1.7
	S	1.36	1.20	0.1
	Ca	2.28	1.61	0.1
A2	Mg	1.26	1.60	0.1
	Al	2.26	2.59	0.1
	Si	63.53	69.86	1.2
	S	2.86	2.76	0.1
	Ca	30.09	23.19	0.4
B	Na	0.92	1.41	0.1
	Mg	0.97	1.41	0.1
	Al	2.33	3.05	0.1
	Si	26.06	32.86	0.6
	S	2.28	2.52	0.1
	Ca	64.03	56.58	1.0
	Fe	3.42	2.17	0.1
C	Na	0.58	0.84	0.1
	Mg	1.41	1.94	0.1
	Al	1.90	2.35	0.1
	Si	42.75	50.94	1.0
	Ca	50.67	42.31	0.8
	Fe	2.69	1.61	0.1
D	Na	1.50	2.26	0.1
	Mg	1.03	1.46	0.1
	Al	2.99	3.83	0.1
	Si	27.77	34.18	0.7
	S	6.84	7.37	0.2
	Ca	56.76	48.97	1.0
	Fe	3.11	1.93	0.1
E	Mg	0.39	0.56	0.0
	Al	1.15	1.46	0.1
	Si	38.38	46.97	0.9
	Ca	57.91	49.67	0.9
	Fe	2.18	1.34	0.1

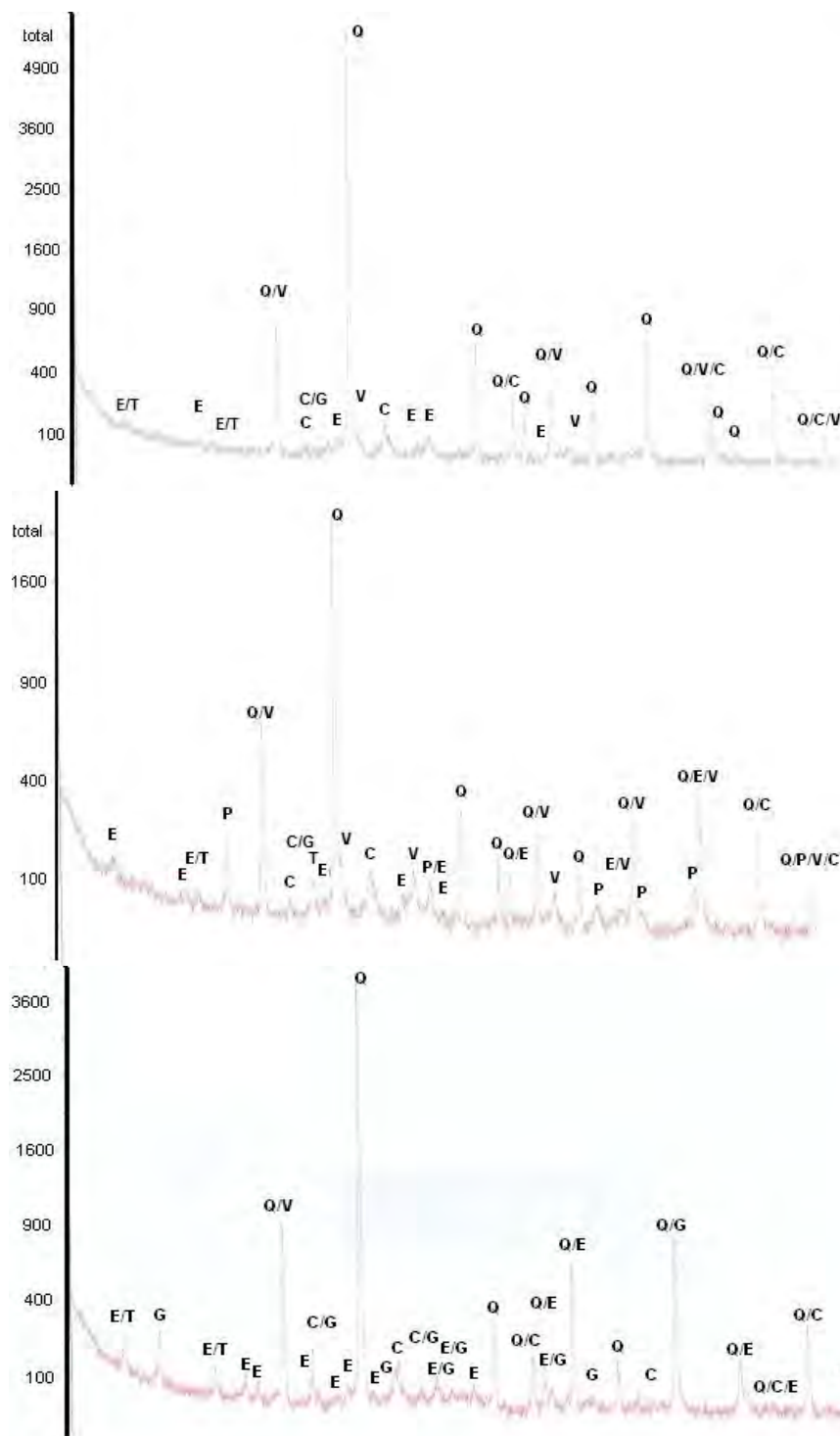
**Table 6. Total elemental contents of specimen E (XRF)**

Components	(%)	Error (%)
SiO <sub>2</sub>	48.0780	0.1
CaO	28.1820	0.05
Al <sub>2</sub> O <sub>3</sub>	4.2417	0.02
SO <sub>3</sub>	3.2994	0.02
Fe <sub>2</sub> O <sub>3</sub>	3.0571	0.02
MgO	1.5575	0.008
TiO <sub>2</sub>	0.3683	0.007

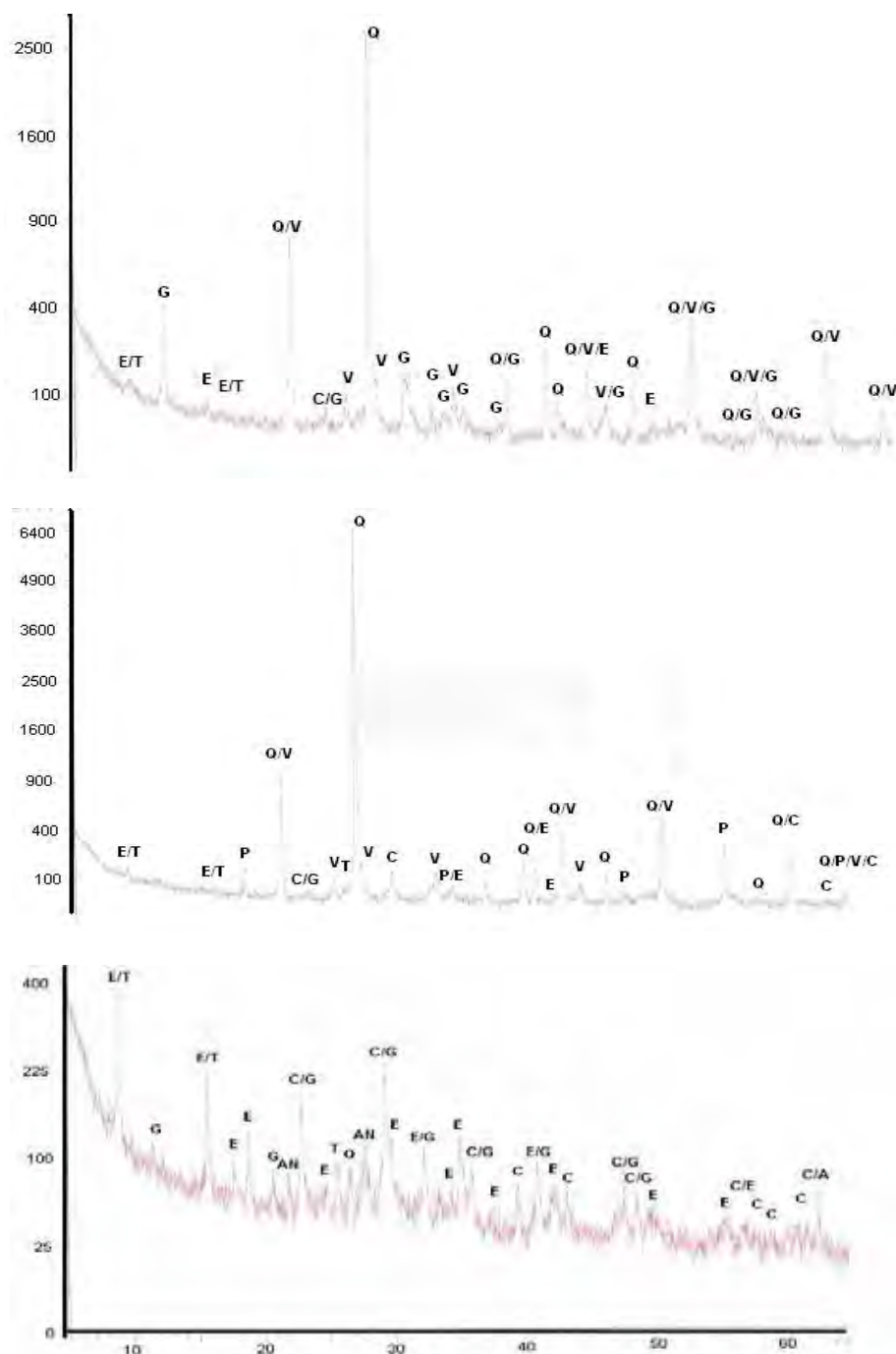
**Table 6 continued.....**

Cl	0.3141	0.006
MnO	0.2031	0.004
Cr <sub>2</sub> O <sub>3</sub>	0.1664	0.004
K <sub>2</sub> O	0.1495	0.002
P <sub>2</sub> O <sub>5</sub>	0,0945	0.002
Na <sub>2</sub> O	0.0863	0.003
SrO	0.0559	0.001
NiO	0.0165	0.001
ZrO <sub>2</sub>	0.0126	0.001
ZnO	0.0098	0.001
CuO	0.0074	0.001
L.I	10.1	0.0001

**Fig. 13. Thaumasite, ettringite and popcorn calcite surrounding fly ash spherules**



**Fig. 14. X-ray diffractograms of the cured specimens (Specimens A1, A2, and B) (A: Anorthite; C: Calcite; E: Ettringite; G: Gypsum; P: Portlandite; T: Thaumassite; Q: Quartz; V: Vaterite)**



**Fig. 15. X-ray diffractograms of the cured specimens (Specimens C, D, and E)**  
 (A: Anorthite; C: Calcite; E: Ettringite; G: Gypsum; P: Portlandite; T: Thaumasite;  
 Q: Quartz; V: Vaterite)

#### 4. CONCLUSION

The study revealed that the,

1. The higher pressure resistance of the C and E specimens compared to the B and D was most likely due to higher CSH gel/aggregate formation together with the co-existing interlocked thaumasite and ettringite crystals.



2. The interground specimen resistance was higher than the separate ground blends, most likely due to the fineness of the material. But the lower resistance of D than E was most probably due to the abundant popcorn calcite distribution and the cracks developed in the former.

3. The use of the ground granulated blast furnace slag and basaltic pumice improved the sulphate resistance of the cement mortars, where specimen E yielded the highest sulphate resistance-highest TSA resistance.

4. The microstructure was modified with the addition of pozzolans. The effect of this was a reduced rate of leaching of the alkali hydroxide from the pore fluid but did not prevent expansion.

5. Despite the numerous studies conducted on the relation of hydration and hydrolysis with reference to cement hardening, the hydration-bound hardening phenomenon coupled with thaumasite morphology and matrix and/or pore space orientations are in need of further investigation. Nevertheless, the presence of thaumasite together with ettringite and portlandite in some specimens reflect the incomplete transformation phase to hydration, i.e., the anticipated complete transformation of ettringite to thaumasite [18-23] and may indicate the continuity of the TSA process in concrete.

### **ACKNOWLEDGEMENTS**

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### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## ***Determination of the seismic load acting on the seismic isolated building***

**Abstract:** This article discusses the definition of seismic load on the seismic isolated building. The technique for calculating a building in accordance with SNIP II-7-81\*.

**Keywords:** system of seismic isolation, seismic load.

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## ***Определение сейсмической нагрузки, действующей на сейсмоизолированное здание***

**Аннотация:** В данной статье рассматривается определение сейсмической нагрузки на сейсмоизолированное здание. Приводится методика расчета здания в соответствии с СНИП II-7-81\*.

**Ключевые слова:** системы сейсмоизоляции, сейсмическая нагрузка.

Проблемы обеспечения сейсмостойкости сооружений актуальны и практически значимы. Эффективным способом повышения уровня сейсмостойкости сооружения является их сейсмоизоляция. Широкое распространение в России получила система сейсмоизоляции в виде резинометаллических опор. Но в виду отсутствия нормативной документации по расчету и проектированию данной системы применять ее можно только при достаточном расчетном

обосновании и математическом моделировании с помощью современных программных комплексов.

Для сооружения, расположенного на сейсмоизолирующих опорах принцип суперпозиции нагрузок неприменим, что делает невозможным прямое применение СНиП II-7-81\*. Если в некоторых случаях характеристики сейсмоизоляторов все же удастся линеаризовать, то период  $T$  основного тона собственных колебаний сооружения оказывается больше  $2\div 3$  с. Согласно СНиП II-7-81\*, значения спектра отклика ускорений для  $T \geq 2$  с принимаются постоянными  $\beta=0,8$ . Таким образом, установить реальный эффект сейсмоизоляции с помощью нормативных спектров не удастся. Поэтому анализ эффективности систем сейсмоизоляции проводят, выполняя так называемый прямой динамический расчет, т.е. пошаговое интегрирование нелинейной системы «сооружение - ССИ».

В предлагаемой методике расчета в качестве исходного воздействия на сейсмоизолированное здание задаются параметры, полученные при обработке законов движения фундамента здания. Параметры движения фундамента может быть определены с помощью программ, учитывающих нелинейности в ССИ, таких как ING+ [1]. Анализ напряженно-деформированного состояния при этом не проводится.

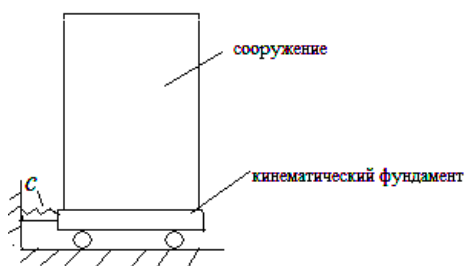


Рис. 1. Общий вид сейсмоизолированного здания

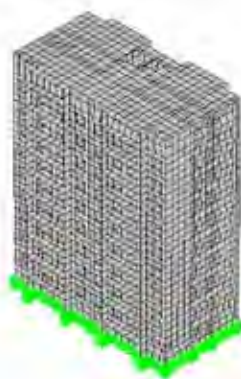


Рис. 2. Конечноэлементная модель здания

Для перехода от закона движения фундамента (назовем его кинематическим фундаментом КФ) к нагрузкам на здание используется идея поэтажных спектров, т.е. исходя из параметров движения КФ, определяются эквивалентные статические нагрузки, а потом проводится прочностной расчет.

Таким образом, методика предполагает следующий порядок расчета:

1) выполняется прямой динамический расчет системы «сооружение – ССИ». Расчет производится для представительной выборки воздействий, сгруппированных по балльности. В результате расчета находятся законы движения КФ сооружения;

2) для каждого закона движения КФ находится нормированный спектр отклика ускорений на MathCAD;

3) производится статистическая обработка спектров отклика и максимальных (по времени) значений абсолютных ускорений КФ. В результате обработки находятся:

а) усредненный спектр отклика ускорений;

б) средние значения абсолютных ускорений КФ (Акфмах), соответствующие различным балльностям землетрясений (при статистической обработке спектр отклика находится как оценка математических ожиданий плюс оценка стандартного отклонения, а пиковые значения ускорений КФ (Акфмах) как оценка математических ожиданий);

4) указанные средние значения используются как исходные данные для расчета сейсмоизолированного здания в соответствии с рекомендациями СНиП II-7-81\*.

В качестве примера применения этой методики приведен расчет девятиэтажного панельного здания, расположенного на резинометаллических опорах. Вес здания 6000 т, здание расположено на 37 резинометаллических опорах, каждая грузоподъемностью 280 т. В качестве исходных данных для проведения динамических расчетов были использованы акселерограммы Холистера, Броули, Кишиневского, Спитакского, Ташкентского, Карпатского землетрясения, а также акселерограммы исследовательского центра в Калифорнии (Эль Центро), захватывающие высоко-, средне- и низкочастотные составляющие. Ускорения грунта были разбиты на три группы, соответствующие интенсивности землетрясений 7, 8 и 9 баллов. Каждая группа воздействий состояла из 10 акселерограмм.

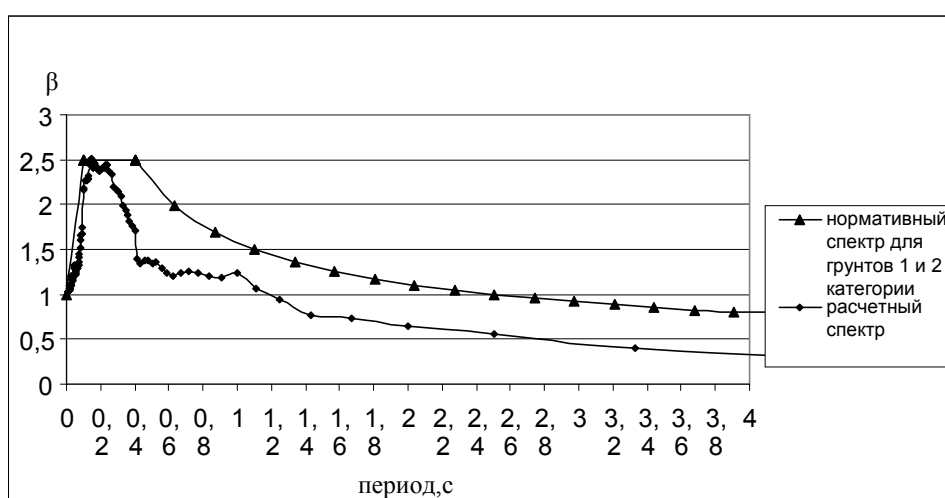
Для каждой акселерограммы был построен нормированный спектр отклика ускорений на MathCAD. Использовалась обычная процедура построения спектров ускорений. Спектры ускорений находились при значении относительного затухания  $\zeta=0,05$ .

Спектральный коэффициент динамичности находился по формуле:

$$\beta = \frac{\ddot{x}_a(f)}{\max_t |\ddot{X}_0(t)|}$$

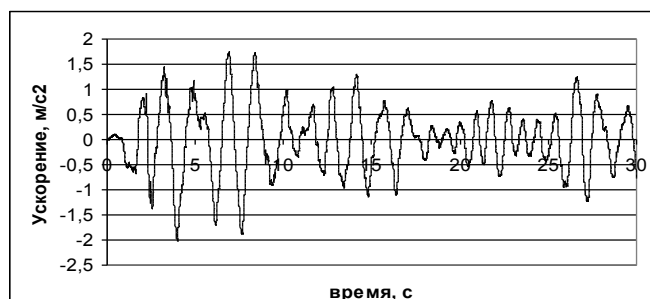
После того, как были получены спектры отклика для всех акселерограмм, была произведена их статистическая обработка.

Сравнение спектра, полученного после статистической обработки, с нормативными [2] показано на рис. 3. Полученные результаты показывают, что выбранные акселерограммы, имеют такой же характер, как нормативный спектр отклика. Поэтому ансамбль внешних воздействий можно считать представительным.



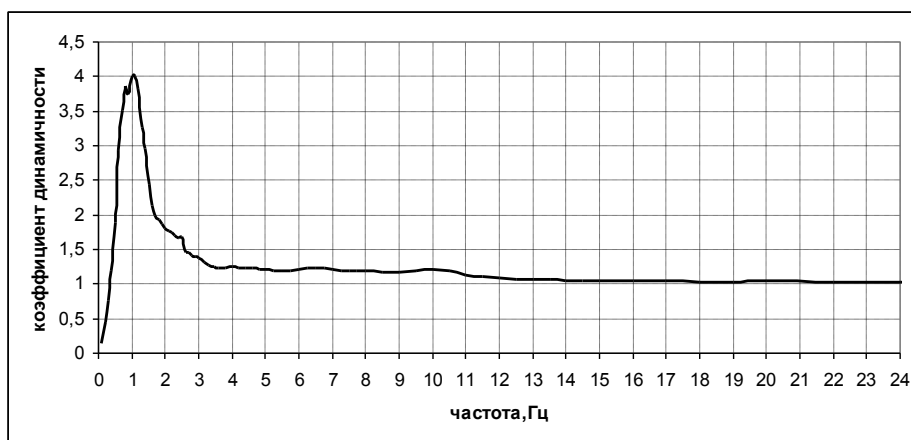
**Рис. 3. Сравнение полученного спектра с нормативными**

Каждая акселерограмма, описывающая ускорение грунта, подавалась на вход математической модели «сооружение – ССИ». Расчет проводился с помощью ПК «MicroFe» (опция «нелинейный анализ»). Из полученных решений были установлены законы движения КФ здания.



**Рис. 4. Ускорение в КФ при 9 бальном воздействии (максимальное ускорение грунта 3,6 м/с²)**

Следующим этапом расчета было определение спектров отклика, соответствующих абсолютным ускорениям КФ. Результаты статистической обработки этих спектров показан на рис. 5.



**Рис. 5. Усредненный спектр отклика, соответствующий движению КФ**

Статистическая обработка абсолютных значений ускорений в кинематическом фундаменте Акфмах приведена в таблице 1.

**Таблица 1.**

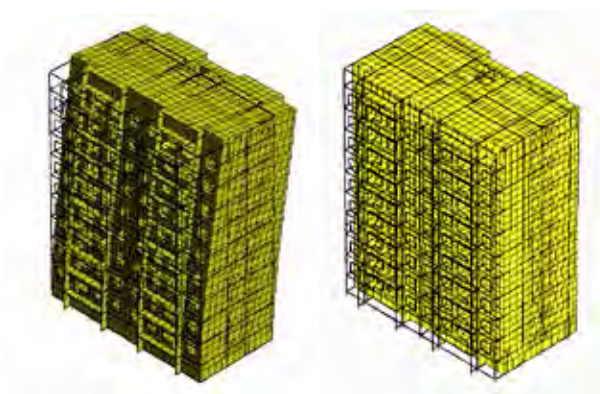
А (в долях g)			
Балльность	7	8	9
КФ	0,08	0,11	0,23
СНиП	0,1	0,2	0,4

**Таблица 2.**

№ формы	1	2	3	4	5	6	7	8	9	10
Частота, Гц	3,84	5,126	6,343	14,65	15,24	16,25	19,31	22,47	23,56	23,84
Период, с	0,26	0,195	0,157	0,068	0,065	0,061	0,052	0,044	0,042	0,042



Если считать, что внешними воздействиями на здание являются движения КФ, то в соответствии СНиП II-7-81\*, для расчета сейсмостойкости нужно определить частоты здания, считая его жесткозащемленным в КФ. Эти частоты, определенные с помощью ПК «MicroFe» даны в таблице 2.



**Рис. 6. Первые формы колебаний жесткозащемленного и здания с системой сейсмоизоляции**

Эффект ССИ виден из таблицы 3, в которой для разных собственных частот приведены произведения  $\beta \cdot A$ , определяющие уровень эквивалентной статической нагрузки для каждой собственной формы.

**Таблица 3.**

№формы	1	2	3	4	5	6	7	8	9	10
$\beta_i \cdot A_{\text{снп}}$	1	1	1	0.809	0.793	0.769	0.708	0.664	0.654	0.6518
$\beta_i \cdot A_{\text{кф}}$	0.279	0.279	0.279	0.238	0.237	0.237	0.243	0.233	0.227	0.227

В рассматриваемом случае сейсмоизоляция снизила сейсмические нагрузки по всем формам более чем в 3 раза.

Предлагаемая методика позволяет: уменьшить объем выходной информации и упростить анализ результатов расчета по сравнению с прямым динамическим расчетом.

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## ***Formulation of recipe and technology of the bread with use of untraditional raw materials***

**Abstract:** The recipe and technology of the bread with use of untraditional raw materials are represented in this article. Properties of the buckwheat flour and activated carbon are revealed here. Composition of the formulated samples of bread and also its organoleptic and physico-chemical properties are shown in the article.

**Keywords:** activated carbon, buckwheat flour, bread, bakery products, recipe.

Since olden times bread was a basis of food for mankind, and nowadays people eat bakery products from one third of daily food norm.

Bread is one of the most important food products, since it has high energetic value, great nutrient contest and good digestibility. It is nice for taste, and much cheaper than most other products. This sort of the bread can preserve its food qualities for a long time in case of definite requirements of storage [8].

The aim of the study is formulation of bakery products "Ember", based on the wheat flour of extra class and buckwheat flour with biologically active additives of activated carbon.

Flour made of buckwheat grain is rich in vegetable protein, which contains the most useful amino acids, necessary for an organism. Besides, buckwheat flour has a lot of vegetable fiber and a little fats. Among the most useful substances in the buckwheat flour, it is worth marking magnesium, zinc, iron, potassium, rutin, natural antioxidants, vitamin E and vitamins or group B as well. Buckwheat flour is very important and essential product for those people, who keep balanced and healthy nutrition [6].

Activated carbon is long ago verified means of absorption the harmful substances which enter our organism with food and drinks together [7].

In standard recipe or bakery products there are no such ingredients as buckwheat flour and activated carbon, however, given ingredients are useful and harmless.

The composition of the formulated bread "Ember" is presented in table 1.

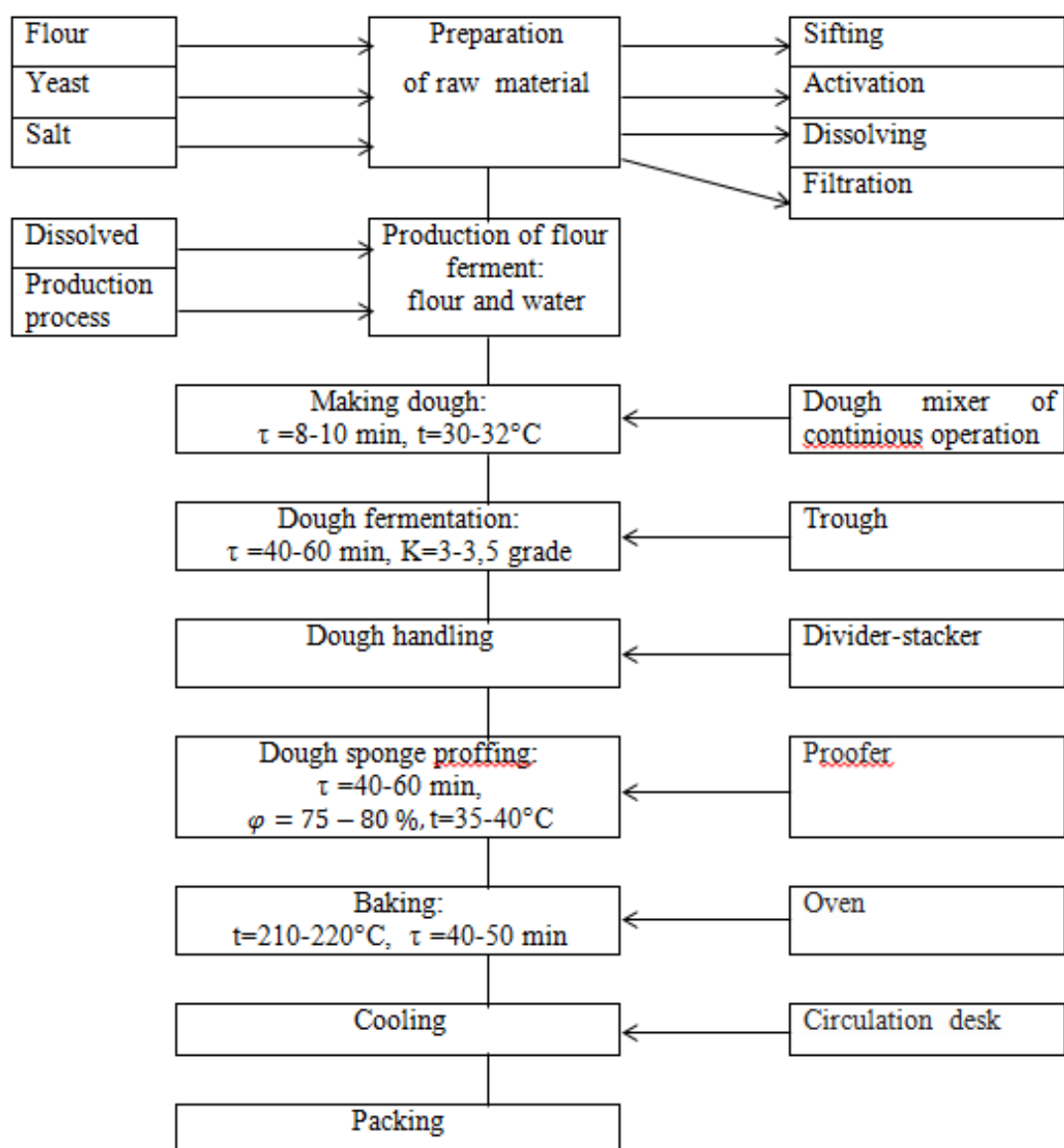
**Table 1. Composition of the bread "Ember" depending on the recipe**

Ingredients	Norm of the bread in variants of the recipes,%		
	№ 1	№ 2	№ 3
Water	2,5	2,5	2,5
Buckwheat flour	40	30	-
Wheat flour of extra class	50	40	60
Vegetable oil	2	2	2
Yeast	2,5	2,5	2,5
Salt	1,5	1,5	1,5
Sugar	1,5	1,5	1,5
Activated carbon	-	20	30
IN TOTAL	100	100	100

Bread "Ember" was cooked with use of untraditional raw materials. Scheme of the bread production is presented in figure 1.

Buckwheat flour has a great amount of carbohydrates, almost all vitamins of group B and all necessary amino acids. Using it in the production provides the bread with dietary properties. In addition, buckwheat flour possesses of medical properties: it promotes proper work of the liver, helps to remove toxins, gives positive influence on the vascular system and also helps to solve a delicate problem of constipation [9].

Activated carbon is widely used in cases of poisoning, infectious and diseases with fermentation in the intestine. Its use in the production gives the bread treatment-and-prophylactic properties [7].



**Figure 1. Scheme of bread production**

Complex of organoleptic and physico–chemical parameters was studied in this sample of the bread.

**Table 2. Organoleptic parameters of the bread "Ember"**

Parameters	Characteristics of bread "Ember" depending on the recipe		
	№ 1	№ 2	№ 3
Shape	Rectangular top of the bread rounded	Rectangular top of the bread rounded	Rectangular top of the bread rounded
Surface	With no damage, burnt crust is not allowed	With no damage, burnt crust is not allowed	With no damage, burnt crust is not allowed
Color	Light brown	From light grey to dark grey	From light grey to dark grey

Condition of the crumb	Baked, not wet to the touch, no traces of undermixed dough, quickly restored the shape	Baked, not wet to the touch, no traces of undermixed dough, quickly restored the shape	Baked, not wet to the touch, no traces of undermixed dough, quickly restored the shape
Taste	Slight taste of cooked buckwheat	Slight taste of buckwheat and activated carbon	Slight taste of activated carbon
Smell	Cooked buckwheat	Cooked buckwheat	Typical for given product

Organoleptic parameters of the bread "Ember" are given in the table 2, physico–chemical parameters in the table 3.

**Table 3. Physico–chemical parameters of bread "Ember"**

Parameters	Characteristics of bread "Ember", depending on the recipe, %		
	№ 1	№ 2	№ 3
Humidity of the crumb	44,5	43,0	38,0
Acidity of the crumb	3,7	4,0	4,3
Porosity of the crumb	58,0	59,0	60,0
Mass fraction of soybean	0,3	0,5	0,6
Mass fraction of sugar	0,3	0,5	0,6

Samples № 1, № 2 and № 3 differ significantly from each other. Sample № 2 has a light grey shade, a pleasant light taste and aroma of cooked buckwheat, that explains the presence of the buckwheat flour and activated carbon in this recipe in moderation. Thus, sample № 2 is mostly acceptable for eating.

Dynamics of its resistance and stability during storage on organoleptic indicators was studied to determine the shelf life of the selected sample. Microbiological characteristics didn't differ significantly from ones, given in the table 2 during two days at a temperature 7 (+2) °C. Throughout the shelf life of it, organoleptic parameters remained at the initial level.

Thus, we have formulated a new sort of bakery products with use of buckwheat flour and activated carbon. Bread "Ember" can be recommended for use in the nourishment for different groups of population.

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## ***Forecasting aspects of resourceability of dangerous industrial objects***

**Abstract:** Article is devoted to approaches for resourceability management of the dangerous industrial objects, which indicators have to be high quality of estimation and forecasting. Scientific problems were formulated for resourceability estimation of the dangerous industrial objects, determining management components of the dangerous industrial objects were considered and formulated.

**Keywords:** management of a resourceability, forecasting, hereditary refusals, Farmer's chart, risk.

Dangerous industrial objects (DIO) as well as other ecological, power and transport complexes is the objects of critical application. It means that the interconnected sequence of damages at the stages of production and operation can lead to the accidents mostly having the character of disaster. The analysis of different accidents and critical situations on objects of critical application shows [1] that they have the system reasons which in general can be formulated as insufficient quality of

culture of their safety which major defining factor is their reliability. One of important complex technical response of reliability is the resourcing (RC) which indicators must have high quality of estimation and forecasting [1]. Relevance of quality standard of the RC real level of the objects of critical application, which are the subject of the processes of aging, fatigue, break, deformation, erosion, corrosion, etc., during their use, is characterized by a large number of DIO. Such DIO has depletion of recourse similar to established by the project. Thus, problems of estimation of DIO RC are formulated as follows [2]:

- unpredictability of the actual resource of operation of concrete DIO;
- the theory of estimation and forecasting of RC at uncertainty of operational data of DIO isn't developed;
- models of an assessment of influence of indicators of RC on degree of risk of critical situations of DIO aren't developed;
- the problem of individual forecasting of DIO RC isn't solved.

It is known [1] that in the design of the plants the most interesting is the application of:

- an expert evaluation method of indicators of resourcing which considers the need of infological modeling and the influence of competence of the experts;
- an evaluation method of competence of the experts based on use of competences as indistinct discrete quantity;
- the methodology of risk assessment at control of indicators of RC of sophisticated DIO.

As can be seen from the above, it can be assumed that management of resourcing of DIO is defined, first of all, by the following components:

- ensuring scientific and technical validity of the made decisions on the basis of improvement of technology of resource design;
- application of infological model for estimation of RC DIO;
- expert estimation and forecasting of prenegative (predefective) and limit conditions of DIO;
- further development of the Farmer's diagram for improvement of quality of estimation of risks at control of resourcing of DIO.

Let's consider four specified components of management of DIO resourcing.

1. Improvement of technology of DIO resource design consists in performing of the correcting actions which content of works is as follows:

- research and specification of service conditions of the projected DIO by means of imitating and physical modeling of estimation processes and forecasting of RC indicators;

- research, technical justification and choice of the criteria of RC of the developed DIO, and also the standard and methodical ensuring their estimation and forecasting including the suggestions of prestart areas at positive and negative forecast;

- research of parametrical redundancy of DIO at the stage of its development for identification of emergence specification of prenegative (predefective) conditions and permanent unsoundness which development time is defined by methods of their estimation and forecasting;

- definition during the design of DIO of the chosen RC indicators for the purpose of their rationing and standardization in design technical documentation;

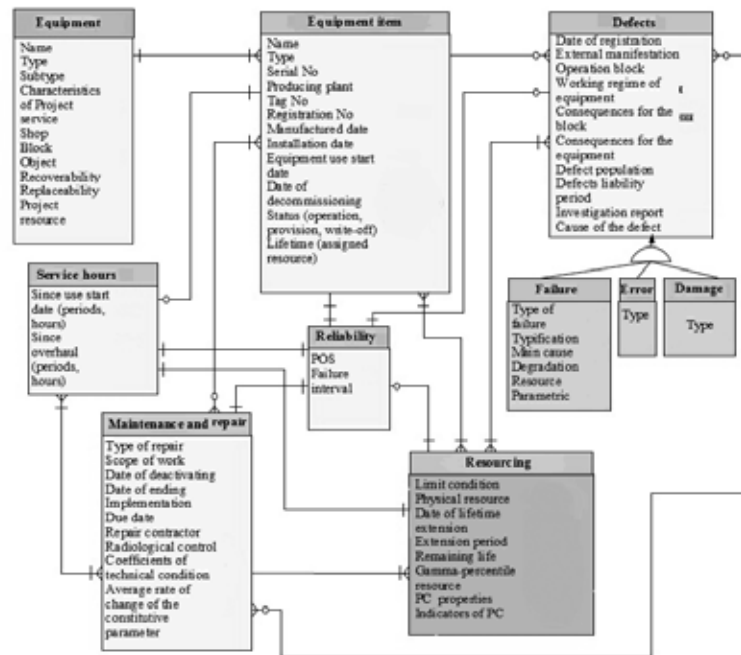
- using of the expert estimation, infological modeling, estimation methods of the limit conditions of DIO at all stages of its life cycle, and also obligatory estimation of risks in forming the technical inference about RC condition.

2. The estimation process of RC indicators has to include compilation of methods used at present and an assessment of their applicability; tests and control of natural ageing components and comparison of their results with the forecasting of RC indicators on the basis of the actual history of development, production and operation of DIO, i.e. heredity. Such assessment and effective modeling of aging mechanisms and degradation remains one of the most difficult points of certification of the equipment of the objects of critical application providing the expert assessment [1]. The analytical models and criteria used at present aren't sufficient for an assessment of RC indicators therefore development of additional evidence-based criteria, proofs and new methods using fuzzy models is expedient and necessary that is shown in work [1].

The using of infological modeling of subject field for estimation of DIO resourcing is shown in order to ensure the information sufficiency at making decisions about reassignment of DIO lifetime or its long-term (fig. 1).

The peculiarity of the developed infological model is application of the essence "resourcing" having obligatory and optional connection with the other entities at estimation of DIO reliability; definition of the superessence "defects" having the

subtype “reject” which set of attributes includes typification, and also its degrading, resource and parametrical nature.

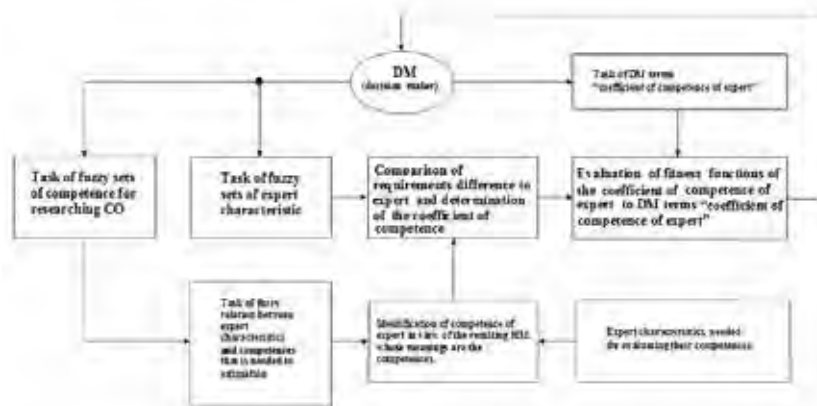


**Fig. 1. Infological model for estimation of DIO resourcing**

Creation of adequate infological model (fig. 1) promotes improvement of quality of the demanded information and can reduce the risks at making decisions about safety and long-term of DIO.

3. Considering the expert evaluation in the control of resourcing DIO it should be noted that the process of selecting experts is one of the hardest and most important. This is due to the fact that it is necessary to take into account the degree of competence of experts, quantitative characteristic of which is missing. In [1] it is shown that at the present time to ensure a sufficient level of quality expert evaluation is most effective application of the theory of fuzzy sets to develop a method which allows a quantitative assessment of the competence of the expert on the basis of its determination in the form of fuzzy discrete values, values which are the necessary competence of experts, and application of fuzzy relations benefits. In this case, it is determined that the competence of the expert is a discrete fuzzy value which values are the competencies required to assess the technical condition and indicators of resourcing of specific DIO and competence are properties, characteristics, abilities, expertise needed to perform effectively the duties of an expert in the relevant field of science and technology, in assessing the technical condition and indicators of

resourcing of specific DIO. This allows to implement the proposed approach as a way of assessing the competence of experts, the functional diagram of which is shown in Figure 2 [1].



**Fig. 2. A method for evaluating the competence of experts**

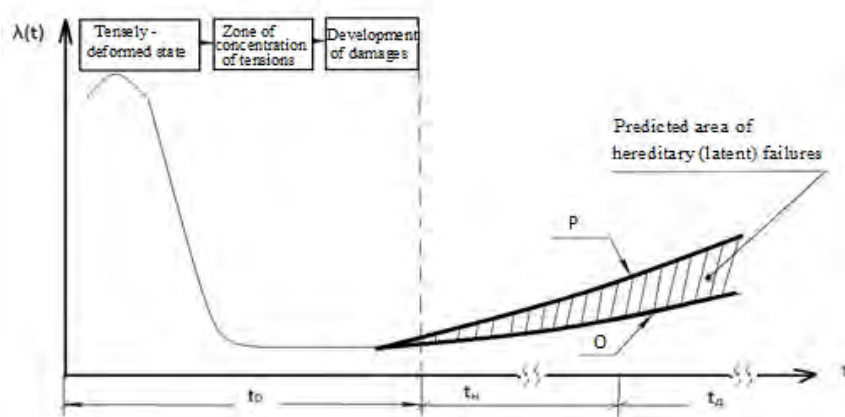
The developed method allows to increase a posteriori estimate of the quality of expert findings, due to the identification of the required level of competence for the formation of an expert group of established competence in the interval  $[0,1]$ ; formulate a group of experts of the same competence on the basis of fuzzy relation of a variety of the necessary characteristics and universum of competence; consider the risk in decision making through the use of coefficients of competence and maximin and maxi multiplicative composite profiles [1].

It should be noted that for the further development of the proposed approach, theory of hyper-random phenomena can be used, that allows to improve more effectively the methodology of evaluation of technical risks when monitoring indicators of resourcing, providing improving of the quality of decisions in an unpredictable variability of the DIO and statistical observation conditions [3].

In the study and control of resourcing of objects of critical application there is always a certain probability, with established requirements on the stage of development of the DIO to the verification process, skip the defect (failure). Therefore, it can be argued that after the construction, testing and recovery of DIO unidentified defects (cracks) may remain, which are characterized the residual defects, ultimately determined by the marginal and resourcing of specific investigational equipment [4].

In general, each failure (defect) is determined by the specific design or operational reasons laid down when it was created, meaning hereditary nature of

occurrence of any equipment unreliability, including DIO. It should be noted that the research questions of defects defined by hidden (latent) character of the processes, do not have very much attention both in Russian literature and foreign literature. Therefore, when evaluating the residual defects in the DIO, one should ensure not only high reliability of non-destructive testing, but also take effective measures to detect failures caused by heredity and the accumulation of reliability at different stages of the life cycle of the DIO using entropy criterion of degradation [4]. Therefore, it is possible to construct a predicted area of hereditary (latent) failures, considering their optimistic and pessimistic character (Fig. 3).



**Fig. 3. Graphic illustration of forecasting hereditary failures of DIO, Where  $t_p$  - the early stage of development of imperfectness, i.e. threw the predefective state;  $t_H$  the appointed resource;  $t_d$  – time, characterizing a limit state**

This approach allows us to improve the quality of evaluation of resourcing using a more precise definition and residual defects in the DIO, due to more complete review of limit conditions of specific test equipment.

4. The problem of estimating the risks associated with long-term safe operation of the DIO, and in particular the control of their resourcing, getting now particularly interest due to the fact that currently operated by man-made systems largely exhausted their resources and it requires an informed decision either for its reassignment for long-term operation, or decommissioning of such equipment. This problem also has significant social and economic sides, so the issues of risk assessment in the justification of the decision support are studied carefully. [1] In the nuclear power industry it has adopted the concept of safety assessment on the basis of risk, which is based on the knowledge of two arguments: the value of the damage

and the likelihood of the fact of accidents, failures and geometrically interpreted Farmer's diagram, which present the lines of equal level.

It should be noted [5] that one of the difficulties of building the space of risk is that the damage from the different events can be calculated in different units, often disparate. In this case, variables of damage and the probability of failure are considered independent. However, the known Farmer's curve describes nothing but as an experimental relationship between radiation dose as a result of the accident and the probability of an accident for US nuclear power plants. We can therefore assume that this dependence is a property of the system designed by man, and is not nature property of damages  $Z$  and probabilities  $P$ .

Taking into account these assumptions, as well as materials of work [6], for making decisions on risk management  $R$  when controlling resourcing DIO, the development of Farmer chart (Fig. 4) is proposed, which consists in the fact that if the  $P$  - axis enter  $P_{\Pi}$  - the probability of the risks associated with the design of the DIO,  $P_{\Theta}$  is the probability of the risks associated with the transition of the DIO in the limiting states area, we can distinguish:

- area of low risk level, where  $A$  is a specific area of risk;  $B$  is an area of risk arising from the operation;  $C$  is an area of risk associated with the transition of the DIO to the limiting states area;

- high level of risk area, where  $A^{\nabla}$  is a zone of risks associated with the presence of errors in the design;  $B^{\nabla}$  is a zone of risks associated with disturbances in the operation;  $C^{\nabla}$  is a zone of risks associated with errors in the estimation and forecasting of resourcing of DIO.

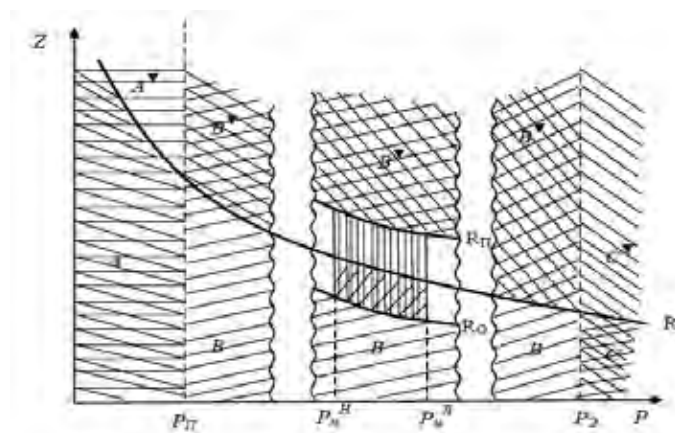


Fig. 4. Development Farmer's diagrams



Simultaneously, when monitoring of indicators of resourcing [6], one can select an area of uncertainty, with the help of curves of the equal level of risks with the optimistic  $R_O$  and pessimistic  $R_P$  forecast, as well as the probability  $P_M^H, P_M^B$  characterizing the lower and upper value of the interval estimation, respectively (Fig. 4).

As a result of this development of Farmer's diagrams it is shown the possibility [6] to improve the quality of evaluation and prediction of risk due to more accurate and reliable evaluation of uncertainty and sensitivity, which makes this approach more acceptable when making decisions about monitoring and sustainable long-term operation of the DIO.

### Abstracts

On the basis of the proposals and approaches it can be said:

1. Application of entropy criterion of degradation allows to predict the area of hereditary failure, which minimizes the prediction errors when management resourcing of DIO.
2. Development of Farmer's diagrams can improve the quality of management of resourcing of DIO that allows to make comparative analysis of the properties of risk in different assumptions about the dependence of the probability of adverse events failures and damages.

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## ***The effect of barberry berries on the shelf life of fish preserves***

**Abstract:** This article describes the use of vegetable raw materials to improve the quality of fish preserves, allowing to exclude from the formula preservative and to expand the range. And also presents the quality as-sessment of fish preserves on organoleptic, physico-chemical and microbiological indicators.

**Keywords:** fish preserves, vegetable raw materials, preservative, technology, quality of production.

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## ***Влияние ягод барбариса на сроки хранения рыбных пресервов***

**Аннотация:** В данной статье рассмотрена возможность использования растительного сырья для улучшения качества рыбных пресервов, позволяющего исключить из рецептуры консервант и расширить ассортимент. А также представлена оценка качества рыбных пресервов по органолептическим, физико-химическим и микробиологическим показателям.

**Ключевые слова:** рыбные пресервы, растительное сырье, консервант, технология, качество.

Продукты из рыбы и нерыбного водного сырья являются источником ряда необходимых человеку основных пищевых веществ: полноценного белка, липидов, углеводов, витаминов, в частности витаминов группы В, жирных кислот и минеральных элементов [1].

На современном этапе наблюдается заметный рост производства рыбной продукции, особенно пресервов из рыбы и нерыбного водного сырья, ассортимент которых достаточно разнообразен [2].

Рыбные пресервы относятся к скоропортящимся продуктам, ввиду того, что при производстве не подвергаются процессу стерилизации. Для продления сроков хранения, в состав рыбных пресервов включен консервант, чаще всего применяют бензоат натрия (Е211).

Консерванты на основе бензойной кислоты оказывают сильное угнетающее действие на дрожжи и плесневелые грибы, включая афлотоксинообразующие, некоторые бактерии (молочнокислые, уксуснокислые и БГКП), подавляют в микробных клетках активность ферментов, расщепляющих жиры и крахмал. Добавка Е211 разрешена для использования в пищевых продуктах на территории Российской Федерации. По степени воздействия на организм человека пищевой бензоат натрия в соответствии с ГОСТ 12.1.007 относится к веществам умеренно опасным – третьему классу опасности [3].

Ранее нами были проведены исследования по введению в рыбные пресервы препаратов из дикоросов с целью увеличения сроков хранения [4].

Целью данного исследования является исключение из рецептуры пресервов консерванта, путем замены его растительным сырьем, а именно ягодами барбариса (*Berberis vulgaris*).

Известно, что в ягодах барбариса высокое содержание витамина С, каротина, органических кислот, фенолкарбоновых кислот и флавоноидов [5].

Нами была разработана заливка для пресервов из сельди тихоокеанской с использованием ягод барбариса. Образцы выработаны на предприятии ООО «Рыбозавод Большекаменский». Для объективной оценки разработанные пресервы сравнивали с контрольным образцом - пресервами «Сельдь тихоокеанская кусочки "Матъе" в ассортименте», приготовленными по

традиционной рецептуре. Представлены два вида заливки: образец №1 – пресервы в барбарисовой заливке с добавлением ягод; образец №2 – пресервы в барбарисовой заливке без добавления ягод. Разработанные образцы рыбных пресервов исследовались по органолептическим, физико-химическим и микробиологическим показателям.

Изменения органолептических показателей в течение всего срока хранения незначительны.

Все образцы пресервов имеют рыбный вкус с умеренно выраженной степенью проявления добавок. Образцы под номерами один и два имеют высокую степень проявления кислоты, что свидетельствует о добавлении барбарисовой заливки. Контрольный образец под номером три имеет слабо-выраженную степень кислоты. В процессе хранения у всех образцов увеличилась степень солености, у образцов под номерами один и два увеличилась степень кислоты, и уменьшилась степень проявления добавки. Все образцы имеют приятный и ароматный запах. Запах заливки умеренно выражен у всех образцов пресервов. По истечении 90 суток у всех образцов наблюдается слабовыраженный запах окислившейся рыбы. Консистенция заливки всех образцов подвижная и маслянистая, не изменяющаяся в процессе хранения. Имеется расслоение, в виде неравномерности цвета, устраняющееся встряхиванием. Консистенция мяса нежная, сочная и мягковатая у образцов под номерами один и три. Образец под номером два имеет очень нежную, тающую и мягкую консистенцию мяса. По истечении 90 суток консистенция мяса всех образцов утратила первоначальную сочность и нежность. Образцы под номерами один и три приобрели недостаточно сочную и нежную консистенцию мяса. Цвет заливки и мяса образцов зависит от внесенной в них заливки.

Оценка физико-химических показателей разработанных образцов проводилась стандартными методами. Определение массовой доли поваренной соли производили в соответствии с ГОСТ 27207-87. Кислотность определяли в соответствии с ГОСТ 27082-89. Массовую долю жира определяли в соответствии с ГОСТ 26829-86 экстракционным методом в аппарате Сокслета. Определение буферности производили в соответствии с ГОСТ 19182-89. Результаты исследования и изменение физико-химических показателей образцов в зависимости от срока хранения представлены в таблице 1.

**Таблица 1. Физико-химические показатели качества пресервов**

Наименование образца	Массовая доля поваренной соли в мясе рыбы, %	Кислотность мяса рыбы (в пересчете на уксусную кислоту), %, не более	Массовая доля жира, %, не менее	Коэффициент буферности, градус, не более
	От 6,0 до 8,0	0,8	0,12	190
<b>Срок хранения 14 сут. (24.12.14)</b>				
Образец №1	4,0	0,38	16,0	180
Образец №2	4,3	0,32	18,0	180
Образец №3	4,6	0,25	16,5	180
<b>Срок хранения 90 сут. (10.03.15)</b>				
Образец №1	3,9	0,40	16,0	200
Образец №2	4,2	0,35	18,0	200
Образец №3	4,5	0,26	16,5	200

Как видно из таблицы 1, в процессе хранения все показатели остались в пределах нормы, исключение составила буферность. Коэффициент буферности равный 180 градусам показывает, что все образцы пресервов из тихоокеанской сельди полностью созрели за 14 суток. Данный показатель изменился в процессе хранения до 200 градусов, что говорит о перезревании и позволяет определить срок хранения равный 90 суток.

Из результатов исследования выявлено, что разработанные образцы по физико-химическим показателям соответствуют требованиям ГОСТ 7453-86. Пресервы из разделанной рыбы. Технические условия.

Результаты микробиологического исследования образцов пресервов, изготовленных из тихоокеанской сельди, представлены в таблице 2.

**Таблица 2. Микробиологические показатели качества пресервов**

Наименование образца	КМАФАнМ, КОЕ/г, не более	Плесени, КОЕ/г, не более	Дрожжи, КОЕ/г, не более	Масса продукта (г), в которой не допускается		
				БГКП (количественные формы)	S. aureus	Сульфитредуцирующие клостридии
	$2 \times 10^5$	10	100	0,01	1,0	0,01
<b>Срок хранения 14 сут. (24.12.14)</b>						
Образец №1	$5,4 \times 10^3$	2	$1,9 \times 10$	-	-	-
Образец №2	$6,9 \times 10^3$	1	$2,0 \times 10$	-	-	-
Образец №3	$4,3 \times 10^3$	1	$1,8 \times 10$	-	-	-

Срок хранения 90 сут. (10.03.15)						
Образец №1	$4,3 \times 10^3$	1	$4,1 \times 10$	-	-	-
Образец №2	$5,1 \times 10^3$	2	$3,8 \times 10$	-	-	-
Образец №3	$3,7 \times 10^3$	2	$4,4 \times 10$	-	-	-

Показатель КМАФАнМ показывает количество мезофильных аэробных и факультативно-анаэробных микроорганизмов. Допустимое значение данного показателя не должно превышать  $2 \times 10^5$  КОЕ/г. В процессе хранения показатель общей бактериальной обсемененности во всех образцах пресервов уменьшается, предположительно, что заливка с добавлением ягод барбариса отрицательно влияет на развитие микроорганизмов в пресервах при их хранении. Количество плесневых грибов в процессе хранения во всех образцах пресервов не превышает допустимую норму – 10 КОЕ/г. Количество дрожжей в процессе хранения во всех образцах пресервов увеличилось, но не превысило допустимого значения – 100 КОЕ/г. БГКП (колиформы), *Staphylococcus aureus* и сульфитредуцирующие клостридии в процессе хранения и созревания не были выявлены.

В результате микробиологического исследования выявлено, что все показатели соответствуют нормам СанПиН 2.3.2.1078-01.

По результатам проведенных органолептических, физико-химических и микробиологических исследований выявлено, что разработанные нами образцы пресервов с использованием заливки из ягод барбариса по свойствам и качеству не уступают контрольному образцу. Показатели качества всех образцов не превысили норму в течение всего срока хранения, исключение составляет коэффициент буферности, который повысился в процессе хранения до 200 градусов, что позволило сделать вывод о перезревании и установить срок хранения равный 90 суток.

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### ***The set-theoretic model for production infrastructure objects technological hazard's level recognition***

**Abstract:** This article deals with the set-theoretic model formation for recognition the technological hazard's level of Ukraine's production infrastructure objects.

**Keywords:** emergency situation, technological hazard, hazard's medium, hazard's medium classification.

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### ***Теоретико-множественная модель распознавания уровня техногенной опасности объектов производственной инфраструктуры***

**Аннотация:** Данная статья посвящена формированию теоретико-множественной модели распознавания уровня техногенной опасности объектов производственной инфраструктуры Украины.

**Ключевые слова:** чрезвычайная ситуация, техногенная опасность, носитель опасности, классификация носителей опасности.

*Цель* исследования – формирование теоретико-множественной модели распознавания уровня техногенной опасности объектов производственной инфраструктуры в целях построения системы поддержки принятия управленческих и организационно-технических решений. *Объект* исследования – производственная инфраструктура, рассматриваемая как источник техногенных чрезвычайных ситуаций (ТЧС) в регионе. *Предмет* исследования – система мониторинга объектов производственной инфраструктуры промышленных предприятий, рассматриваемая с точки зрения поддержки принятия управленческих и организационно-технических решений по снижению риска возникновения ТЧС в регионе и смягчения их последствий.

В Украине сегодня насчитывается около 24 тысяч опасных производств и объектов [1], которые могут привести к ТЧС объектового, местного, регионального и государственного уровней [2]. К ним отнесены пять групп объектов, на которых:

1) получают, используются, образуются, хранятся, транспортируются и уничтожаются опасные вещества – воспламеняющиеся, окисляющиеся, горючие, взрывчатые, токсичные вещества и вещества, представляющие опасность для окружающей природной среды;

2) используется оборудование, работающее под давлением более 0,07 МПа или при температуре нагрева воды более 115°C;

3) используются стационарно установленные грузоподъемные механизмы, эскалаторы, канатные дороги, фуникулер;

4) получают расплавы черных и цветных металлов, их сплавы;

5) ведутся горные работы, работы по обогащению полезных ископаемых и работы в подземных условиях.

Весьма значимым источником ЧС в регионе является производственная инфраструктура. В широком смысле инфраструктуру формируют предприятия и отрасли, обеспечивающие общие условия производства и жизнедеятельности

людей. В первом случае имеет место производственная, а во втором – социальная инфраструктура, обеспечивающая потребности людей в здравоохранении, образовании, коммунальных услугах, отдыхе, объектах культуры и др. При этом в отдельных случаях одни и те же объекты могут являться элементами как производственной, так и социальной инфраструктуры, например, системы водо- и теплоснабжения.

Рассматривая производственную инфраструктуру как целостную систему, в ней, исходя из функционального назначения и масштабного фактора, следует выделить в иерархической последовательности:

- *общеотраслевую* инфраструктуру, предназначенную для обеспечения функционирования различных, не связанных между собой, отраслей народного хозяйства (транспорт, связь, сооружения, передаточные устройства (трубопроводы, воздушные и кабельные ЛЭП), системы энергообеспечения и др.).
- *межотраслевую* инфраструктуру, необходимую для группы родственных или смежных отраслей (изготовление стандартной оснастки, производственные, технологические и технические услуги);
- *внутриотраслевую* инфраструктуру, ориентированную на обслуживание предприятий одной отрасли;
- *внутрипроизводственную* инфраструктуру, обеспечивающую непрерывное, эффективное и экономичное функционирование основного производства предприятия (соответствующие подразделения и службы предприятия).

Первые три разновидности производственной инфраструктуры по отношению к обслуживаемым отраслям выступают *внешними* в форме независимых специализированных предприятий, четвертая является *внутренней* в форме специализированных подразделений предприятия.

На региональном уровне более 80% объектов, являющихся источниками ТЧС, относятся к общеотраслевой, межотраслевой, внутриотраслевой и внутрипроизводственной инфраструктуре. Например, на предприятиях пищевой промышленности источниками ТЧС служат склады аммиака, на предприятиях деревообрабатывающей и текстильной промышленности – склады хлора. Таким образом, производственную инфраструктуру в целом следует отнести к существенному источнику ТЧС в производственной сфере региона.

В дальнейшем в качестве объекта исследования будем рассматривать ту часть производственной инфраструктуры (как совокупности инженерно-техни-

ческих объектов), которая предназначена для обслуживания основных составляющих производственной системы. При этом нас будет интересовать только одна характеристика выделенного подмножества объектов производственной системы – уровень их *техногенной опасности*. Только после идентификации и адекватной оценки уровня опасности [3] можно принимать эффективные решения о мерах по преодолению возникшей ТЧС или ее последствий, при этом каждому уровню опасности должен соответствовать определенный комплекс организационно-технических мероприятий.

В связи с разнородностью и многообразием источников ТЧС в системе мониторинга объектов производственной инфраструктуры поддержка принятия решений должна строиться на автоматической классификации опасностей или их классификации в диалоговом режиме. Для оценки потенциального уровня опасности ТЧС выделим:

- класс (вид) возможной ТЧС – **K**;
- разряд (масштаб) возможной ТЧС – **P**;
- носитель опасности – **H**;
- класс опасности (вреда) – **B**.

Множество инфраструктурных объектов как источников ТЧС некоторого класса  $k \in K$  можно представить следующим образом:

$$O^k = (O^k_1, O^k_2, \dots, O^k_{|K|}). \quad (1)$$

При этом под классом ТЧС будем понимать множество ТЧС, объединенных по некоторым общим признакам или свойствам:

$$K = (K_1, K_2, \dots, K_i, \dots, K_{|K|}). \quad (2)$$

В общем случае классы могут определяться по качественным и/или количественным признакам или характеристикам. Количественными признаками классов могут быть реализованная опасность или ее последствия, например: взрыв, выброс химически опасных веществ, химическое загрязнение, нарушение энергообеспечение и т.п.

Множество инфраструктурных объектов как источников ТЧС некоторого разряда  $p \in P$  опишется следующим образом:

$$O^p = (O^p_1, O^p_2, \dots, O^p_{|P|}). \quad (3)$$

Разряд опасности имеет не только качественные, но и количественные характеристики. Они включают ряд показателей, которые должны рассматри-

ваться в совокупности: сведения о пострадавших, материальный ущерб, зона действия ТЧС, определяемая ее территориальными границами:

$$T = (T_1, T_2, T_3, T_4), \quad (4)$$

где  $T_1$  – объектовые ТЧС;  $T_2$  – местные ТЧС;  $T_3$  – региональные ТЧС;  $T_4$  – ТЧС государственного (национального) масштаба.

Множество носителей опасности – это химические вещества (хлор, аммиак, серная, фосфорная, соляная кислоты и др.), углеводороды (бензин, дизтопливо, мазут, природный и сжиженный газ), вода и др.:

$$H = (H_1, H_2, ..., H_i, ..., H | H | ). \quad (5)$$

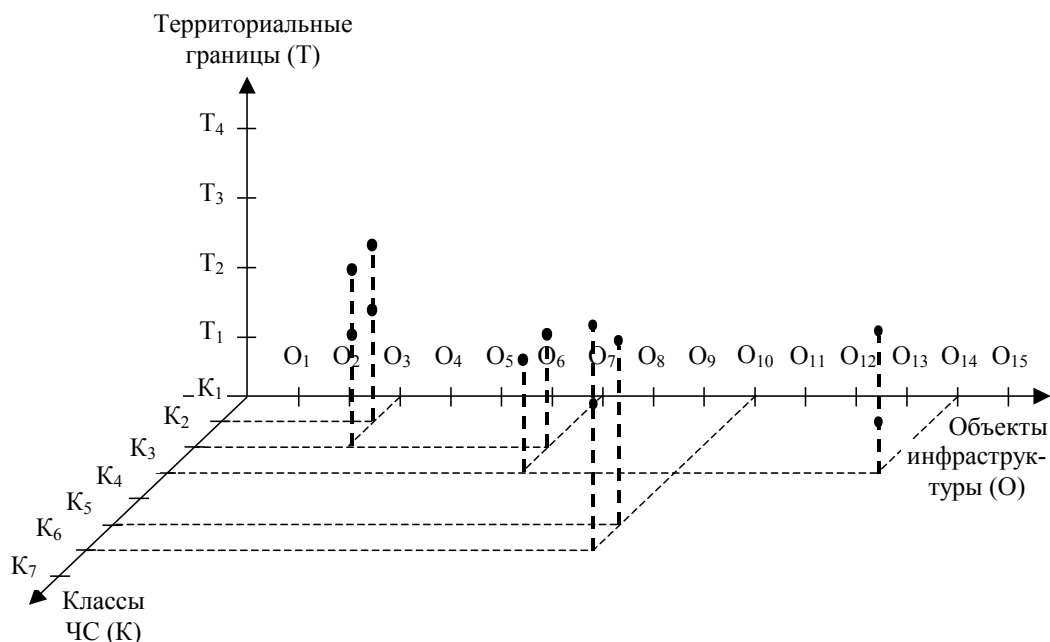
Множество классов опасности представим как:

$$B = (B_1, B_2, ..., B_i, ..., B | B | ). \quad (6)$$

Тогда составляющие модели распознавания уровня опасности ТЧС на объектах производственной инфраструктуры можно представить кортежем в виде множества  $U$ :

$$U = < K, P, H, B > \quad (7)$$

Поставим в соответствие объектам производственной инфраструктуры региона объектам возможные характерные риски угроз ТЧС с указанием их класса и разряда (территориальных границ).



**Рисунок 1. Влияние объектов производственной инфраструктуры на класс (вид) опасности ТЧС и ее территориальные границы**

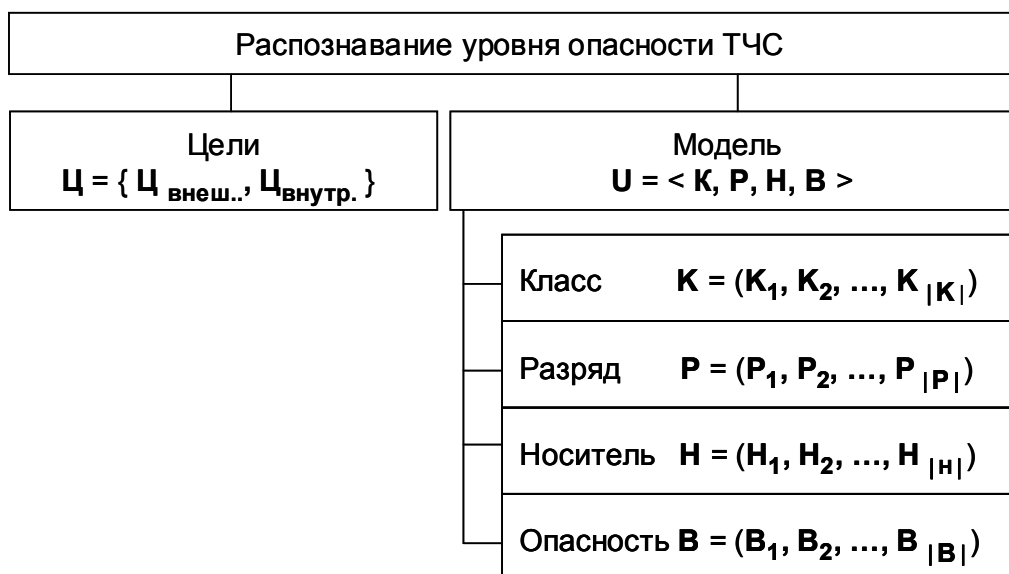
Наглядно можно отобразить влияние объектов производственной инфраструктуры различного уровня на характер опасности ТЧС и ее территориальные масштабы в трехмерных декартовых координатах. На рисунке 1 показаны классы возможных ТЧС и их территориальные границы на примере следующих объектов инфраструктуры: складов нефтепродуктов ( $O_3$ ), магистрального газопровода ( $O_7$ ), гидроэлектростанций ( $O_{10}$ ) как элементов *общепромышленной* инфраструктуры и производственных складов химических веществ ( $O_{14}$ ) как элемента *внутрипроизводственной* инфраструктуры.

Представим в конъюнктивной нормальной форме (КНФ) диагностические классификационные модели ТЧС, источником которых служат объекты производственной инфраструктуры, для рассмотренных примеров:

$$\begin{aligned} M_{O_3} &= (O_3 \vee K_1 \vee T_2) \wedge (O_3 \vee K_2 \vee T_2) \wedge (O_3 \vee K_2 \vee T_2); \\ M_{O_7} &= (O_7 \vee K_1 \vee T_2) \wedge (O_7 \vee K_2 \vee T_2); \end{aligned} \quad (8)$$

$$\begin{aligned} M_{O_{10}} &= (O_{10} \vee K_5 \vee T_2) \wedge (O_{10} \vee K_6 \vee T_3) \wedge (O_{10} \vee K_6 \vee T_4); \\ M_{O_{14}} &= (O_{14} \vee T_1) \wedge (O_{14} \vee T_2). \end{aligned}$$

Декомпозиция модели распознавания уровня опасности объектов производственной инфраструктуры отражена на рисунке 2.



**Рисунок 2. Декомпозиция модели распознавания уровня опасности ТЧС в системе производственной инфраструктуры**



Внутренней целью моделирования (Цвнутр) является идентификация и оценка уровня техногенной опасности; внешней (Цвнешн) – поддержка принятия решения о мерах по локализации, снижению последствий и потерь от ТЧС.

### **Выводы**

1. На основе системного подхода сформирована иерархическая модель производственной инфраструктуры, выполнен её структурный и функциональный анализ.

2. Для системной оценки потенциального уровня ТЧС введены понятия класс (вид) возможной ТЧС; разряд (масштаб) возможной ТЧС; носитель опасности; класс опасности (вреда).

3. На основе введенной классификации построены теоретико-множественные диагностические модели ТЧС, источником которых служат объекты производственной инфраструктуры.

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## ***Analysis of methods for determining the optimal working life of transport-technological facilities***

**Abstract:** At the present moment in the regional construction complex, the current pool of construction machines does not use effectively enough the results of the absence of coordination of the work of enterprises within the regional construction complex, therefore indicating that the concept of delay periods for able-working machines does have its place. Lacking is an account of regional requirements in construction machinery by type of machine in relation to accepted construction plans, rather than future investments in the development of enterprises of repair and technical service. Thus, this article analyzes academic works which consider the theoretical conditions for the formation, maintenance, and optimization of a construction machinery pool, and the processes of a system for technical usage.

**Keywords:** construction machinery pool, optimal working life, means of labor, planning, prime cost.

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## ***Анализ методов определения оптимальных сроков службы транспортно-технологических средств***

**Аннотация:** В настоящее время в региональном строительном комплексе даже имеющийся парк строительных машин используется недостаточно эффективно вследствие отсутствия координации работы предприятий регионального строительного комплекса, поэтому имеют место простои и работоспособных машин. Отсутствует расчет региональной потребности в строительной технике по типам машин в соответствии с принятыми планами строительства, не запланированы инвестиции в развитие предприятий по

ремонт и техническому сервису. Поэтому в статье анализируются научные работы, в которых рассмотрены теоретические положения формирования, обновления, оптимизации парка строительных машин, процессов системы технической эксплуатации.

**Ключевые слова:** парк строительных машин, оптимальный срок службы, средства труда, планирование, себестоимость.

С методами определения оптимального срока службы машин, связаны научные работы В. О. Васильева, А. И. Селиванова, А. М. Трыкова, М. Ф. Фролова, А. С. Гальперина, С. Е. Канторера, Н. С. Сачко, В. В. Новожилова, В. М. Рогожкина и др. [1, 3, 4, 5, 8, 9, 14, 15].

Методы определения оптимальных сроков службы машин отличаются между собой выбором критерия оптимальности и принципами, используемыми при решении различных задач. Срок службы машины является одним из важнейших показателей эффективности ее использования. Вся политика обновления формируется с учетом оптимальных сроков службы машин, в том числе и мобильного транспорта. Для определения оптимальных сроков службы применяют статистические, аналитические, графические и графоаналитические и другие методы.

Метод определения экономически оптимальных сроков службы машин по материальному износу разработал Л. И. Селиванов. Им была впервые сделана попытка предложить универсальную аналитическую зависимость между прогрессивно нарастающими эксплуатационными расходами и сроком службы машин, которая была бы пригодна для любого вида машин.

Исходя из этой концепции, предлагается основное равенство, определяющее оптимальный предел службы средств труда. С его помощью сопоставляются издержки производства, без амортизации на восстановление, данной продукции на старых и наиболее эффективных новых средствах труда:

$$C \leq C_n + K_n \times r,$$

где:  $C, C_n$  — себестоимость единицы продукции без собственно амортизации при ее производстве с помощью старой и новой машины;  $K_n$  — капита-

ловложения в новые средства труда в расчете на единицу готовой продукции;  $r$  - норматив эффективности вложений.

Оптимальный момент замены старого средства труда новым наступает тогда, когда неравенство превращается в равенство:

$$C = C_n + K_n \times r.$$

При определении сроков службы средств труда предполагается, что изношенные средства труда больше не используются, изношенные по одному назначению средства труда могут быть эффективно использованы по другим назначениям.

С учетом определяющих факторов задаются различные сроки службы машин, и на основе расчетов по обусловленному критерию (минимум приведенных затрат) устанавливаются наиболее целесообразные сроки на отдельных этапах расчётного периода. Метод может быть использован: при перспективном планировании для расчета производства новых машин; потребности в запасных частях; расчетов потребности в капитальных ремонтах; расчетов фактических текущих затрат и капитальных вложений в году; установления возрастной структуры парка машин в текущем году планового периода.

Венгерский экономист Г. Рецеи предложил метод, основанный на определении такого срока службы, при котором годовая сумма текущих затрат и капитальных вложений для поддержания парка из  $n$  машин на постоянном уровне будет минимальной [Reczey].

**Таблица 1. Методы определения оптимальных сроков службы машин**

Автор метода	Год	Аналитическая зависимость	Источник
1	2	3	4
Васильев В. О.	1925	$t = \sqrt{2A/b}$ , где $A$ , $b$ – соответственно постоянная и возрастающая части расходов на ТО и Р машины за год.	2
Токарев Т. Г.	1958	$L_3 = \sqrt{C_0/b}$ , где $C_0$ – остаточная стоимость автомобиля	17

Канторер С. Е.	1959	$T_{эк} = -D\gamma + \sqrt{D^2\gamma^2 + D(1+\gamma)}$ , где $D = A/(P\alpha + \beta + (P - \beta)\gamma)$ $\alpha, \beta, \gamma$ – коэффициенты, $\beta$ – затраты на материалы за год.	6,7
МАПИ	1960	$C_B + C_3 \rightarrow \min$ , где $C_B$ – издержки на возмещение вложенного капитала; $C_3$ – эксплуатационная неполноценность.	11
Бронштейн Л. А., Лейдерман С. Р.	1961	$Z_{опт} = \sqrt[n]{\frac{C_M - C_0}{bZ_1} - \frac{R_1}{bZ_1}} + L_1^n$ , где $Z_1$ – пробег за первый год; $b, n$ – коэффициенты.	1
Рецеи Г.	1962	$\sum_i^n C_i \rightarrow \min$ при $P(t) = \text{const}$	Recz
Колегаев Р. Н.	1963	$Z_{опт} = C_M - C_0 + \sum_i^n E_i + \frac{\sum_i^{n-1} R_i}{\sum_i^n L_T}$ , где $E_i$ – постоянные расходы на $i$ -ом межремонтном цикле; $R$ – затраты на один КР; $L_T$ – величина межремонтного цикла.	8
ГОСНИТИ	1996	$\left[ \sum_{i=1}^n (C_i + E_H K_i) + C_3 \right] \rightarrow \min$	10
Рогожкин В. М.	2005	$\sum \Pi(t) = R(t) - U(t) - S(T) + Q(t) \rightarrow \max$ , где, $\Pi(t)$ – наибольшая прибыль от применения машин за время $t$ ; $R(t)$ – доход, получаемый от использования машины за время $t$ ; $U(t)$ – расходы на машины за время $t$ ; $S(T)$ – затраты, связанные с заменой машины возраста $T$ , или «стоимость» новой машины.	15

Наиболее широко применяется метод, при котором в качестве критерия оптимальности используется минимум себестоимости единицы наработки (продукции или работы) [8]. Сущность этого метода заключается в следующем: с увеличением срока службы машины удельная величина амортизационных отчислений, приходящихся на единицу ее наработки, уменьшается. Приведенный метод имеет недостатки, среди которых главным является необоснованный выбор минимума себестоимости единицы наработки в качестве критерия оптимальности. Срок службы определяют, учитывая только материальный износ, и принимается минимально допустимым ( $t_{\min}$ ), замена машины до его истечения требует капитальных вложений и вызывает рост себестоимости единицы наработки. Максимально допустимая граница срока службы оборудования  $t_{\max}$  определяется с использованием величины экономического эффекта:

$$\Delta \Delta = (C_1 - C_{2i})\psi + F_H[V(B - 1) - \Delta P_i];$$

где,  $\Delta \mathcal{E}$  — экономический эффект от повышения срока службы машин, руб.,  $C_1, C_{2i}$  — соответственно среднегодовые суммарные текущие затраты на эксплуатацию изделия при минимально допустимом сроке службы, равном  $i$  лет, руб.,  $\psi$  — коэффициент, учитывающий действие фактора времени,  $F_H$  — нормативный коэффициент окупаемости для срока службы изделия  $t_i$  лет,  $V$  — затраты на приобретение изделия, руб.,  $B$  — коэффициент, учитывающий повышение долговечности изделия,  $\Delta P_i$  — дополнительные затраты на ремонт изделия и запасные части, руб.

Недостатком является то, что не учитывается влияние морального износа на сроки службы машин. Используется для определения сроков службы специального и нестандартного оборудования.

Для определения оптимальных сроков службы тракторов используется математический аппарат динамического программирования [9].

При расчетах по этому методу допускается, что в начальный момент времени имеется новый трактор, возраст которого равен  $t_0$ . Требуется найти такой возраст  $t_1 > t_0$ , при котором трактор следует заменить новым с тем, чтобы обеспечить минимум суммарных издержек за  $t_1$  лет эксплуатации первого трактора и за оставшиеся  $T_n - t_1$  лет использования следующих тракторов ( $T_n$  — принятая продолжительность расчетного периода).

Недостатком данной методики является то, что для каждого года в плановом периоде необходимо знать остаточную стоимость машины.

Метод определения оптимального срока службы машин с учетом материального износа отличается от рассмотренных тем, что в нём полагается нерациональным использование машин в основной сфере до их полного износа.

Оптимальным сроком службы по материальному износу считается такой период эксплуатации машины в основной сфере, при которых приведенные затраты на единицу продукции являются минимальными. Удельная величина приведенных затрат:

$$z = \frac{(K - O_p)(E_H - H_a)t_1 + C_\Sigma + P_\mathcal{E} + O_p E_H t_2}{B},$$

где,  $K$  — стоимость средства труда в момент его создания (действующая оптовая цена), руб.,  $C_{\Sigma}$  — затраты на производство общего объема продукции за весь срок службы (на сырье и материалы, электроэнергию, заработную плату рабочих), руб.;  $P_{\Sigma}$  — затраты на все виды ремонтов и межремонтных осмотров за срок службы, руб.,  $O_p$  — предполагаемая цена реализации средства труда после окончания срока эксплуатации,  $H_a$  — норма амортизации на реновацию,  $t_1$  — срок службы средства труда, для которого производится расчет приведенных затрат, лет;  $E_n$  — нормативный коэффициент эффективности капитальных вложений;  $t_2$  — предполагаемый период функционирования средства труда после прекращения эксплуатации в данной сфере его применения, лет,  $B$  — общий объем продукции, выпущенной на данном средстве труда за весь срок службы, шт.

Недостаток метода заключается в том, что срок использования машины в основной сфере её применения определяется на основе действующего нормативного срока службы машины.

В рассмотренных методах определения оптимальных сроков службы машин исследуется изменение себестоимости единицы наработки техники в зависимости от её срока службы. Проведенный обзор показывает, что исследованиям парка строительных машин посвящено достаточно много работ, как с организационных, так и технико-экономических сторон.

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## ***Progressive electric equipment and electro technologies for the protected soil***

**Abstract:** In article are the questions connected with development of power effective ultraviolet LED installations and LED of the fitoustanovka with RGB technology allowing to use rationally electric energy and to increase efficiency of plants are considered.

**Keywords:** ultraviolet, LED, light-emitting diodes, phytoinstallations, RGB lightemitting diodes, preseeding processing of seeds, electric equipment, electro technologies, the protected soil.

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## ***Прогрессивное электрооборудование и электротехнологии для защищенного грунта***

**Аннотация:** В статье рассмотрены вопросы, связанные с разработкой энергоэффективных ультрафиолетовых LED установок и LED фитоустановок с RGB технологией, позволяющих рационально использовать электрическую энергию и повышать продуктивность растений.

**Ключевые слова:** ультрафиолет, LED, светодиоды, фитоустановки, RGB светодиоды, предпосевная обработка семян, электрооборудование, электротехнологии, защищенный грунт.

Известный ученый К.А. Тимирязев считал, что предел плодородия почвы определяется количеством световой энергии, поступающей от солнца потому, что до 95% урожая в открытом грунте формируется за счет фотосинтетической деятельности растений. Для получения высоких урожаев в защищенном грунте фитолампы должны иметь спектр излучения в диапазоне 300...750 нм, при этом видимое излучение изменяется от 400 до 760 нм и ультрафиолетовое – от 300 до 400 нм [1, 2, 3].

Ультрафиолетовое излучение (УФИ) является энергоэффективным электротехнологическим способом обработки семян перед посевом. УФИ оказывает стимулирующий эффект на семена пониженного класса качества, усиливая энергию прорастания [4, 5].

В Ижевской сельскохозяйственной академии была разработана установка для УФ облучения семян транспортерного типа производительностью 0,6 кг/час [4]. Источником излучения служила дуговая ртутная газоразрядная лампа высокого давления типа ДРЛ, имеющая в своем спектре излучения все три зоны УФ-А (380...315 нм), УФ-В (315...280 нм) и УФ-С (280...200 нм). С помощью светофильтра была оставлена только зона УФ-В. В виду того, что со временем поток лампы уменьшается, было разработано устройство коррекции дозы УФ излучения, которое автоматически поддерживает требуемую дозу УФ за счет и увеличивается время облучения семян. Измерение УФИ осуществлялось прибором ТКА-01/3, который имеет спектральную чувствительность в диапазоне 250...400 нм. Опыты показали, что УФ облучение семян повысило всхожесть семян, сократило сроки подготовки рассады и способствовало получению большего урожая ранних дорогостоящих огурцов [5].

Принимая во внимание развитие научно-технического прогресса, целесообразно рассмотреть возможность разработки прогрессивного электрообору-

дования с использованием в качестве источников излучения энергосберегающих, экологически чистых УФ светодиодов и проведения дальнейших исследований в этом направлении.

В отношении видимого излучения, диапазон которого совпадает с диапазоном фотосинтетически активной радиации, можно сказать, что для растениеводства защищенного грунта одной из важных задач является разработка энергосберегающего электрооборудования с возможностью автоматического управления спектральным составом излучения, например, на базе фитоустановок с RGB-светодиодами, которые позволяют регулировать спектр излучения для получения максимально возможных урожаев [5, 6, 7, 8, 9].

Одним из главных преимуществ светодиодов (LED) является высокая светоотдача, экологичность, низкий расход электрической энергии, высокий срок службы, что позволяет существенно снизить эксплуатационные расходы [11, 12].

К 2015 г. ожидается его рост производства LED примерно до \$8.2 млрд. и составит 60% от всего ассортимента источников излучения. Дальнейшее совершенствование LED источников связано с увеличением светоотдачи до ~150 лм/Вт, световых потоков с единичного кристалла ~1000 lm, индекса цветопередачи >85, рабочего ресурса 50 000...100 000 ч.

RGB светодиоды (от английских слов red, green, blue) обладают уникальной возможностью управления (изменения) освещенностью, спектром излучения, цветовыми координатами (цветовой температурой) и др. На базе RGB светодиоды создается «интеллектуальный» свет (smartlight). При смешивании цветов в многокристальных RGB светодиодных излучателях получают все реально существующие цвета, что позволяет использовать многокристальные RGB светодиоды («интеллектуальный» свет) при решении различных светотехнических задач.

Светодиодные RGB технологии можно использовать в меристемных лабораториях для выращивания растений in vitro. При разработке специальных алгоритмов управления для многокристальных RGB светодиодов можно будет управлять интенсивностью излучения, спектральным составом излучения в зависимости от культуры растений, фазы его развития и т.д. [10, 12, 13].

Таким образом, принимая во внимание положительное воздействие УФ и видимого излучения целесообразно разработать энергоэффективное электрооборудование на примере LED УФ и фито-установок с RGB светодиодами.

Наряду с этим электрооборудование LED УФ и фитоустановок RGB светодиодами является электробезопасными в виду питания их от низковольтных источников. Благодаря этому это прогрессивное электрооборудование не являются потенциальным источником возникновения пожара или взрыва [14]. Всё это говорит о целесообразности разработки энергосберегающего электрооборудования с использованием прогрессивных электротехнологий для защищенного грунта и проведения дальнейших исследований.

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## ***Intellectualization of management processes in road transport***

**Abstract:** The basic results of the study of theoretical approaches in the management of the organization of transport in road transport. The peculiarities of development of routes of movement of vehicles with the use of artificial neural networks in designing routes and direct control of movement of vehicles. The proposed implementation of the transport companies of algorithms for planning and managing the transportation process models based on artificial neural networks as tools for intellectual control of the transportation process.

**Keywords:** transport, logistics, itinerary, transportation, system, technology, transportation, process.

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## **Интеллектуализация процессов управления на автомобильном транспорте**

**Аннотация:** Изложены основные результаты исследования теоретических подходов в управлении организацией перевозок на автомобильном транспорте. Рассмотрены особенности разработки маршрутов движения подвижного состава с применением искусственных нейронных сетей в проектировании маршрутов и непосредственном управлении движением автомобилей. Предложено внедрение в практику работы транспортных компаний алгоритмов планирования и управления перевозочным процессом моделей на основе искусственных нейронных сетей, как инструментов интеллектуального управления перевозочным процессом.

**Ключевые слова:** транспорт, логистика, маршрут, перевозка, система, технология, перевозка, процесс.

Задачи управления транспортным процессом на автомобильном транспорте исходя из анализа литературных источников формулируется исходя из необходимости организации процесса перевозки при минимизации общих издержек и при условии соблюдения качественных и количественных требований стандартов.

Задача оптимизации может быть в общем случае математически решена только для одного критерия оптимальности или, что то же, для одного критерия эффективности. Однако эффективность больших человеко-машинных или даже чисто технических сложных систем характеризуется набором частных показателей, и их не удаётся свести в один общий показатель, пригодный для оценки эффективности. Данное обстоятельство подталкивает нас к продолжению исследования и развитию современных подходов в управлении сложными системами на основе формирования интеллектуальных транспортных систем [1]. Поэтому в качестве критерия оптимальности выбирают такой доминирующий показатель, который позволит в наибольшей степени определить способность системы выполнить своё предназначение.

В общем случае применяются следующие способы выделения критерия оптимальности при наличии нескольких показателей:

- часть показателей превращают в ограничения. Так, если в рассмотренном примере задано время перевозок, то его можно представить в виде ограничения, а критерием оптимальности считать стоимость перевозок. Возможна и обратная постановка задачи оптимизации: минимизировать время перевозок при заданной стоимости (при имеющихся средствах перевозки);

- несколько показателей свёртывают (объединяют) в один обобщённый показатель (путём постановки общей цели, введением весовых коэффициентов и др.). Применение этого способа сопряжено с большими трудностями, заключающимися в сложности определения единой меры для разнородных показателей;

- варьируют постановку задачи, т. е. производят оптимизацию при разных критериях оптимальности и решение принимают по оптимизируемым требованиям на основании полученных результатов (метод уступок).

Необходимо отметить, что в системе значимость одного и того же показателя меняется в зависимости от уровня иерархии. Показатель высшей ступени системы не всегда обязателен для низшей его ступени; в то же время показатель низшей ступени или прямо, или, что бывает чаще, опосредствованно. В каждой иерархической организованной системе показатель любого низшего её уровня находится в области показателей высшего уровня.

Предлагаемые модели формируют единый подход к формализации методов решения транспортной логистики и теории организации перевозок, охватывают основные типы транспортных задач, применительно к автомобильным перевозкам в пространстве (распределительная задача, маршрутизация) и во времени; позволяют осуществить трехуровневую оптимизацию по мере редуцирования количества рассматриваемых объектов (поставщики, потребители) и последовательного включения дополнительных факторов, связанных с конкретными маршрутами перевозок.

Применение того или иного метода из представленных ранее, направлено на сокращение каких-либо затрат энергии и времени, потерь, совокупных затрат и логистических издержек. В силу того, что управленческие решения принимают люди, возникает необходимость оптимизации какими-либо методами интеллектуального потока мыслей [2]. Учитывая, что классические методы трудоемкие и требуют больших затрат энергии в интеллектуальном труде на поиск оптимального решения (большее количество итераций), возникает

необходимость использовать методы, обладающие возможностями поиска решений с малым числом итераций, сокращающих время на принятие решений и подчас сразу дающие оптимальное решение [3,4].

Переход к рыночным отношениям изменил схему взаимоотношений между контрагентами, предоставив им свободу действий и одновременно с этим повысил неопределенность условий, в которых работают предприятия транспорта. В силу указанных обстоятельств и того, что переменные величины будут появляться вновь в разнообразных формах, необходимо применять модели, позволяющие как можно лучше учитывать происходящие изменения. Для решения указанных вопросов предлагается использовать системы, которые мы сможем самостоятельно обучать в тех условиях, которые будут возникать в процессе оказания услуг и изменяться под воздействием параметров внешней и внутренней среды. Предполагая вариации исходных показателей, изменяются и выходные характеристики. По сути, мы говорим о поиске таких моделей, которые были бы наиболее полно адаптированы к создавшимся условиям и неопределенностям. Для реализации таких подходов предлагается использовать искусственные нейронные сети (ИНС), формирующие банк интеллектуальных моделей в организации перевозочного процесса на автомобильном транспорте.

Доказано, что задача разработки маршрутов перевозок мелкопартионных грузов принадлежит к большому множеству задач, называемых «NP-полными» (недетерминистски полиномиальными). Для NP-полных задач неизвестно лучшего метода решения, чем полный перебор всех возможных вариантов, и, по мнению большинства математиков, маловероятно, чтобы лучший метод был, когда либо найден. Так как такой полный поиск практически неосуществим для большого числа городов, то эвристические методы используются для нахождения приемлемых, хотя и неоптимальных решений.

Описанное в работе [5] решение, основанное на сетях с обратными связями, является типичным в этом отношении. Все же ответ получается так быстро, что в определенных случаях метод может оказаться полезным.

Функция энергии должна удовлетворять двум требованиям: во-первых, должна быть малой только для тех решений, которые имеют по одной единице в каждой строке и в каждом столбце; во-вторых, должна оказывать предпочтение решениям с короткой длиной маршрута.

Этим достигается выполнение следующих условий [5]:

1. Первая тройная сумма равна нулю в том и только в том случае, если каждая строка (город) содержит не более одной единицы.
2. Вторая тройная сумма равна нулю в том и только в том случае, если каждый столбец (порядковый номер посещения) содержит не более одной единицы.
3. Третья сумма равна нулю в том и только в том случае, если матрица содержит ровно  $n$  единиц.

Подводя итоги исследованию алгоритмов проектирования маршрутов перевозок мелкопартионных грузов, следует отметить, что предлагаемые модели с использованием искусственных нейронных сетей могут быть использованы для анализа и оптимизации маршрутов движения подвижного состава не только на стадии разработки, но и в реальных условиях функционирования транспортных компаний. Это может быть обеспечено путем включения алгоритмов в состав специального математического обеспечения управления перевозочным процессом.

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## ***Solution of the problem of cooling adjoins high-temperature metal bodies***

**Abstract:** In this paper the numerical solution of the problem of cooling high-temperature metallic bodies coupled rectangular shape. A mathematical model of unsteady heat transfer with boundary conditions III-IV kinds. The results of numerical calculations of the temperature depending on the geometry, thermal properties of the material body and the time the cooling process.

**Keywords:** mathematical model, transient heat transfer, cooling, high-temperature rectangular metal body, the numerical calculation.

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## ***Решение задачи охлаждения сопряженных высокотемпературных металлических тел***

**Аннотация:** В работе рассматривается численное решение задачи охлаждения сопряженных высокотемпературных металлических тел прямоугольной формы. Приводится математическая модель процесса нестационарного теплообмена при граничных условиях III-IV рода. Получены результаты численных расчетов температур в зависимости от геометрии, теплофизических свойств материала тела и времени процесса охлаждения.

**Ключевые слова:** математическая модель, нестационарный теплообмен, охлаждение, высокотемпературное прямоугольное металлическое тело, численный расчет.

### Введение

Одной из актуальных задач связанной с численным расчетом нестационарного теплообмена сопряженных высокотемпературных металлических тел в охлаждающей среде, встречающейся во многих технических приложениях, является задача определения температур на границе сопрягаемых поверхностей, а также в расчетной точке охлаждаемого тела.

### Математическое обоснование задачи

Как и в [1], рассмотрим трехмерное уравнение теплопроводности.

В декартовых координатах имеем:

$$\frac{\partial}{\partial t} c\rho T = \frac{\partial}{\partial x} \left( \lambda \frac{\partial T}{\partial x} \right) + \frac{\partial}{\partial y} \left( \lambda \frac{\partial T}{\partial y} \right) + \frac{\partial}{\partial z} \left( \lambda \frac{\partial T}{\partial z} \right). \quad (1)$$

Коэффициенты теплоемкости, теплопроводности и плотность считаем известными функциями температуры.

Будем решать это уравнение методом расщепления [2], сводя решение трехмерной задачи к трем одномерным. Поэтому в разностной форме получим (1):

$$\begin{aligned} (c\rho T)_{i,j,h}^{n+\frac{1}{3}} &= (c\rho T)_{i,j,h}^n + \frac{1}{3} \frac{\Delta t(1-\sigma)}{\Delta \bar{x}_i} \left[ \frac{\lambda_{i+0,5}^{n+\frac{1}{3}}}{\Delta x_{i+1}} (T_{i+1} - T_i)^{n+\frac{1}{3}} - \frac{\lambda_{i-0,5}^{n+\frac{1}{3}}}{\Delta x_i} (T_i - T_{i-1})^{n+\frac{1}{3}} \right] \\ &+ \frac{1}{3} \frac{\Delta t\sigma}{\Delta \bar{x}_i} \left[ \frac{\lambda_{i+0,5}^n}{\Delta x_{i+1}} (T_{i+1} - T_i)^n - \frac{\lambda_{i-0,5}^n}{\Delta x_i} (T_i - T_{i-1})^n \right] \\ (c\rho T)_{i,j,h}^{n+\frac{2}{3}} &= (c\rho T)_{i,j,h}^{n+\frac{1}{3}} + \frac{1}{3} \frac{\Delta t(1-\sigma)}{\Delta \bar{y}_j} \left[ \frac{\lambda_{j+0,5}^{n+\frac{2}{3}}}{\Delta y_{j+1}} (T_{j+1} - T_j)^{n+\frac{2}{3}} - \frac{\lambda_{j-0,5}^{n+\frac{2}{3}}}{\Delta y_j} (T_j - T_{j-1})^{n+\frac{2}{3}} \right] \\ &+ \frac{1}{3} \frac{\Delta t\sigma}{\Delta \bar{y}_j} \left[ \frac{\lambda_{j+0,5}^{n+\frac{1}{3}}}{\Delta y_{j+1}} (T_{j+1} - T_j)^{n+\frac{1}{3}} - \frac{\lambda_{j-0,5}^{n+\frac{1}{3}}}{\Delta y_j} (T_j - T_{j-1})^{n+\frac{1}{3}} \right] \end{aligned}$$

$$(\diamond \rho T)_{i,j,h}^{n+1} = (c \rho T)_{i,j,h}^{n+\frac{2}{3}} + \frac{1}{3} \frac{\Delta t (1-\sigma)}{\Delta \bar{z}_h} \left[ \frac{\lambda_{h+0,5}^{n+1}}{\Delta z_{h+1}} (T_{h+1} - T_h)^{n+1} - \frac{\lambda_{h-0,5}^{n+1}}{\Delta z_h} (T_h - T_{h-1})^{n+1} \right] + \frac{1}{3} \frac{\Delta t \sigma}{\Delta \bar{z}_h} \left[ \frac{\lambda_{h+0,5}^{n+\frac{2}{3}}}{\Delta z_{h+1}} (T_{h+1} - T_h)^{n+\frac{2}{3}} - \frac{\lambda_{h-0,5}^{n+\frac{2}{3}}}{\Delta z_h} (T_h - T_{h-1})^{n+\frac{2}{3}} \right].$$

Здесь  $i, j, h$  – номера узловых точек вдоль пространственных направлений,  $x, y, z$  соответственно;  $n$  – номер шага интегрирования по времени;  $\sigma$  – весовой параметр, изменяющийся в интервале  $[0,1]$ ; по направлению  $x$ :  $\Delta x_i$  – шаг интегрирования; соответствующий интервалу  $[i-1, i]$ ; коэффициенты теплопроводности  $\lambda_{i+0,5}$  и  $\lambda_{i-0,5}$  относятся к серединам отрезков  $[i, i+1]$  и  $[i-1, i]$ , соответственно;  $\Delta \bar{x}_i = \frac{\Delta x_i + \Delta x_{i+1}}{2}$ ; по направлениям  $y, z$  обозначения величин аналогичны.

Решение трехмерного уравнения (1) производит методом прогонки по каждому из пространственных направлений [3].

Пусть, далее, речь идет не об однородном материале, а о среде, состоящей из двух материалов (металлов) *metal1* и *metal2*. На границе их сопряжения должно выполняться граничное условие IV рода, которые подразумевают, равенство температур  $T_0^{m1} = T_0^{m2}$  на границе раздела двух сопрягаемых тел и тепловых потоков, проходящих через границу сопряжения:

$$\lambda^{m1} \frac{\partial T_0^{m1}}{\partial x} = \lambda^{m2} \frac{\partial T_0^{m2}}{\partial x}, \quad (2)$$

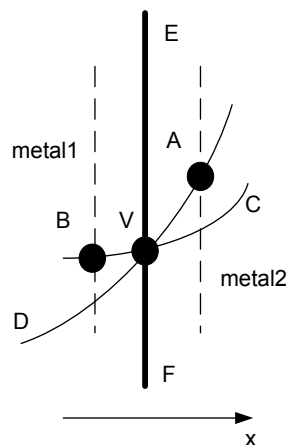


Рисунок 1. Граница перехода



Обозначим границу двух разных металлов, как это показано на (Рис. 1), в виде прямой EF. Пусть индекс ноль – это номер в точке V. Введем две фиктивные точки A и B. Пусть точка A находится на продолжении кривой DA, а точка B на продолжении кривой CB. Принимаем, что первая точка в *metal2* находится на том же удалении от границы FE, равном  $\Delta x_1$ , что и точка A, а последняя точка в *metal1* – на том же удалении от границы FE, равном  $\Delta x_0$ , что и точка B.

Считаем, что шаги  $(\Delta x_{1m})_0$  и  $(\Delta x_{2m})_1$  не совпадают. Для удобства вычислений примем, что шаг  $(\Delta x_{2m})_1$  в целое число, раз отличается от шага  $(\Delta x_{1m})_0$ . Кроме того, коэффициенты  $c, \rho, \lambda$  будем рассматривать переменными. Из уравнения (2) отнесенного к  $(n+1)$ -ому временному слою, получаем:

$$\lambda_0^{m1} \frac{T_A - T_{-1}}{\Delta x_1 + \Delta x_0} = \lambda_0^{m2} \frac{T_1 - T_B}{\Delta x_1 + \Delta x_0}. \quad (3)$$

В точке V для материалов *metal1* и *metal2* имеем:

$$\begin{aligned} (c\rho T)_{0,m1}^{n+1} = & (c\rho T)_{0,m1}^n + \frac{\Delta t(1-\sigma)}{\Delta \bar{x}_0} \left[ \frac{\lambda_{0,m1}^{n+1}}{\Delta x_1} (T_A - T_0)^{n+1} - \frac{\lambda_{-0,5,m1}^{n+1}}{\Delta x_0} (T_0 - T_{-1})^{n+1} \right] \\ & + \frac{\Delta t\sigma}{\Delta \bar{x}_0} \left[ \frac{\lambda_{0,m1}^n}{\Delta x_1} (T_A - T_0)^n - \frac{\lambda_{-0,5,m1}^n}{\Delta x_0} (T_0 - T_{-1})^n \right] \end{aligned} \quad (4)$$

$$\begin{aligned} (\diamond \rho T)_{0,m2}^{n+1} = & (c\rho T)_{0,m2}^n + \frac{\Delta t(1-\sigma)}{\Delta \bar{x}_0} \left[ \frac{\lambda_{+0,5,m2}^{n+1}}{\Delta x_1} (T_1 - T_0)^{n+1} - \frac{\lambda_{0,m2}^{n+1}}{\Delta x_0} (T_0 - T_B)^{n+1} \right] \\ & + \frac{\Delta t\sigma}{\Delta \bar{x}_0} \left[ \frac{\lambda_{+0,5,m2}^n}{\Delta x_1} (T_1 - T_0)^n - \frac{\lambda_{0,m2}^n}{\Delta x_0} (T_0 - T_B)^n \right]. \end{aligned} \quad (5)$$

Здесь  $\Delta \bar{x}_0 = \frac{\Delta x_0 + \Delta x_1}{2}$ ;  $\Delta x_0$  - отрезок VB;  $\Delta x_1$  - отрезок AV.

Используя уравнения (4) и (5) исключим фиктивные переменные  $\Delta x_1$  и  $T_B$  в уравнении (3). Получим равенство:

$$A_0 T_1^{n+1} - C_0 T_0^{n+1} + B_0 T_{-1}^{n+1} + F_0 = 0, \quad (6)$$

содержащее на  $(n+1)$  - ом временном слое только переменные  $T_1^{n+1}$ ,  $T_0^{n+1}$ ,  $T_{-1}^{n+1}$ .

$$\text{Здесь: } A_0 = \frac{\Delta t(1-\sigma)}{\Delta \bar{x}_0} \frac{\lambda_{+0,5,m2}^{n+1}}{\Delta x_1} \left[ 1 + \frac{\Delta x_0}{\Delta x_1} \frac{\lambda_{+0,5,m2}^{n+1}}{\lambda_{0,m2}^{n+1}} \right]; \quad B_0 = \frac{\Delta t(1-\sigma)}{\Delta \bar{x}_0} \frac{\lambda_{-0,5,m1}^{n+1}}{\Delta x_0} \left[ 1 + \frac{\Delta x_0}{\Delta x_1} \frac{\lambda_{+0,5,m1}^{n+1}}{\lambda_{-0,5,m1}^{n+1}} \right];$$

$$C_0 = \frac{\Delta t(1-\sigma)}{\Delta \bar{x}_0} \left[ \frac{\lambda_{0,m1}^{n+1}}{\Delta x_1} + \frac{\lambda_{-0,5,m1}^{n+1}}{\Delta x_0} + \frac{\lambda_{+0,5,m1}^{n+1}}{\Delta x_1} + \frac{(\lambda_{+0,5,m2}^{n+1})^2}{(\Delta x_1)^2} \cdot \frac{\Delta x_0}{\lambda_{0,m2}^{n+1}} \right].$$

$$F_0 = (c\rho)_{0,m1}^n T_0^n + \frac{\Delta t\sigma}{\Delta \bar{x}_0} \left[ \frac{\lambda_{0,m1}^n}{\Delta x_1} (T_A - T_0)^n - \frac{\lambda_{-0,5,m1}^n}{\Delta x_0} (T_0 - T_{-1})^n \right] + \frac{\lambda_{0,m1}^{n+1}}{\lambda_{-0,5,m1}^{n+1}} \frac{\Delta x_0}{\Delta x_1} \left\{ (c\rho)_{0,m2}^n T_0^n + \frac{\Delta t\sigma}{\Delta \bar{x}_0} \left[ \frac{\lambda_{+0,5,m2}^n}{\Delta x_1} (T_1 - T_0)^n - \frac{\lambda_{0,m2}^n}{\Delta x_0} (T_0 - T_B)^n \right] \right\}.$$

Перемещаясь в направлении увеличения  $i$  в однородном материале  $m1$  и показывая, что все  $\alpha_i$  ( $i = 2, 3, \dots$ ) меньше единицы, получим и  $\alpha_0 < 1$ .

Подставим в уравнение (6) выражение  $T_{-1}^{n+1} = \beta_0^{n+1} + \alpha_0^{n+1} T_0^{n+1}$  получим:

$$A_0 T_1^{n+1} - C_0 T_0^{n+1} + B_0 [\beta_0^{n+1} + \alpha_0^{n+1} T_0^{n+1}] + F_0 = 0. \text{ Отсюда } T_0^{n+1} = \beta_1^{n+1} + \alpha_1^{n+1} T_1^{n+1} \text{ где } \beta_1^{n+1} = \frac{B_0 \beta_0^{n+1} + F_0}{C_0 - B_0 \alpha_0^{n+1}};$$

$$\alpha_1^{n+1} = \frac{A_0}{C_0 - B_0 \alpha_0^{n+1}}. \text{ Рассмотрим разность } C_0 - B_0 \alpha_0^{n+1}. \text{ Видим, что коэффициент } B_0$$

совпадает с первыми двумя слагаемыми  $C_0$ . Но так как  $\alpha_0^{n+1} < 1$ , то в результате вычитания  $B_0 \alpha_0^{n+1}$  из двух первых слагаемых  $C_0$  получим положительное число. Коэффициент  $A_0$  совпадает с двумя следующими слагаемыми  $C_0$ . Учитывая наличие других положительных слагаемых в выражении  $C_0$  можем утверждать, что знаменатель выражения для  $\alpha_1^{n+1}$  больше числителя и поэтому  $\alpha_1^{n+1} < 1$ . Имея  $\alpha_1^{n+1} < 1$ , для  $\alpha_i^{n+1}$  ( $i = 2, 3, \dots, N$ ) с  $i \geq 2$  можем показать так, как это было выполнено выше, что они тоже меньше единицы.

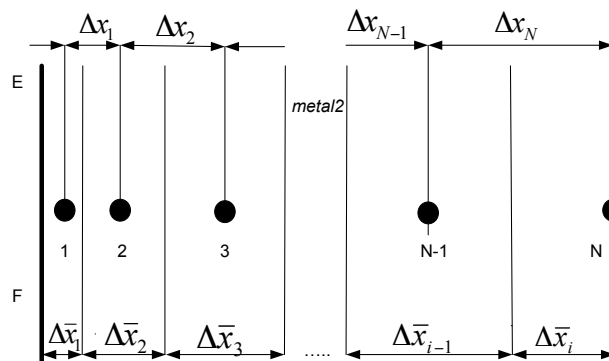
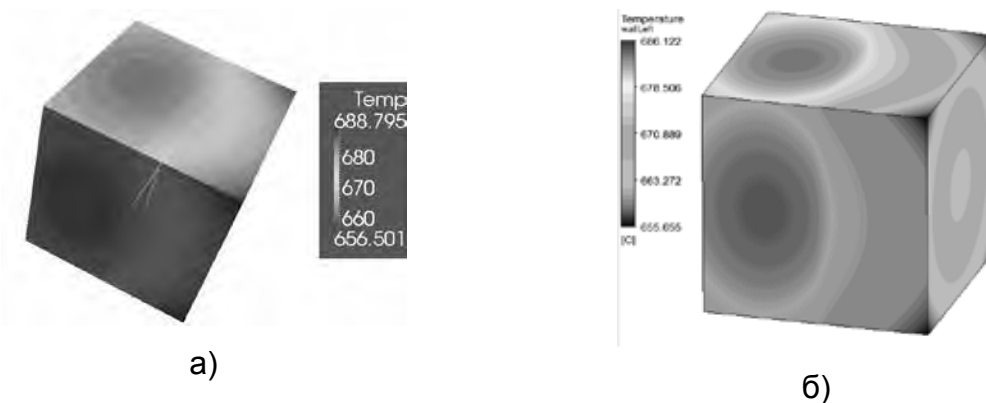


Рисунок 2. Измельчение сетки на границе перехода

Для получения сходящегося решения с заданной точностью необходимо сделать измельчения разностных сеток как со стороны *metal1*, так и со стороны *metal2* (Рис.2).

### Результаты численных расчетов

**Пример 1.** Рассмотрим процесс охлаждения высокотемпературного тела с начальной температурой  $T_0 = 1000^\circ\text{C}$ , температура охлаждающей среды  $T_l = 20^\circ\text{C}$ , коэффициент температуропроводности  $a = 7 \cdot 10^{-6} \text{ м}^2/\text{с}$ . Коэффициент теплоотдачи с поверхности в процессе охлаждения принят постоянным и равным  $\alpha = 170 \text{ Вт}/(\text{м}^2\text{°C})$ . Геометрией расчетной сетки  $X=0,01 \text{ м}$ ;  $Y=0,01 \text{ м}$ ;  $Z=0,01 \text{ м}$ . Расчетная схема состоит из 620000 расчетных узлов по  $X$  62; по  $Y$  100; по  $Z$  100. Примем, что  $\lambda_1 \neq \lambda_2$ .  $\lambda_1 = 32 \text{ Вт}/(\text{м}^\circ\text{C})$  на участке  $X/2$ , а второй участок  $X/2$  имеет  $\lambda_2 = 57 \text{ Вт}/(\text{м}^\circ\text{C})$ . Сгущение сетки производим только по направлению координаты  $X$  с кратностью равной  $k = 2\Delta\bar{x}_i/\Delta\bar{x}_1$ .

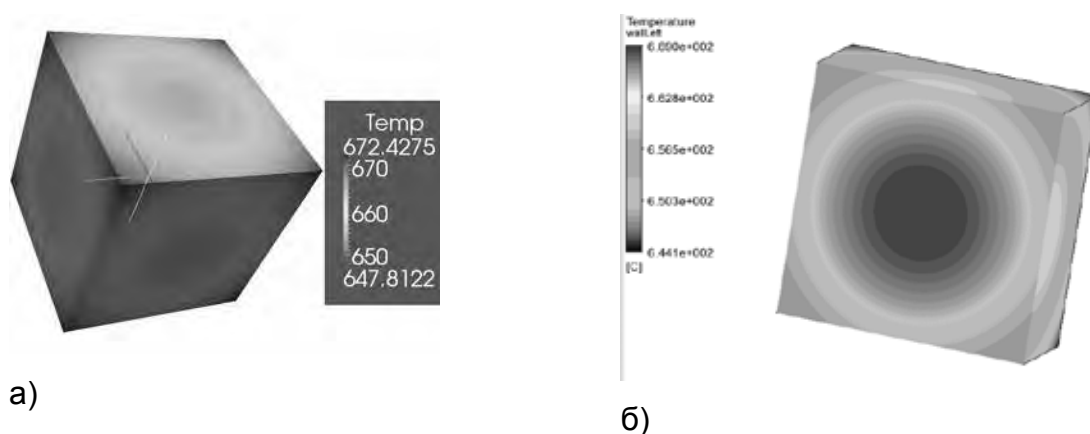


**Рисунок 3. Температура в расчетных узлах за время  $t = 25 \text{ с}$  шаг по времени  $\Delta t = 0,03 \text{ с}$  а) расчет по предлагаемой модели  $k = 25$ ; б) расчет в ANSYS**

При заданных исходных данных примера расхождение результатов по предлагаемой модели (Рис. 3, а) с численным решением в ANSYS (Рис. 3, б) составило порядка 0,3%. Это связано в первую очередь с методом решения и расчетными параметрами сетки.

**Пример 2.** Воспользуемся геометрическими параметрами расчетной сетки примера 1 при условии, что теплофизические параметры материала тела:

$\lambda_1 = \lambda_2$ ,  $c, \rho, \lambda$  будут переменными от температуры. Примем в качестве материала – сталь 45. Параметры для металла изменяются согласно интерполяционным зависимостям, полученным при обработке табличных данных [4] в диапазоне от 20 °C до 800 °C:  $\lambda = -0.000025529T^2 - 0.00668764T + 48.58873$ ;  $c = 0.00020939T^2 + 0.14089T + 476.08223$ ;  $\rho = 0.0000951467T^2 - 0.4018T + 7839.6$ . Расчет проведем с начальной температурой тела  $T_0 = 800^\circ\text{C}$ , температура охлаждающей среды  $T_l = 20^\circ\text{C}$ ,  $k = 19$ .



**Рисунок 4. Температура в расчетных узлах за время  $t = 10$  с шаг по времени  $\Delta t = 0,03$  с  $c, \rho, \lambda = f(T)$  а) расчет по модели; б) расчет в ANSYS**

Расхождение полученных результатов по разработанной модели (Рис. 4, а) с численным решением в ANSYS (Рис. 4, б) составило для граничных и центральных узлов порядка 0,5%.

### Заключение

Приведенные результаты численных решений задач нестационарного теплообмена при охлаждении высокотемпературного металлического тела прямоугольной формы в зависимости от геометрии, теплофизических свойств материала тела и времени процесса показывают адекватность разработанной математической модели. Сопоставление численных расчетов с аналитическими данными и результатами, полученными с помощью программы ANSYS, позволяет говорить об удовлетворительной точности расчетной модели.

Это значит, что изложенный в статье алгоритм численного решения уравнений (1) можно применять и при решении других задач, где программы ANSYS не могут быть использованы.

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## Medicine, Biology & Chemistry

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### ***Impaired Fasting Glucose & 8-Iso-Prostaglandin F<sub>2α</sub> in Diabetes Disease Progression***

#### **ABSTRACT**

**Aims:** The objective of the present study was to evaluate the changes of 8-isoprostaglandin F<sub>2α</sub> and other markers of oxidative stress with impaired fasting glucose when compared to non-diabetic control participants.

**Methodology:** This is a cross-sectional study, conducted at Charles Sturt University, Albury, NSW, Australia and included 428 participants (female: male, 247:181) participants attending the Diabetes Complications Clinic in the School of Community Health for the period between January 2011 to October 2012.

**Results:** Urinary 8-isoprostaglandin F<sub>2α</sub> was significantly greater in the impaired fasting glucose group (1.4±1.3ng/ml) compared to control group (0.68±0.5ng/ml,  $P=.05$ ). The increase in urinary 8-isoprostaglandin F<sub>2α</sub> was associated with a significant elevation in serum total cholesterol (4.7±1.1mol/L,  $P=.04$ ) and a significant reduction in high density lipoprotein cholesterol (1.4±0.4mmol/L,  $P=.02$ ) in the impaired fasting glucose group compared to the control group. A significant negative

correlation was noted between urinary 8-isoprostaglandin  $F_{2\alpha}$  and high-density lipoprotein cholesterol among all the participants included in this study ( $P=.05$ ).

**Conclusions:** The current study proves the importance of measuring markers of oxidative stress, expressed by urinary 8-isoprostaglandin  $F_{2\alpha}$  and serum lipids in managing cases of impaired fasting glucose and suggests a useful biomarker for assessing disease progression and/or remission, especially in the prediabetic state.

**Keywords:** Oxidative stress; impaired fasting glucose; 8-isoprostaglandin  $F_{2\alpha}$ ; serum lipids.

## 1. INTRODUCTION

Patients with diabetes mellitus type 2 (DMT2) have an impaired redox state, with impaired antioxidant activity primarily associated with the glutathione-glutathione disulfide (GSH: GSSG) redox, thioredoxin-1 and plasma cysteine/cysteine reactions [1-3] as hyperglycemia causes cellular oxidative stress, which through generating free radicals, leads to diabetes complications, some of which may already manifest in the impaired fasting glucose (IFG) stage [4,5]. Cardiovascular disease, as a complication of diabetes progression, develops as a result of transient or chronic hyperglycemia due to polyol pathway flux, formation of advanced glycation end products and over activity of the hexosamine pathway [6-8]. These pathophysiological changes are in turn linked with lipid peroxidation, oxidative stress, and inflammation seen in IFG and diabetes [9]. Lipid peroxidation is most often measured using malondialdehyde (MDA) and 8-iso-prostaglandin  $F_{2\alpha}$  (8-iso-PGF $_{2\alpha}$ ) [10-12]. Oxidative stress can be determined by GSH and 8-hydroxy-2-deoxyguanosine (8-OHdG) assays [13-15]. GSH is a global antioxidant primarily located in erythrocytes, while 8-OHdG is correlated with endothelial DNA damage caused by oxidative stress.

Increased fasting blood glucose (FBG) and postprandial blood glucose (PBG) levels, glycated hemoglobin (HbA1c), low density lipoprotein-cholesterol (LDL-C) and triglycerides (TG) are associated with oxidative stress progression and diabetes complications. IFG can lead to atherosclerosis through glucose self-oxidation, protein oxidation and lipid peroxidation [16-20]. Progression of atherosclerosis in turn leads to an increase in 8-OHdG, interleukin-6 (IL-6), C-reactive protein (CRP), MDA and 8-iso-PGF $_{2\alpha}$  [12,14,21].



The pathophysiological imbalance between LDL-C, high density lipoprotein-cholesterol (HDL-C), triglycerides and blood glucose levels (BGL) are already present in the IFG state and increases the risk of coronary heart disease and arrhythmia [13,22-25]. Impaired fasting glucose is a preclinical stage of diabetes characterized by intermittent or chronic increases in BGL above 5.5 mmol/L and below 7 mmol/L [26]. Increased levels of BGL and triglycerides have been shown to be associated with increased endothelial dysfunction and oxidative stress [27,28].

Isoprostanes are stable products of arachidonic acid peroxidation due to free radical activity and reliable biomarkers for oxidative stress, which are suitable for measures of lipid peroxidation in place of MDA [29]. Isoprostanes, including 8-iso-PGF<sub>2α</sub> are stable in biological fluids and easily detectable as well as not being affected by diet and modulated by endogenous antioxidants [30]. Plasma levels of 8-iso-PGF<sub>2α</sub> have been associated with atherosclerosis and coronary artery disease as well as DM2 [31-33]. In contrast to cross-sectional studies where 8-iso-PGF<sub>2α</sub> have been shown to be increased in type 2 diabetes, longitudinal studies have shown an inverse relationship between the level of 8-iso-PGF<sub>2α</sub> and risk of diabetes independent of traditional risk factors [33,34]. This inverse relationship may occur due to either lower levels of HDL-C or HDL-C losing some of its antioxidant potential with increased blood glucose levels or hypertriglyceridemia affecting redox balance differently.

Multiple metabolic pathways are therefore associated with oxidative stress and the development of diabetes and its complications. Whether these changes are seen in impaired fasting glucose and the relationship between antioxidant activity cholesterol and isoprostane levels is not clear and this paper aims to elucidate some of this [35].

## 2. METHODOLOGY

Data for this study was obtained from patients attending the diabetes complications clinic at Charles Sturt University, Albury, NSW, Australia. All participants were recruited via public media announcements. Those with diabetes, cardiovascular or renal disease were excluded from the analysis. Twenty-five participants with IFG were included in this study. IFG was set between 5.5 mmol/L to 7 mmol/L in accordance with the American Diabetes Association [36]. Thirty-eight subjects were included in the control group. The research was approved by the Human Ethics in

Research Committee, Charles Sturt University. Medications used by the participants are listed in (Table 1).

**Table 1. Medications used by the participants in this study**

	Control (n=38)	IFG (n=25)	P
Aspirin/clopidogrel	9	4	ns
Statins	8	14	.04
Antihypertensives	12	14	.006
Diuretics	3	4	ns

*\*ns-non significant*

After an overnight fast, whole blood specimens were collected into heparin and EDTA tubes for analysis. Plasma was separated within 1 hour by centrifugation at 1000 x g for 10 min. Plasma from heparin-containing tubes was immediately used for lipid analysis. Plasma from EDTA-containing tubes was kept at -80°C for serum 8-OHdG and GSH analysis. Fresh blood was kept on ice for not more than 1 hour to measure GSH. The level of erythrocyte reduced glutathione (GSH) was determined using the 5,5-dithiobis-2-nitrobenzoic acid (DTNB) reaction [37]. 8-isoprostane was determined by a urinary Isoprostane ELISA Kit (Northwest, USA), which uses a competitive ELISA strategy, allowing the 8-isoprostane contained in samples and standards to compete with a 8-isoprostane-horseradish peroxidase conjugate for binding to a specific antibody pre-coated on a microplate. The blue colour development after addition of the horseradish peroxidase substrate is inversely proportional to the amount of 8-isoprostane in the samples and standards and changes to yellow after stopping the reaction with acid. Absorbance is measured at 450 nm. Urine 8-OHdG was measured using an EIA Kit, Cayman Chemical, MI, USA [38]. The test utilizes an anti-mouse IgG-coated plate and a tracer consisting of an 8-OHdG-enzyme conjugate, which detects all three oxidized guanine species; 8-hydroxy-2'-deoxyguanosine from DNA, 8-hydroxyguanosine from RNA and 8-hydroxyguanine from either DNA or RNA. This format has the advantage of providing low variability and increased sensitivity compared with assays that utilize an antigen coated plate and only detect 8-hydroxy-2'-deoxyguanosine. 8-iso-PGF<sub>2α</sub> was also measured using an EIA Kit, Cayman Chemical, MI, USA.

Fasting plasma total cholesterol (TC), triglycerides (TG) and high-density lipoprotein cholesterol (HDL-C) were measured by standard techniques. TC and TG were determined with a commercial enzymatic kit. HDL-C was determined by

immunoinhibition assay. Low-density lipoprotein cholesterol (LDL-C) was calculated according to the Friedewald formula [39].

**Statistical analysis:** The data was analyzed using SPSS (Version 14) and Microsoft Excel (Office 2007, Microsoft). All values were expressed as mean  $\pm$  standard deviation (M  $\pm$  SD). Statistical analysis was performed using an independent sample t-test. In all tests,  $P < .05$  was considered to be statistically significant. Power analysis was performed for a median effect size and high power, providing a sample number of 27 with a p value of 0.05.

### 3. RESULTS

During the screening period of January 2011 to October 2012, 428 participants (female: male, 247:181) attended the diabetes screening clinic. After exclusions, 25 participants were identified with an impaired fasting blood glucose levels (IFG) in the range defined by the American College of Endocrinology [36] and 38 participants had no IFG/diabetes. Table 2 shows the demographics and biomarker results of the study.

The blood glucose level (BGL) was significantly different between the two groups as expected with a near statistically significant rise in HbA1c in the IFG group ( $P = .052$ ). 8-iso-PGF<sub>2 $\alpha$</sub>  was significantly elevated in the IFG group ( $P = .02$ ) (Fig. 1). Both total cholesterol and HDL-C were significantly lower in the IFG group, while triglycerides and LDL-C showed no difference between the groups (Table 2).

**Table 2. Demographics and biomarkers of the study population**

Parameters	Control(38)	IFG(25)	P value
Age (yrs)	64 $\pm$ 11	65.4 $\pm$ 9	ns
Male/Female ratio	17/21	11/14	ns
BGL (mmol/L)	4.9 $\pm$ 0.5	6.3 $\pm$ 0.4	.001
HbA1c (%)	5.7 $\pm$ 0.7	6.2 $\pm$ 0.6	ns (.052)
BMI (kg/m <sup>2</sup> )	25.7 $\pm$ 4.4	26.4 $\pm$ 5	ns
TC (mmol/L)	5.4 $\pm$ 0.9	4.7 $\pm$ 1.1	.04
Triglycerides (mmol/L)	1.2 $\pm$ 0.6	1.3 $\pm$ 0.7	ns
HDL-C (mmol/L)	1.7 $\pm$ 0.5	1.4 $\pm$ 0.4	.02
LDL-C (mmol/L)	3.1 $\pm$ 0.8	2.6 $\pm$ 0.9	ns
TC/HDL-C	3.3 $\pm$ 0.9	3.5 $\pm$ 1	ns
8-OHdG (ng/ml)	119.3 $\pm$ 81.2	132.6 $\pm$ 108.5	ns
GSH (mg/100ml)	68.4 $\pm$ 16.2	58.9 $\pm$ 21.5	ns
GSSG (mg/100ml)	28.9 $\pm$ 17.9	21.6 $\pm$ 8.9	ns
GSH:GSSG	6.6 $\pm$ 4.4	6.1 $\pm$ 3.2	ns
8-iso-PGF <sub>2<math>\alpha</math></sub> (ng/ml)	0.68 $\pm$ 0.5	1.4 $\pm$ 1.3	.02
AIP	-0.18 $\pm$ 0.3	-0.09 $\pm$ 0.27	ns

\*ns-non significant

The atherogenic index of plasma (AIP), which reflects the balance between atherogenic and protective lipoproteins, was in the normal range for both groups suggesting a low risk of CVD. Oxidative stress measured by 8-OHdG was elevated with redox balance (GSH: GSSG) reduced but neither reached significance (Table 2).

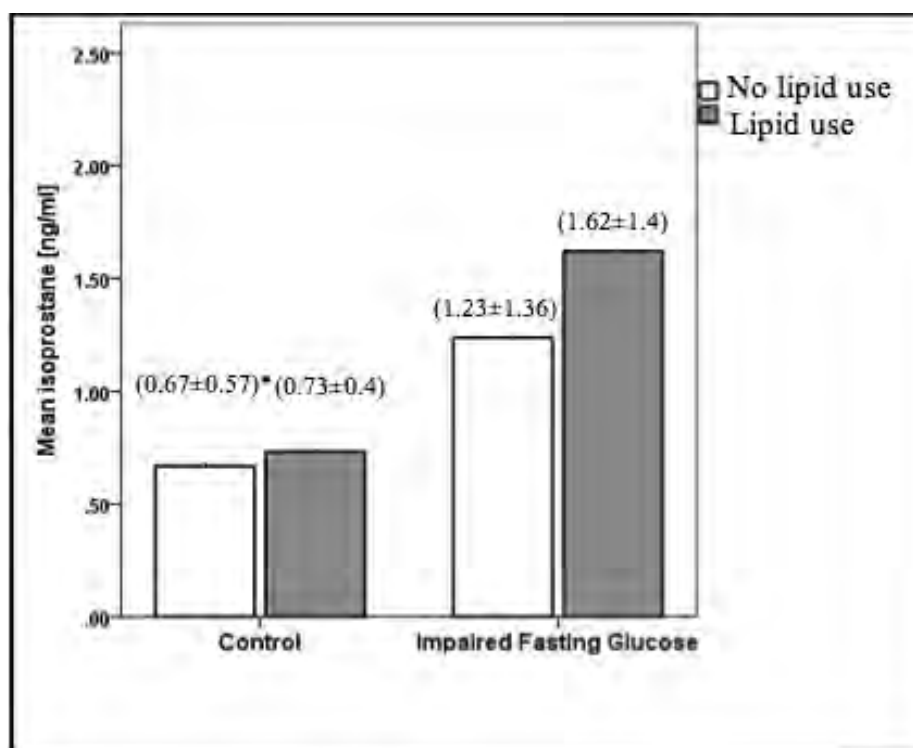
Pearson correlation analysis showed a significant negative correlation between 8-iso-PGF<sub>2α</sub> & HDL-C (Table 3). This correlation wasn't significant with other parameters of this study (Table 3).

**Table 3. Pearson correlation between significant markers found in this study**

Parameters	HDL (mmol/L)	Isoprostane (ng/ml)	HbA1c (%)
Isoprostane (ng/ml)	-0.4(0.002)*		
HbA1c (%)	-0.27(0.07)	0.2(0.15)	
TC (mmol/L)	0.4(0.001)	-0.4(0.001)	-0.16(0.25)

\*Pearson Correlation Coefficient (*P* value <.05)

No significant difference in 8-iso-PGF<sub>2α</sub> was observed when statin use was considered in the analysis (Fig. 1).



**Fig. 1. The mean values of 8-iso-PGF<sub>2α</sub> in both the control group and the IFG group with and without the use of lipid lowering medication**

#### 4. DISCUSSION

Our data demonstrates a significant increase in 8-iso-PGF<sub>2α</sub> in the IFG group, which means that lipid peroxidation is definitely present during the IFG stage and supports Gopaul, et al.'s findings that 8-iso-PGF<sub>2α</sub> was increased following an oral glucose tolerance test in individuals with no diabetes but with either IFG or impaired glucose tolerance [40]. These authors suggested that oxidative stress identified by elevated 8-iso-PGF<sub>2α</sub> levels precedes glucose intolerance and insulin resistance. However other studies argue for no direct causal link between 8-iso-PGF<sub>2α</sub> and a decrease in insulin sensitivity [41]. This indicates the presence of other oxidative stress associated pathways and the necessity to identify these to better understand disease progression even into the preclinical domain. Changes in serum lipids in type 2 diabetes have also been demonstrated in the IFG stage and are associated with oxidation of arachidonic acid to 8-iso-PGF<sub>2α</sub> [42,43,37]. In our current study there was a significant reduction in both total cholesterol and HDL-C, which explains the increased 8-iso-PGF<sub>2α</sub> as HDL-C carries 8-iso-PGF<sub>2α</sub> [11]. Of importance is that no significant change in serum lipids in response to the statin use was noted. This may be related to the fact that LDL-C does not play a major role in diabetes disease progression. Furthermore, the type of statin medication used may possess variable effects on lipid peroxidation and oxidative stress and hence variation in the levels of 8-iso-PGF<sub>2α</sub> [22,44].

The increase in 8-iso-PGF<sub>2α</sub> shown in the current research is associated with a non-significant decrease in GSH and GSSG with a concomitant increase in 8-OHdG. The decrease in GSH suggests that the intracellular erythrocyte pool is depleting due to its role in the detoxification of aldehydes associated with lipid peroxidation [45] but in our study it has not reached a significant value.

It is worth mentioning here that IFG forms approximately 15% of the patients newly diagnosed with high blood glucose and is confirmed by either impaired fasting glucose or impaired glucose tolerance [46]. IFG can be viewed as a multifactorial disease with increased risk of developing diabetes mellitus and its complications. Therefore the etiology of IFG needs to be carefully determined with reference to the multiple biochemical pathways associated with hyperglycemia and associated oxidative stress and inflammation.

## 5. CONCLUSION

The current study illustrates that lipid peroxidation, expressed by urinary 8-isoprostaglandin  $F_{2\alpha}$ , is already present in IFG. In addition, oxidative DNA damage and impaired antioxidants, which may be associated with endothelial dysfunction may be present at this stage as demonstrated by the increased 8-OHdG and decreased GSH levels. These findings provide a useful way of assessing disease progression and/or remission in response to the treatment.

## CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this study.

## ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

## COMPETING INTERESTS

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

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## ***Could Mean Platelet Volume and Red Cell Distribution Width Predict Vitamin B12 Deficiency?***

### **ABSTRACT**

**Aims:** Vitamin B12 deficiency causes an increase in homocysteine levels which is associated with inflammatory conditions. Mean platelet volume (MPV) and red cell distribution width (RDW) are also associated with inflammation. Therefore, we aimed to compare hematological parameters in patients with and without vitamin B12 deficiency to find out whether they could predict vitamin B12 deficiency.

**Methods:** Patients who underwent vitamin B12 assessment grouped based on the serum level of vitamin B12. We grouped 116 patients, whose B12 level was lower than 250, in first group and 62 patients, whose B12  $\geq$  250 pg/ml, in second group.

**Results:** Red cell distribution width was significantly higher in group 1 (patients with a vitamin B12 level lower than 250 pg/ml) compared to those in group 2 (patients with a vitamin B12 level higher than 250 pg/ml). Mean platelet volume was significantly lower in group 1 compared to group 2.

**Conclusion:** We suggest that MPV and RDW should be an indicator of vitamin B12 deficiency especially in early stages of the disease. However, prospective studies with larger cohort are needed to confirm our results.

**Keywords:** vitamin B12; mean platelet volume; red cell distribution width; inflammation.

## 1. INTRODUCTION

Vitamin B12 is an important nutrient which can not be produced in vivo by human. Vitamin B12 deficiency occurs as a consequence of reduced oral intake or impaired absorption. Vegetarian diet, alcohol consumption, smoking, gastric acid suppression and drugs (i.e Metformin) may cause vitamin B12 deficiency [1-4]. Hematologic (anemia alone or accompanied with leukopenia or thrombocytopenia) and neurologic disorders occur usually in later periods of the deficiency [1,5]. Diagnosis of the disease is easy in these stages, however, early diagnosis, which is very important to avoid irreversible neurological damage, is confusing due to laboratory methods and lack of symptoms [6,7]. Macro-ovalocytosis in erythrocytes and hypersegmentation in the nuclei of neutrophil are two major findings of vitamin B12 deficiency in peripheral blood smear. On the other hand, hematocrit (Htc) and mean corpuscular volume (MCV) might be normal in vitamin B12 deficiency even in cases presented with neurological disorders [8].

Homocysteine levels increase in serum of the patients with vitamin B12 deficiency [9-11] and lead to hyperhomocysteinemia, which is considered as a risk factor for atherosclerosis [11,12]. Treatment of vitamin B12 deficiency not only corrects the level of vitamin B12, but also reduces serum homocysteine levels [13]. On the other hand, inflammation had been found as an underlying pathological mechanism in atherosclerosis [14].

Mean platelet volume (MPV), and red cell distribution with (RDW) are hemogram parameters that authors speculate that both two were associated with inflammation and inflammatory conditions [15,16]. Moreover, atherosclerosis is characterized with subclinical inflammation and data in literature suggest that it is associated with both RDW and MPV [17,18].

In present retrospective study, we aimed to compare hematological parameters in patients with and without vitamin B12 deficiency to find out whether they could predict vitamin B12 deficiency.

## 2. MATERIALS AND METHODS

Patients who underwent vitamin B12 assessment grouped based on the serum level of vitamin B12. Laboratory data obtained from computerized database of our institution. Patients with chronic inflammatory disease, diabetes mellitus, coronary artery disease and congestive heart failure were excluded from the study

because these conditions may affect MPV and RDW levels. We also did not include subjects with an elevated white blood cell count which probably indicates recent infection. Patients with iron deficiency or with a history of iron replacement therapy in last six months were also excluded. Remaining 178 patients grouped into two groups according to the serum B12 level. Previous studies usually grouped patients at a cut point B12 level of 250 pg/ml [19], therefore, we grouped 116 patients, whose B12 level was lower than 250, in first group and 62 patients, whose  $B12 \geq 250$  pg/ml, in second group. The reference range of serum Vitamin B12 was 191-663 pg/ml in the laboratories of our institution.

The complete blood count analyses were performed in automatic analyser of LH 780 model of Beckman Coulter device (Beckman Coulter Inc.; Bre CA). Electro-chemiluminescent assay performed in the detection of serum vitamin B12 assessment (Roche Cobalt e 601).

Patients' characteristics and laboratory data; white blood cell count (WBC), neutrophil count (neu), lymphocyte count (lym), eosinophil count (eos), hemoglobin (Hb), hematocrit (Hct), mean corpuscular volume (MCV), red cell distribution width (RDW), platelet count (PLT), mean platelet volume (MPV), platelet distribution width (PDW) recorded.

SPSS software (SPSS 15.0 for Windows Chicago, IL, USA) used for statistical analysis. Patients characteristics and laboratory data of the groups compared either with student t test (for normal distributed variables) or with Mann Whitney U test (for non normally distributed variables). A spearman correlation analyze performed to detect correlation of the variables. Statistically significance set on  $p < 0.05$  level. The study was approved by local ethics committee of Abant Izzet Baysal University.

### 3. RESULTS

General characteristics and laboratory data of the patients in study groups summarized in Table 1.

Age was not significantly different between groups ( $p=0.23$ ). Similarly, gender was not different between groups ( $p=0.91$ ), either. There was no significant difference between study groups in terms of following laboratory parameters: WBC, Neu, Lym, Eos, Hb, Hct, MCV, PLT and PDW (all  $p > 0.05$ ).

**Table 1. Characteristics and laboratory data of the study groups**

		<b>Group 1 (Vitamin B12&lt;250 pg/ml)</b>	<b>Group 2 (Vitamin B12≥250 pg/ml)</b>	<b>p</b>
Gender (n)	Male	27	14	0.91
	Female	89	48	
Median (Min-Max)				
Age (years)		23.5 (20-73)	25 (19-75)	0.23
WBC (u/mm <sup>3</sup> )		6.4 (4.1-9.8)	6.7 (4.3-9.6)	0.24
Neu (u/mm <sup>3</sup> )		3.7 (1.7-7)	3.7 (1.7-6.7)	0.87
Lym (u/mm <sup>3</sup> )		1.9 (0.6-4)	2 (0.8-3.9)	0.27
Eos (u/mm <sup>3</sup> )		0.1 (0-0.5)	0.1 (0-0.9)	0.21
RDW(%)		16.5 (15.6-18.8)	16.3 (14.4-18.1)	0.031
MPV (fL)		8.2 (6.3-11.4)	8.6 (4.9-12)	0.026
PDW (%)		13.7 (11.6-28.9)	13.8 (11.5-27.4)	0.48
VitB12 (pg/ml)		180 (150-247)	315 (250-899)	<0.001
Mean±Standard Deviation				
Hb (g/dL)		13.6±1.1	13.7±1.2	0.89
Htc (%)		40.1±3.4	40.5±3.4	0.58
MCV (fL)		87±4.7	87.7±5.2	0.40
PLT (u/mm <sup>3</sup> )		262±60	268±94	0.62

RDW was significantly higher in group 1 (patients with a vitamin B12 level lower than 250 pg/ml) compared to those in group 2 (patients with a vitamin B12 level higher than 250 pg/ml) [16.5 (15.6-18.8) in group 1 and 16.3 (14.4-18.1) in group 2]. The difference was statistically significant (p=0.031).

Mean platelet volume was significantly lower in group 1 compared to group 2 [8.2 (6.3-11.4) in group 1 and 8.6 (4.9-12) in group 2], and the difference reached statistical significance (p=0.026).

Serum vitamin B12 level was significantly lower in group 1 [180(150-247pg/ml)] compared to group 2 [315 (250-899 pg/ml)] (p<0.001).

In correlation analysis, we figured out that vitamin B12 was significantly correlated with MPV (p=0.017) (r=0.178). However, serum vitamin B12 level was not correlated with any other hemogram parameters.

#### 4. DISCUSSION

We found that RDW and MPV were significantly different in patients with vitamin B12 deficiency compared to the patients with normal vitamin B12 serum levels.

MPV refers the size of circulating platelets and red cell distribution width refers the size variability of erythrocytes. Literature is full of data reported association between both these two hemogram parameters and overt or subclinical inflammatory processes [16,20-23]. Vitamin B12 deficiency may be associated with occult inflam-



mation by homocysteine increasing pathway. It is well established that serum homocysteine levels increase in vitamin B12 deficiency [9] and homocysteine is considered to be associated with inflammation [24]. Because homocysteine plays important role in inflammation, one can conclude that vitamin B12 deficiency should be associated with inflammatory conditions. The results of our study encourage this hypothesis.

Elevation in serum homocysteine has been described as a risk factor for atherosclerosis, and for arterial and venous thromboembolism [11] and similarly, MPV has been found to be associated with such conditions too [18,25]. Therefore, we can suggest that homocysteine and MPV act interrelated in the course of inflammation. The results of Mohan et al's study reporting that homocysteine promoted platelet activation, suggest this hypothesis [26].

Why RDW increase in Vitamin B12 deficiency? A deficiency in vitamin B12 results on a defect in DNA synthesis, therefore, leads to unbalanced growth and impaired division of hematopoietic cells. Thus, larger and normal sized erythrocytes should be produced in bone marrow which causes an elevation in RDW. Another explanation could be about the association between vitamin B12 deficiency and inflammation. Since RDW has been found to be related with inflammatory conditions and vitamin B12 deficiency is considered to be connected with inflammation via homocysteine increase, an elevated RDW in vitamin B12 deficiency should reflect the inflammatory burden of the disease. Similar to the results of present study, elevated RDW in vitamin B12 deficiency has been reported in literature by Ponstaporn et al. [27] and Bhatia et al. [28].

We showed that MPV was lower in patients with vitamin B12 deficiency than in the patients without vitamin B12 deficiency. Similar to our results, some authors pointed an involvement of MPV in inflammation [16,20]. Furthermore, changes in MPV have been found to be related with acute myocardial infarction, an important outcome of atherosclerosis (18). Possible reasons for this difference in MPV in vitamin B12 deficiency may be include inflammation related to vitamin B12 deficiency may interact with megakariopoiesis in bone marrow and cause production of smaller platelets. Another explanation should be that active platelets tend to be larger in diameter and they involve in inflammatory conditions. After utilization of active platelets in inflammatory processes, remaining smaller platelets may be responsible of the reduction in MPV.

Our results indicated that RDW and MPV changes occur in such an early stage of the deficiency before other well established hematological changes developed are very important. Because, authors do not rely on MCV in the diagnosis of vitamin B12 deficiency due to that it has been reported to be normal between reference range even in patients with suspected vitamin B12 deficiency [28,29]. Besides, Loikas et al reported that neither anemia nor macrocytosis predicted vitamin B12 deficiency [30].

Retrospective design and relatively small study population are two important limitations of present study. Moreover, we could not discuss the homocysteine levels of our study population because of retrospective design.

## **5. CONCLUSION**

In conclusion, we think that MPV and RDW should be an indicator of vitamin B12 deficiency especially in early stages of the disease in patients without cytopenias. However, prospective studies with larger cohort are needed to confirm our results.

## **CONSENT**

Not applicable.

## **ETHICAL APPROVAL**

Present study was approved by local ethics committee of Abant Izzet Baysal University.

## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## ***Dexmedetomidine Ameliorates Histological and Neurological Outcomes after Transient Spinal Ischemia in Rats***

### **ABSTRACT**

**Aims:** Dexmedetomidine, an D<sub>2</sub>adrenergic agonist, provides neuroprotection in various cerebral ischemia models and against anesthesia-related neurotoxicity. Dexmedetomidine also improves paraplegia induced by intrathecal morphine after short-term spinal ischemia. In this preliminary study, we investigated whether dexmedetomidine provides spinal protection against transient spinal ischemia in rats. **Methodology:** Adult male Sprague-Dawley rats were randomly divided into the following 3 groups: 1) intravenous infusion of 0.9% NaCl at a rate of 0.5 ml/h (control), 2) dexmedetomidine 1 µg/kg/h, and 3) intravenous infusion of 0.9% NaCl without spinal ischemia (sham). The rats received saline solution or dexmedetomidine 30 min before spinal cord ischemia and for 24 h. Spinal cord ischemia was induced by intra-aortic balloon occlusion combined with proximal arterial hypotension for 10 min. Ischemic injury was assessed by the neurological deficit score and by the number of viable motor nerve cells in the anterior spinal cord at 24 h of reperfusion.

**Results:** The neurological deficit score was significantly lower in the dexmedetomidine group compared to the control group ( $p < 0.05$ ). The number of viable motor nerve cells in the dexmedetomidine group was significantly greater than was that in the control group ( $p < 0.05$ ), but was lower than was that in the sham group.

**Conclusion:** Our findings suggest that continuous administration of dexmedetomidine ameliorates short-term neurological and histological outcomes induced by transient spinal cord ischemia and reperfusion in rats; thus, dexmedetomidine appears to protect the spinal as well as the brain.

**Keywords:** spinal protection; spinal ischemia; dexmedetomidine; D<sub>2</sub> adrenergic agonist.

## 1. INTRODUCTION

Dexmedetomidine, an  $D_2$  adrenergic agonist, has been widely used clinically as an adjuvant of anesthesia and in intensive care because it has sedative and analgesic effects [1,2]. Dexmedetomidine has also been shown to have a protective effect on the brain in various ischemia models, such as focal [3-5], global [6-8], and incomplete cerebral ischemia [9-11]. Previous studies suggested the following mechanisms for these neuroprotective effects: decreased activation of focal adhesion [12], imidazoline 1 receptor-extracellular-regulated kinase pathways [12,13], activation of protein kinase C [14], anti-oxidant effect [7,15], excitatory neurotransmitter suppression [10,16], anti-inflammatory effect [7], and anti-apoptotic effect [7,11,17].

Transient spinal ischemia can occur under various conditions during surgery, especially thoracic aortic surgery, and spinal ischemia can induce detrimental paraplegia in some circumstances. Pharmacological adjuncts need to reduce and prevent the incidence of paraplegia following spinal cord ischemia. Based on the previous reports that dexmedetomidine prevented morphine-induced paraplegia following short-term transient spinal ischemia [18] and reduced spinal cord ischemia-reperfusion injury in mice [19], administration of dexmedetomidine would affect spinal cord injury caused ischemic insult as well as brain protective effects. Thus, the aim of this preliminary study was to evaluate the neuroprotective effect of dexmedetomidine on spinal cord ischemia and reperfusion injury in rats.

## 2. MATERIALS AND METHODS

### 2.1 Preparation of Rats

Male Sprague Dawley rats weighing 350 to 450 g were used in this study. The rats had free access to food and tap water before the experiment. None of the animals had any neurological abnormality before anesthesia and surgery. On the day of surgical preparation, the rats were weighed and were administered a continuous flow of 4% halothane and 60% nitrous oxide in oxygen in an acrylic plastic box. Anesthesia was maintained with 0.75% to 1.5% halothane with 30% oxygen with a non-sealing facemask device. The rectal and paravertebral muscle temperatures were maintained at approximately 37.0°C with a heating lamp and an underbody heating pad. Surgical preparation was conducted as previously described [20]. The femoral vein was cannulated with a PE-50 catheter to infuse dexmedetomidine or saline. The catheter was tunneled subcutaneously and was exteriorized through a



swivel sutured over the dorsal mid-thorax, which allowed the rat to move freely in the cage after emergence from anesthesia. The tail artery was cannulated with a PE-50 catheter for monitoring the distal arterial pressure (DAP). A PE-60 catheter was inserted into the right carotid artery for monitoring the proximal arterial pressure (PAP), and the catheter was connected to an external blood reservoir to reduce the mean PAP during aortic occlusion to 40 mm Hg. Spinal ischemia was induced by a balloon catheter via the femoral artery, as previously described [20,21]. Briefly, the right femoral artery was exposed and a Fogarty 2F balloon-tipped catheter (Edwards life sciences, Irvine, CA) was advanced into the thoracic descending aorta (11 cm from the site of insertion). Immediately after performing arterial cannulation, 200 U of heparin (0.2 ml) was injected into the tail artery. The catheter balloon was inflated with 0.05 ml saline and was maintained for 10 minutes. The efficiency of the occlusion was confirmed by a decrease in the DAP measured at the tail artery. The PAP was decreased to 40 mm Hg during occlusion by drawing blood from the carotid artery containing 1 ml of 7% sodium bicarbonate solution. The balloon was deflated after ischemia, and the collected blood was administered to the animals through the carotid artery catheter within 2 min. The rats were brought out of the anesthesia 30 min after reperfusion. The animals were returned to the cage if their hemodynamic variables were stable after all catheters, except for the femoral vein catheter, were removed. The incisions were subsequently closed.

## 2.2 Groups

The rats were randomly divided into 3 groups as follows: 0.9% NaCl solution (control group; n=8), dexmedetomidine at a rate of 1 µg/kg/h (dex group; n=8), and the sham surgical group (n=6). The drug-infusion or saline-infusion volume was adjusted to a rate of 0.5 ml/h and was administered from 30 min before aortic occlusion until the end of the subsequent 24-h reperfusion. The rats in the sham surgical group received saline through catheters that were inserted in the same manner, without the induction of spinal cord ischemia.

## 2.3 Measurements

### 2.3.1 Hemodynamics

Hemodynamic variables (PAP, DAP, and heart rate) were continuously monitored and were recorded after surgical preparation for up to 5 minutes after

reperfusion. Arterial blood gas and blood glucose levels were determined immediately before aortic occlusion and 5 min after reperfusion.

### **2.3.2 Neurological evaluation**

At 24 h after reperfusion, the neurological deficit score (NDS) of the animals was assessed according to previously described grading systems [20]. The NDS was quantified as shown in Table 1. The NDS was calculated for each rat as the sum of the ambulation, placing/stepping reflex scores and sensory score; the maximal score was 8. The assessments were made by a blinded observer (YT).

### **2.3.3 Histological evaluation**

After scoring neurological function at 24 h, the animals were anesthetized with 4% halothane in an acrylic plastic box. A high dose of pentobarbital (80 mg/kg) was administered by intraperitoneal injection. After the administration of a direct left ventricular bolus of 0.2 ml heparin, each rat was transcardially perfused with 100 ml heparinized saline followed by 150 ml of 4% paraformaldehyde in phosphate buffer (pH 7.4). The lumbar spinal cord was removed and was post-fixed in the same fixative for another 48 h. Post-fixation, the L4 spinal segment was dissected and was embedded in paraffin; subsequently, serial transverse sections of 3- $\mu$ m thickness were prepared. The slides were stained with hematoxylin and eosin for quantitative evaluation. Analysis of the degree of ischemic cell injury was based on the number of viable neurons in the ventral area of the gray matter (anterior to a transverse line drawn through the central canal) with x 100 magnification in each group. Intact cells that contained Nissl substance in the cytoplasm, loose chromatin, and prominent nucleoli were considered viable neurons. The assessments were made by a blinded observer (YT).

## **2.4 Statistical Analyses**

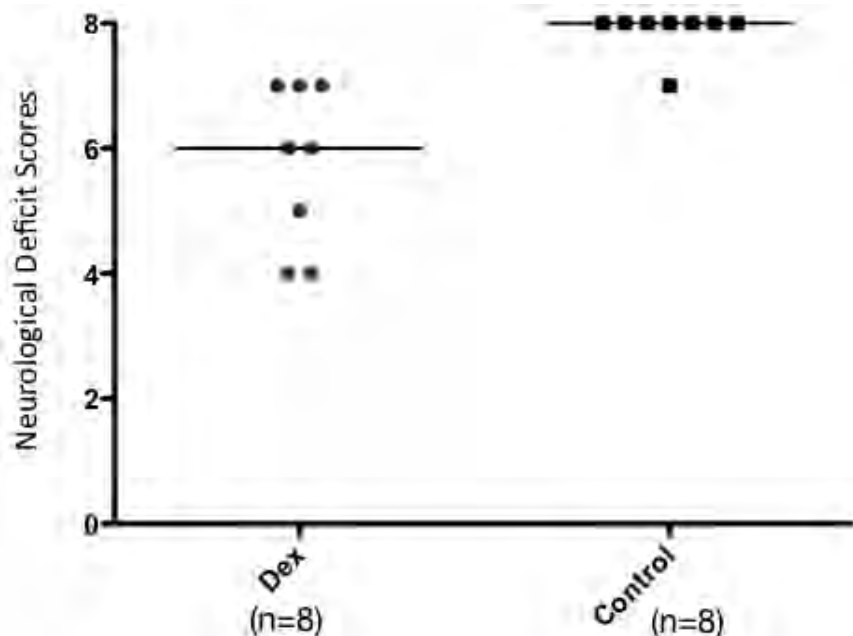
The physiological variables and the number of normal ventral cells are expressed as the mean  $\pm$  SD. Comparisons among groups were made with 1-way analysis of variance for multiple comparisons followed by a Bonferroni post-hoc test. The NDS data for the animals are expressed as the median with the range in parentheses. The differences were determined by nonparametric analysis using the Kruskal-Wallis test. P values < 0.05 were considered statistically significant.

**Table 1. Neurological deficit score**

Motor and sensory function		Score
Ambulation	Normal	0
	toes flat beneath the body when walking but presence of ataxia toes	1
	knuckle walking	2
	unable to knuckle walk but some movement of the lower extremities	3
	no movement of the lower extremities	4
Placing/stepping reflex	Normal	0
	weak	1
	no stepping	2
Sensory	Normal	0
	weak	1
	none	2

### 3. RESULTS AND DISCUSSION

The physiological variables and arterial blood gas data are presented in Table 2. No differences were found between the experimental groups with respect to the proximal MBP, Distal MBP, heart rate, and paravertebral muscle temperature before and after ischemia. Proximal and distal MBP in the saline group after ischemia were higher than that before ischemia. The blood chemistry values before aortic occlusion were within the normal range, with no significant differences between the groups. The blood glucose and pH levels after reperfusion were significantly higher and lower, respectively, compared to those before ischemia and sham group ( $p < 0.05$ ).



**Fig. 1. Neurological deficit score (NOS) 24 hours after transient spinal ischemia in rats**

The median value was significantly lower in the dex group compared to that in the control group at 24 hours after ischemia. The score in the sham group was zero. dex = dexmedetomidine

Table 2. Physiological variables 10 min before, during and after ischemia

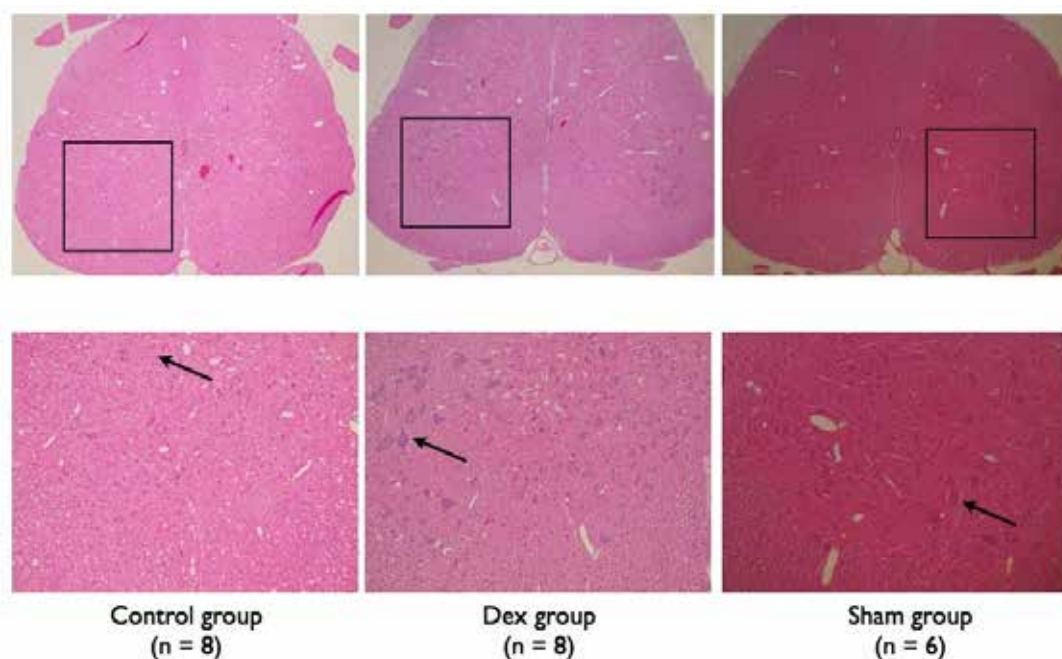
	Before ischemia				During ischemia				After ischemia			
	Sham (n=6)	Control (n=8)	Dex (n=8)		Sham (n=6)	Control (n=8)	Dex (n=8)		Sham (n=6)	Control (n=8)	Dex (n=8)	
Proximal MBP (mm Hg)	89±11	77±9	81±11		99±9	42±4*#	41±2*#		97±9	111±17*	91±12	
Distal MBP (mmHg)	84±11	72±10	79±10		97±10	7±3*#	6±1*#		99±10	109±20*	89±14	
Heart Rate (bpm)	367±27	335±28	339±18		363±19	256±94#	310±21#		371±18	320±32	347±12	
Paravertebral temperature (°C)	37.9±0.3	37.9±0.2	37.7±0.2		38.0±0.3	38.0±0.3	37.7±0.1		37.9±0.2	37.8±0.2	37.9±0.1	
pH	7.43±0.02	7.412±0.05	7.339±0.06						7.433±0.01	7.314±0.04*	7.282±0.02*#	
PaO <sub>2</sub> (mmHg)	141±19	123±23	107±23						136±11	135±19	114±14	
PaCO <sub>2</sub> (mmHg)	43±2	42±3	54±9						43±2	49±4	57±5#	
Blood glucose (mg/dl)	110±13	110±20	121±26						108±15	222±18*#	197±56*#	
Hb (g/dl)	14.7±0.8	14.6±1.0	14.5±0.7						14.6±0.3	14.5±0.8	13.9±0.7	

Data are expressed as mean ± SD. MBP = mean arterial blood pressure. DEX = dexmedetomidine. \*p<0.05 vs before ischemia in the group. # p<0.05 vs sham group

As shown in Fig. 1, the medians (range) of the NDS were significantly lower in the DEX groups compared to the control group ( $p < 0.05$ ).

Representative photomicrographs of the ventral area of hematoxyline and eosin-stained transverse sections taken from the L4 spinal segment are shown in Fig. 2. The number of viable motor nerve cells in the ventral area of the gray matter in the dexmedetomidine group ( $39.2 \pm 6.5$ ) was significantly greater than was that in the control group ( $20.2 \pm 12$ ,  $p < 0.05$ ), but was lower than was that in the sham group ( $58 \pm 6$ ,  $p < 0.05$ ).

This preliminary study showed that dexmedetomidine improved the neurological and histological outcomes after 24 h of transient spinal ischemia and reperfusion. These findings are consistent with a previous report demonstrating that dexmedetomidine provided neuroprotection against brain ischemia [3-11].



**Fig. 2. Representative photomicrographs (x40; upper figures, x100; lower figures) of the ventral area of hematoxyline and eosin-stained transverse section 24 hours after transient spinal ischemia**

*Arrows indicated viable motor nerve cells*

Many previous reports regarding the neuroprotective effects of dexmedetomidine focused on its ability to protect the brain against various insults such as transient focal [3-5], forebrain [6-8], and incomplete ischemia [9-11], anesthesia-related neurotoxicity [22,23], and various other conditions [15,24,25]. Although there

were many studies which referred the drug-induced spinal protection against spinal cord ischemia for example beta-blocker [20], statin [26], and rolipram [27], few studies that dexmedetomidine prevented morphine-induced paraplegia following short-term transient spinal ischemia [18] and reduced spinal cord ischemia-reperfusion injury in mice [19], existed.

In this study, only short-term results (i.e., 24 hours) were assessed. A previous study showed that transient spinal cord ischemia-induced motor dysfunction deteriorated into paraplegia for several days [28]. Neural degeneration was shown to progress gradually after an ischemic insult, with the number of necrotic neurons peaking at 2 days after the insult [29]. Moreover, hind-limb motor function might gradually recover during the 2 weeks following spinal cord ischemia [29]. Therefore, a further study that includes long-term observation is needed.

We did not examine the mechanisms of dexmedetomidine-induced spinal protection in this study. Many previous studies demonstrated the protective effects of dexmedetomidine on the brain against transient focal ischemia [3-5], transient forebrain ischemia [6-8], and incomplete brain ischemia [9-11]. Further, numerous reports have proposed mechanisms for the neuroprotective effects of dexmedetomidine, including decreased activation of focal adhesion [12], imidazoline 1 receptor-extracellular-regulated kinase pathways [12,13], activation of protein kinase C [14], anti-oxidant effect [7,15], excitatory neurotransmitter suppression [10,16], anti-inflammatory effect [7], and anti-apoptotic effect [7,11,17]. Therefore, we can only speculate on the mechanisms responsible for the protective effects of dexmedetomidine against transient spinal ischemia.

Although we did not evaluate the mechanisms or the long-term effects of dexmedetomidine against transient spinal cord ischemia, the results from this preliminary study suggest that dexmedetomidine exerts short-term protective effects against spinal cord ischemia-reperfusion injury. Further studies are warranted to investigate the detailed action, mechanisms, and therapeutic time window of dexmedetomidine-induced spinal protection.

#### **4. CONCLUSION**

In summary we investigated the effect of pre-administered dexmedetomidine after transient spinal cord ischemia in rats by performing neurological and histological evaluations. Dexmedetomidine improved the short-term neurological and histological

outcomes, suggesting that dexmedetomidine exerts protective effects on the spinal-cord as well as on the brain.

### **CONSENT**

Not applicable.

### **ETHICAL APPROVAL**

All authors hereby declare Principles of laboratory animal care (NIH publication No. 85-23, revised 1985) were followed, as well as specific national laws where applicable. All experiments have been examined and approved by the Animal Subjects Committee of Akita University Graduate School of Medicine.

### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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## ***The Effects of Supervised Exercise Program on Health-Related Physical Fitness in Kuwait***

### **ABSTRACT**

**Aims:** Physical activity improves health in terms of cardiovascular fitness, musculo-skeletal fitness, body composition, and metabolism. The study aims to examine the effects of supervised exercise training on metabolic profile and health-related physical fitness parameters in Kuwait.

**Study Design:** A prospective observational study.

**Place and Duration of Study:** Fitness and Rehabilitation Center (Dasman Diabetes Institute, Kuwait) between January 2012 and December 2013.

**Methodology:** We included 90 participants (44 women), mean age 48.6 ( $\pm 14.4$ ) years with adherence exceeding 50%. Outcome measures health-related physical fitness (measured by cardiopulmonary exercise testing) and other secondary outcome measures including anthropometric data, vital signs, and glycemic profile values.

**Results:** Paired t-test was used to evaluate the effects of exercise training. Both diabetic and non-diabetic participants showed significant increase in peak oxygen consumption ( $3.0 \text{ mlDmin}^{-1} \text{ Dkg}^{-1}$ ; 95% CI: 2.3 to 3.7;  $p < 0.001$ ). There was significant reduction in BMI ( $-0.6 \text{ kg/m}^2$ ; 95% CI:  $-0.9$  to  $-0.3$ ;  $p < 0.001$ ), waist circumference ( $-2.2 \text{ cm}$ ; 95% CI:  $-3.4$  to  $-1.0$ ;  $p = 0.002$ ) and body fat percentage ( $0.9\%$ ; 95% CI:  $-1.4$  to  $-0.3$ ;  $p = 0.002$ ). The glycated hemoglobin significantly decreased ( $p = 0.001$ ). Fasting blood glucose and lipid profile improved but were not statistically significant. The exercise intervention reduced the systolic blood pressure (BP) and diastolic BP by a mean of  $0.6$  (95% CI:  $-3.2$  to  $1.9$ ;  $p = 0.63$ ) and  $2.6 \text{ mmHg}$  (95% CI:  $-4.9$  to  $-0.3$ ;  $p = 0.03$ ) respectively, with the latter being statistically significant. Significant changes were also noted in variables of total handgrip ( $4.2 \text{ kg}$ ; 95% CI:  $1.4$  to  $7.0$ ;  $p = 0.04$ ) and push-up ( $4.2$  repetition; 95% CI:  $1.9$  to  $6.4$ ;  $p < 0.001$ ).

**Conclusion:** The 12-week supervised exercise intervention used seems to improve cardiorespiratory fitness, glycemic control, diastolic BP and anthropometric measurements. This improvement can indicate that exercise decrease cardiovascular events and mortality.

**Keywords:** Exercise; Health-related Physical Fitness; Kuwait.

## 1. INTRODUCTION

During the past 3 decades, the widespread socio-economic development and progressive urbanization in Kuwait had caused dramatic changes in individuals lifestyles such as physical activity patterns and eating habits. These resulted in increased caloric intake and concomitant decreased physical activity [1,2], as well as a considerable negative impact on social health. Eventually, an epidemic of chronic non-communicable diseases such as obesity, diabetes mellitus (DM), and hypertension (HTN) has been reported [3,4].

A community-based national study in 2008 showed that the overall prevalence of DM and coronary artery disease (CAD) have reached 11.2% and 2.9%, respectively. The study also showed that non-communicable diseases are collectively estimated to account for 76% of all deaths in Kuwait [4,5].

Addressing physical activity is a milestone in the prevention of non-communicable diseases. Physical inactivity is an independent risk factor for a number of chronic diseases including CAD, type 2 DM (T2DM), HTN, obesity, and osteoporosis. Global estimates have shown that physical inactivity results in approximately 30% of CAD cases and in 27% of all of T2DM. Physical inactivity can potentially lead to breast, colon, and rectal cancer [3]. Observational studies have shown that regular physical activity is associated with a lower risk of all-cause mortality and a reduced risk of developing T2DM, osteoporosis, and certain types of cancer. In addition, evidence suggest that physical activity enhances psychological wellbeing [3,6,7]. Most recent recommendation advise people of all ages to include a minimum of 30 minutes of moderate intensity (e.g. brisk walking) on 5 days each week or a minimum of 20 minutes of vigorous intensity (e.g. jogging causing rapid breathing and substantial increase in heart rate) on 3 days each week. In addition, every adult should perform activities that increase muscular strength and endurance a minimum of 2 days each week [3,7].

In contrast to physical activity, which is related to bodily movements that result in energy expenditure above a resting state, physical fitness that results from intended physical activity affects a variety of factors related to health status such as cardiovascular fitness, musculo-skeletal fitness, body composition, and metabolism. Physical fitness is defined as a set of characteristics individuals have or achieve that is related to their ability to perform physical activity. These characteristics are divided into health-related (cardiorespiratory endurance, body composition, flexibility and, muscular strength and endurance) and skill-related (agility, coordination, balance, power, reaction time and speed) components of physical fitness. Health-related physical fitness is a common measurement in preventive and rehabilitative exercise programs [8-11]. With respect to morbidity and mortality, the effects of physical fitness are similar to those of physical activity; however physical fitness is a stronger predictor of health outcomes. Routine physical activity has shown to improve health outcomes such as improvement in body composition, lipid profiles, glucose homeostasis, insulin sensitivity, autonomic tone, coronary blood flow, endothelial function, reduced blood pressure (BP), and systemic inflammation and blood coagulation [12-14].

The published reports on physical activity among the population of Kuwait indicate that the majority of individuals are not physically active to the extent required to achieve health benefits. The overall prevalence rate of low level physical activity in Kuwait was 63%, higher in women than in men (71.3 vs. 58.0%) [2,4,5]. Hence, physical activity is emphasized in health promotion and disease prevention campaigns in Kuwait to promote optimal health.

Evidence from multiple observational studies overwhelmingly illustrates the beneficial impact of exercise on cardiovascular health and T2DM control [15-25]. The purpose of this study was to examine the effects of 12-week supervised training on metabolic profile and health-related physical fitness parameters in adult participants.

## **2. MATERIALS AND METHODS**

### **2.1 Study Participants**

The study participants were selected from individuals enrolled to the Exercise Program (ExP) at the Dasman Diabetes Institute (Kuwait) between January 2012 and December 2013. All included individuals were above 14 years old. Participants were enrolled to undergo a detailed medical evaluation by a physician including their past medical history and exercise tolerance. All individuals with either physical or

psychological health conditions that may possibly interfere with their ability to perform the requested exercise and concurrent cardiopulmonary exercise testing (CPET) were excluded from the study. Exclusion criteria also included pregnancy and inability to perform the CPET. For individuals to be included in the post-intervention analysis, they have to adhere to the 12-week exercise program with an attendance record of at least 3 days per week.

## **2.2 Exercise Intervention**

The ExP is an evidence-based intervention, which includes an exercise program designed to improve functional capacity, promote lifelong physical activity, and enhance the overall quality of life. The ExP includes supervised aerobic, including water exercises and resistance training. When studied in basic science literature, we found that the ExP restores the expression of DNAJB3 gene in obese subjects, which can potentially play a protective role against obesity [26].

All participants were enrolled to complete 12 weeks of supervised exercise training as recommended by the American College of Sports Medicine [8] and Your Prescription for Health, Exercise is Medicine® guidelines [9]. The exercise training involves a combination of both moderate intensity aerobic exercise aiming for a target heart rate (THR) range of 65-80% of maximal HR achieved at peak oxygen consumption (peak  $\dot{V}O_2$ ) and resistance training of 15 repetitions for 2 to 4 sets. The participants spend 30 minutes on each training session. Regular monitoring of the heart rate during the aerobic training was ensured to maintain the THR.

Participants of the study received exercise prescriptions that primarily included aerobic exercises. These were activities that require minimal skills such as walking, running, dancing, cycling (upright and recumbent bikes), arm cycling, arc training, elliptical machine, stepping machine rowing, spinning, and aqua aerobics. Non-weight bearing machines and aqua-based aerobic exercises were recommended for participants with musculoskeletal limitations. Strength training was performed 2 to 3 times a week and consisted of either a total body workout or a split-programming workout. Strength training focused on more than one muscle group including chest and shoulder press, latissimus dorsi muscle pull down, lower back extension, abdominal crunch, and leg press. Single joint exercises targeting major muscle groups consisted of quadriceps muscle extension as well as biceps, triceps and hamstring muscles curl. Strength exercises that are contraindicated for certain health



conditions or physical disabilities were modified accordingly. Fitness instructors supervised all training sessions to ensure correct technique and proper amount of exercise performed with adequate frequency of rest intervals taken. Capillary blood glucose (CBG), HR, and BP were assessed prior to and after the training session. Only participants who exercised at least three days per week were included in the study.

### **2.3 Outcomes**

Participants underwent baseline anthropometrics measurements, vital signs, blood analysis, body composition, CPET, and further physical fitness assessment. The measurements were repeated after 12 weeks of supervised exercise intervention. Written informed consent was obtained from all participants before the CPET procedure. All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 declaration of Helsinki.

The study's primary outcome measure is cardiorespiratory fitness, measured by the CPET. Our secondary outcomes were other health-related physical fitness measurements including body composition, handgrip strength, muscular strength and endurance, and flexibility testing. We also evaluated participants' anthropometric data, vital signs (CBG, HR, and BP), and basic blood analysis. Further details of some of the outcomes are as follows.

#### **2.3.1 Health-related physical fitness**

The health-related physical fitness assessments are divided into 5 components:

##### **2.3.1.1 Cardiorespiratory fitness**

The cardiorespiratory fitness was measured while undergoing a symptom-limited maximal incremental CPET using an electromagnetically braked cycle ergometer (Ergoline®) by increasing the workload in a ramping pattern. The CPET was performed at the beginning of the study to assess aerobic endurance, identify the source of exercise limitation, and determine the adequate range of THR for exercise prescription. The test was repeated after 12 weeks upon completion of the exercise program. To begin with the test, the participant's mouth and nose were

covered with a sterilized face mask which was connected to a metabolic cart (COSMED Quark CPET®). The cart contains a flow meter and gas analyzers which analyzes oxygen intake and carbon dioxide output using breath-by-breath computer-based system. Testing protocol starts with two minutes of rest, followed by two minutes of unloaded cycling, after which workload was increased in a ramping mode at a rate of 5 to 15 Watts per minute. The ramping protocol was adjusted according to participant's age and medical background. Participants were instructed to maintain the pedaling rate at 55 to 60 rate per minute until they reach maximal exhaustion. and finally completes with 3 to 5 minutes of recovery stage. The electrocardiography (ECG) and BP were monitored continuously. In the absence of chest pain, dizziness and significant ECG abnormalities, all tests were continued as symptom-limited (volitional exertion by dyspnea or fatigue). All tests were conducted by the CPET laboratory biomedical engineer, a nurse and a supervising physician. Peak  $\dot{V}O_2$  was used as the functional capacity [10,27].

#### **2.3.1.2 Body composition**

After 4 hours of fasting, total body fat of each participant was measured using the body composition analyzer (Analyzer i0i353®). The percent body fat (%) was determined as the percentage of adipose tissue in the body. Another parameter used was lean body mass which represents the weight of muscle.

#### **2.3.1.3 Handgrip strength**

Handgrip strength was measured using isometric dynamometers (Baseline® Digital Hydraulic Hand Dynamometer). The participants held the dynamometer in the hand to be tested, with the arm flexed at ninety degrees and the elbow by the side of the body. The dynamometer's base should rest on first metacarpal (heel of palm), while the handle should rest in middle of four fingers. Participants were instructed to squeeze the dynamometer with maximum isometric effort, maintaining the technique for about 5 seconds with no other body movement. The best result from several trials (up to 3) for each hand was recorded, with at least 15 seconds recovery between each effort. Best total of both hands was counted as the score [8,10,11].

#### **2.3.1.4 Muscular strength and endurance**

Push-up test was administered as standard push-up position for men and modified knee-push-up position for women. Standard push up was started with the “down position with hand pointing forward and under the shoulder, back straight, head up, and using the toes as the pivotal point. The participants were asked to raise the body by straightening the elbow and return to the “down position. Proper technique was constantly observed by making sure that the chest is a fist away from the floor. Modified “knee push up position was started with lower leg in contact with the mat and ankles planter-flexed, back straight, hands shoulder width apart, head up and using the knees as the pivotal point. Similarly, they were asked to raise the body and return to the initial position. Each participant was timed for one minute (or as managed) and total repetitions were recorded.

Half sit-up test was administered in supine position with both knees bent and palms facing down. Participants were asked to lift-off shoulder blade from the floor as in performing crunches (the chin should not reach towards the chest and space was maintained between chin and chest area). Participants were instructed to perform as many repetitions as possible in one minute and total repetitions were recorded [8,10,11].

#### **2.3.1.5 Flexibility**

Forward bending test was done in a long-sitting position. The tape measure was positioned between the legs with the “0 part of measuring tape starting from the foot. Participants were asked to bend forward with both hands as far as possible without allowing the knees to be bent and the most distant point reached with the finger tips was measured. This assessment was carried out with caution as overstretching of muscles can occur. The test was contraindicated in participants with disc problems. The best measurement of three trials was recorded [8,10].

#### **2.3.2 Anthropometric measures**

Each participant s body mass index (BMI) was extrapolated from measured body weight and height. BMI was calculated by dividing body weight (kg) by height in metres squared ( $m^2$ ). The waist circumference was measured at the narrowest waist level, or if this is not apparent, at the midpoint between the lowest rib and the top of

the hipbone (iliac crest). Hip circumference was measured at the level of the greatest protrusion of the gluteal muscles.

The waist tohip ratio is the circumference of the waist divided by the circumference of the hip [10,11]. All the measurements were done by the same study personnel.

### **2.3.3 Blood analysis**

Fasting blood samples were collected by experienced phlebotomist after 10 hours of fasting from the night before. The blood samples include fasting blood glucose (FBG), total cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, triglyceride and glycated hemoglobin (HbA1c). All samples were analyzed in the biochemistry laboratory at Dasman Diabetes Institute.

### **2.4 Statistical Analysis**

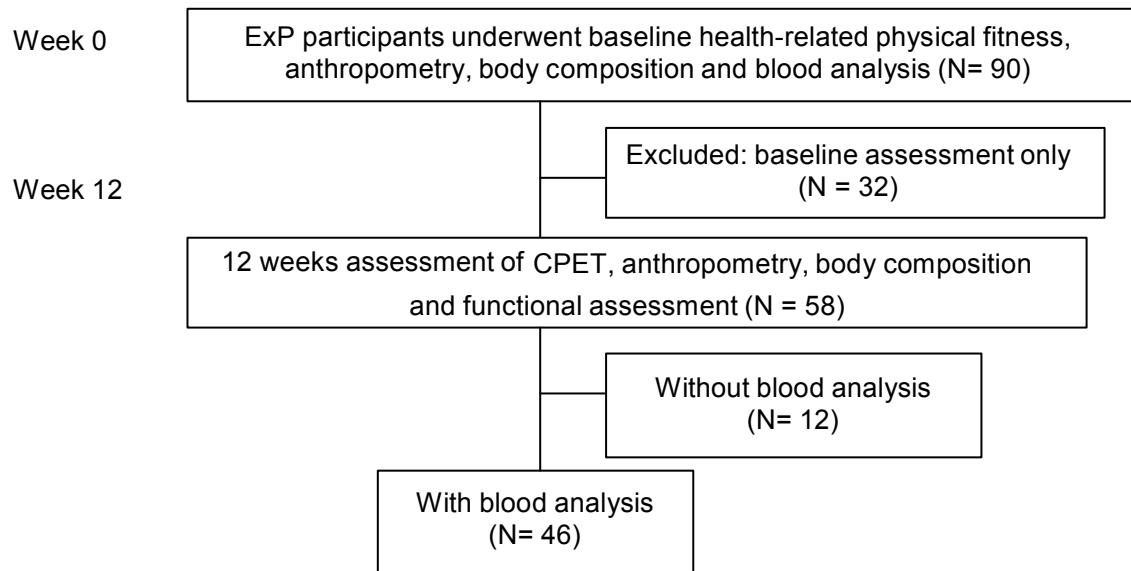
The sociodemographic data were analyzed using descriptive statistics and presented as mean  $\pm$  standard deviation (SD). To evaluate the effects of exercise training, paired t-test was used to measure the differences in change from baseline to post-intervention for the participants. Statistical significance was set at  $p < 0.05$  and results are presented as a mean difference with 95 percent confidence interval (95% CI). All statistical analyses were performed using SPSS software (version 19.0).

## **3. RESULTS AND DISCUSSION**

Of the 90 participants with acceptable attendance records, 58 repeated the CPET after 12 weeks, and 46 had second blood tests. All 90 participants exercised at least 3 days per week with no serious adverse effects reported. The 32 participants who were excluded from the analysis refused for a repeat CPET after 12 weeks. Moreover, 12 of the 58 participants who repeated the CPET did not agree for a repeat blood analysis (Fig. 1).

Participants mean age was 48.6 ( $\pm 14.4$ ) years, with 51% males. At the time of enrolment to the study 90% of them had a BMI of more than 25 kg/m<sup>2</sup>. The mean body fat percentage was 35.1%. Among the 90 participants, 48% suffered from T2DM and 32% had HTN. The prevalence of hyperlipidemia and CAD was 57 and 9%, respectively. The mean HbA1c in the enrolled participants was 6.6%. Peak V<sub>O</sub><sub>2</sub>

measured at the baseline CPET was  $17.6 \pm 4.2 \text{ ml Dmin}^{-1} \text{ Dkg}^{-1}$ . Table 1 illustrates more detailed baseline characteristics including metabolic markers and fitness assessments.



**Fig. 1. Participants flow diagram of participants with satisfactory attendance**

Table 2 shows the comparative values of anthropometric, vital signs, glycemic control, metabolic profile and cardiovascular fitness parameters at baseline and upon completion of 12 weeks of exercise intervention. Both diabetic and non-diabetic participants showed significant increase in peak  $\dot{V}O_2$  ( $3.0 \text{ ml Dmin}^{-1} \text{ Dkg}^{-1}$ ; 95% CI: 2.3 to 3.7;  $p < .001$ ). The baseline exercise capacity was noted to be lower in diabetic participants compared to non-diabetic participants ( $16.2 \pm 4.2$  vs  $19.3 \pm 4.7 \text{ ml Dmin}^{-1} \text{ Dkg}^{-1}$ ) (Fig. 2-A). In terms of percentage, diabetic participants showed 11% increase ( $1.6 \text{ ml Dmin}^{-1} \text{ Dkg}^{-1}$ ; 95% CI: 0.7 to 2.6;  $p = .001$ ) and non-diabetic participants showed 20% increase ( $4.5 \text{ ml Dmin}^{-1} \text{ Dkg}^{-1}$ ; 95% CI: 3.5 to 5.7;  $p < 0.001$ ) in peak  $\dot{V}O$  levels. There was significant reduction in BMI ( $-0.6 \text{ kg/m}^2$ ; 95% CI:  $-0.9$  to  $-0.3$ ;  $p < .001$ ), waist circumference ( $-2.2 \text{ cm}$ ; 95% CI:  $-3.4$  to  $-1.0$ ;  $p = .002$ ) and body fat percentage ( $-0.9\%$ ; 95% CI:  $-1.4$  to  $-0.3$ ;  $p = .002$ ). The HbA1c significantly decreased ( $p = .001$ ) and was distinct among the diabetic participants with 7% reduction ( $-0.54\%$ ; 95% CI:  $-0.78$  to  $0.30$ ;  $p < .001$ ), meanwhile no difference was noted among the non-diabetic participant ( $-0.02\%$ ; 95% CI:  $-0.09$  to  $0.07$ ;  $p = .66$ ) (Fig. 2-B). Although levels of fasting blood glucose ( $-0.3 \text{ mmol/l}$ ; 95% CI:  $-0.7$  to  $0.1$ ;  $p = .10$ ) and lipid profile, including total cholesterol ( $-0.2 \text{ mmol/l}$ ; 95% CI:  $-0.4$  to  $0.1$ ;  $p = .12$ ), HDL-cholesterol

(0.03 mmol/l; 95%CI: -0.02 to 0.08;  $p=.21$ ), LDL-cholesterol (-0.15 mmol/l; 95% CI: -0.32 to 0.03;  $p=.09$ ), and triglycerides (-0.11 mmol/l; 95% CI: -0.37 to 0.16;  $p=.42$ ), improved after the intervention but these changes were not statistically significant.

**Table 1. Baseline characteristics of participants**

Characteristic	Participants (n =90)	
	Male 46 (51.1)	Female 44 (48.9)
<b>Gender, No. (%)</b>		
<b>Age, yr, mean (SD)</b>	49.6 (16.7)	47.7 (11.8)
<b>Nationality, No. (%)</b>		
Kuwaiti	30 (65.2)	33 (75.0)
Other Nationality	16 (34.8)	11 (25.0)
<b>Medical History, No. (%)</b>		
Type 2 Diabetes Mellitus	24 (52.2)	19 (43.2)
Hypertension	18 (39.1)	11 (25.0)
Hyperlipidaemia	28 (60.9)	23 (52.3)
Coronary artery disease	5 (10.9)	3 (6.8)
<b>Anthropometrics, mean (SD)</b>		
Weight, kg	94.8 (23.5)	78.3 (19.6)
BMI, kg/m <sup>2</sup>	31.8 (6.4)	30.4 (5.6)
Waist Circumference, cm	107.6 (13.2)	96.7 (14.4)
Hip Circumference, cm	113.7 (15.2)	110.6 (11.9)
Waist-to-Hip Ratio	0.95 (0.07)	0.87 (0.08)
<b>Presence of Overweight or Obesity, No. (%)</b>		
Body Mass Index 25-29.9	17 (37)	17 (38.6)
Body Mass Index D30	22 (48)	16 (36.4)
<b>Vital signs, mean (SD)</b>		
Systolic BP, mmHg	124.1 (10.6)	120.7 (12.9)
Diastolic BP, mmHg	74.3 (7.7)	69.8 (8.7)
RHR, beats/min, mean (SD)	81.4 (14.2)	78.4 (10.3)
<b>Cardiovascular Risk Factors, mean (SD)</b>		
FBG, mmol/L	6.6 (1.8)	6.9 (2.6)
HbA1c (%)	6.6 (1.3)	6.6 (1.5)
Total Cholesterol, mmol/L	5.0 (1.1)	5.1 (0.9)
HDL Cholesterol, mmol/L	1.0 (0.3)	1.4 (0.4)
LDL Cholesterol, mmol/L	3.2 (0.9)	3.1 (0.8)
Triglyceride, mmol/L	1.7 (1.0)	1.5 (1.1)
<b>Exercise Test Variables, mean (SD)</b>		
Peak V <sub>O</sub> <sub>2</sub> , ml/min	1677 (474)	1253 (324)
Peak V <sub>O</sub> <sub>2</sub> per weight, ml/min/kg	18.4 (4.0)	16.9 (4.4)
<b>Functional Variables, mean (SD)</b>		
Total Handgrip, kg	81.4 (19.8)	50.3 (11.1)
Sit-up, No. Repetitions	24.8 (13.3)	17.5 (15.7)
Push-up, No. Repetitions	6.3 (6.6)	4.7 (7.9)
Flexibility, cm	22.1 (15.2)	21.7 (15.0)
<b>Body composition, mean (SD) [n= 82]*</b>	<b>n=41</b>	<b>n=41</b>
Body Fat (%)	31.8 (4.4)	38.4 (4.8)
Lean Body Mass, kg	60.1 (8.7)	45.7 (6.4)

The exercise intervention reduced the systolic BP and diastolic BP by a mean of 0.6 (95% CI: -3.2 to 1.9;  $p=.63$ ) and 2.6 mmHg (95% CI: -4.9 to -0.3;  $p=.03$ ) respectively, with the latter being statistically significant (Fig. 2-C). Significant changes were also noted in variables of total handgrip (4.2 kg; 95% CI: 1.4 to 7.0;  $p=.04$ ) and push-up (4.2 repetition; 95% CI: 1.9 to 6.4;  $p<.001$ ).

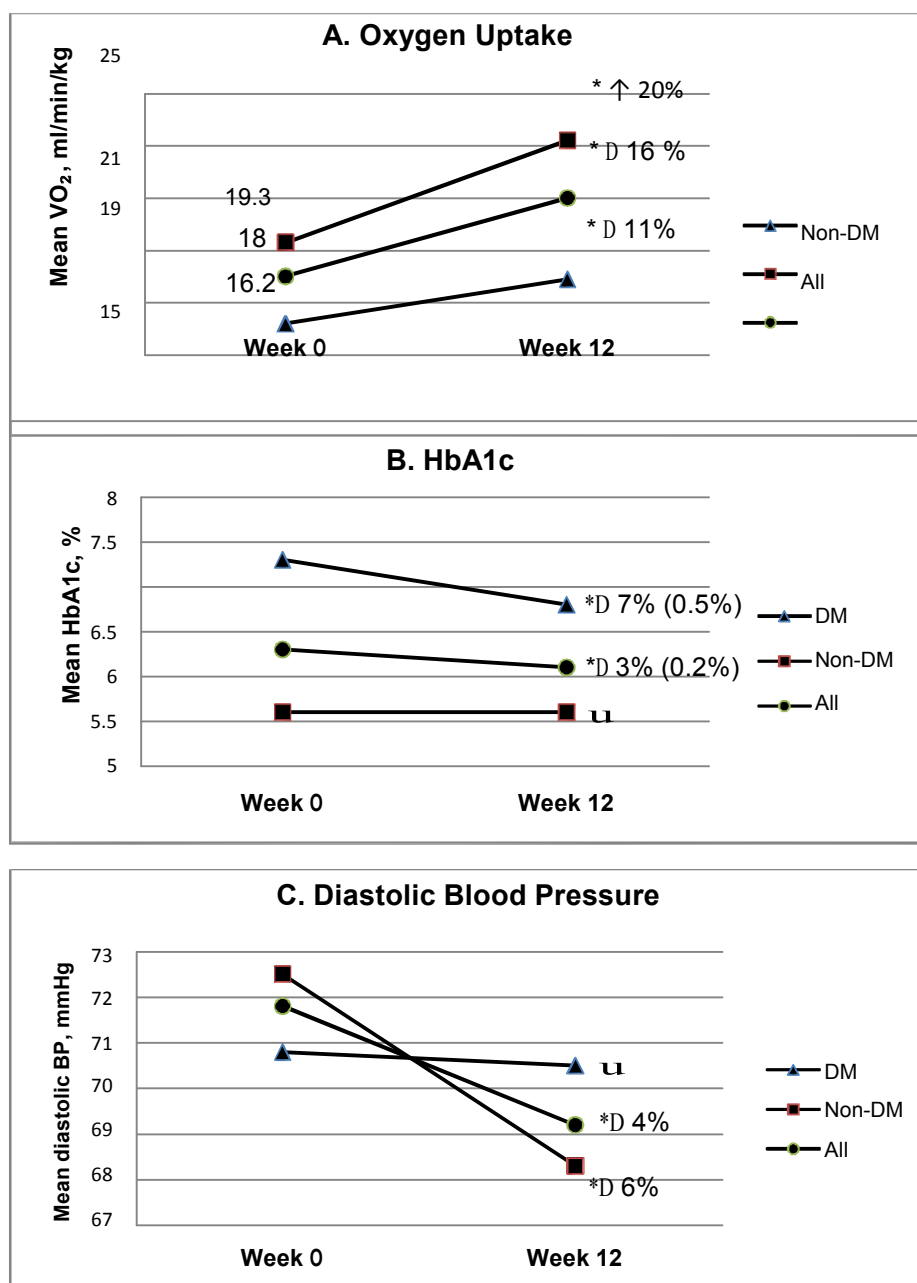
**Table 2. Changes in anthropometric, vital signs, glycemic control, metabolic profile and cardiovascular fitness parameters at baseline and upon completion of 12-week exercise program**

Variables	Baseline, mean (SD)	Week 12, mean (SD)	Mean difference (95% CI)	p-value
<b>Anthropometrics (n=58)</b>				
Body weight, kg	86.4 (21.3)	84.6 (20.6)	-1.7 (-2.6 to -0.9)	<0.001
BMI, kg/m <sup>2</sup>	31.2 (6.1)	30.6 (5.9)	-0.6 (-0.9 to -0.3)	<0.001
Waist circumference, cm	102.3 (14.5)	100.0 (15.0)	-2.2 (-3.6 to -0.9)	0.002
Hip circumference, cm	112.0 (13.0)	109.8 (12.5)	-2.2 (-3.4 to -1.0)	<0.001
Waist-to-hip ratio	0.91 (0.09)	0.91 (0.09)	0.0 (-0.02 to 0.01)	0.74
<b>Vital Signs (n=58)</b>				
Systolic BP, mmHg	120.5 (11.4)	119.9 (10.6)	-0.6 (-3.2 to 1.9)	0.63
Diastolic BP, mmHg	71.8 (7.8)	69.2 (8.4)	-2.6 (-4.9 to -0.3)	0.03
RHR, beats/min	78.7 (12.0)	76.4 (11.7)	-2.3 (-4.8 to 0.3)	0.08
<b>Glycemic and Metabolic profile (n=46)*</b>				
CBG, mmol/L (n=27)	7.4 (2.4)	6.9 (2.2)	-0.6 (-1.2 to 0.4)	0.66
FBG, mmol/L	6.3 (1.9)	6.1 (1.4)	-0.3 (-0.7 to 0.3)	0.10
HbA1c (%)	6.3 (1.3)	6.1 (1.1)	-0.2 (-0.3 to -0.1)	0.001
Total Cholesterol, mmol/L	4.9 (0.9)	4.7 (0.9)	-0.2 (-0.4 to 0.1)	0.12
HDL-cholesterol, mmol/L	1.2 (0.3)	1.2 (0.4)	0.0 (-0.02 to 0.08)	0.51
LDL-cholesterol, mmol/L	3.0 (0.8)	2.9 (0.7)	-0.2 (-0.32 to 0.03)	0.09
Triglyceride, mmol/L	1.6 (1.0)	1.5 (1.0)	-0.1 (-0.4 to 0.2)	0.42
<b>Body Composition (n=52)‡</b>				
Fat Percentage (%)	34.9 (5.8)	34.1(6.0)	-0.9 (-1.4 to -0.3)	0.002
Lean Body Mass, kg	53.6 (11.0)	53.5 (11.1)	-0.1 (-0.5 to 0.3)	0.58
<b>Cardiopulmonary Exercise Test (n=58)</b>				
Peak V <sub>O</sub> <sub>2</sub> , ml/min	1540 (463)	1783 (596)	243 (176 to 310)	<0.001
Peak V <sub>O</sub> <sub>2</sub> per weight, ml/min/kg	18.02 (4.7)	21.0 (5.5)	3.0 (2.3 to 3.7)	<0.001
<b>Functional Variables (n=58)</b>				
Total Handgrip, kg	64.2 (23.5)	68.4 (23.3)	4.2 (1.4 to 7.0)	0.04
Sit-up, n	22.1 (15.1)	25.8 (15.7)	3.7 (-0.7 to 8.1)	0.10
Push-up, n	6.0 (7.7)	10.2 (9.8)	4.2 (1.9 to 6.4)	<0.001
Flexibility, cm	23.4 (15.5)	24.45 (15.4)	1.1 (-2.7 to 4.9)	0.57

where BMI=Body Mass Index, RHR=Resting Heart Rate, BP=Blood Pressure, CBG= Capillary Blood Glucose, FBG= Fasting Blood Glucose, HDL= High Density Lipoprotein, LDL=Low Density Lipoprotein, Peak V<sub>O</sub><sub>2</sub>=Peak Oxygen Uptake, \* Number of participants with repeat metabolic markers, ‡ Number of diabetic participants with capillary blood sugar monitored during exercise, † 6 participants without body composition values either due to the out of range measurements or the patient had metal insitu that precludes them from doing the test

The results of this study demonstrate that supervised exercise intervention which include aerobic and resistance training program performed at least 3 days per week for 12 weeks duration seems to be effective in improving cardiorespiratory fitness, glycemic control, diastolic BP and anthropometric measurements. These outcomes are known risk markers for all-cause mortality and cardiovascular events. Therefore, the study findings support the effectiveness of the supervised aerobic and resistance training for improving health and physical function. To our knowledge this is the first study in Kuwait to evaluate objectiveness of physical activity and fitness.





**Fig. 2. (A-C) Changes in parameters at baseline and upon completion of 12-week supervised exercise training**

\* Statistically significant,  $p < 0.05$

Low levels of cardiorespiratory fitness have been associated with a markedly increased risk of premature death for all causes, specifically cardiovascular disease. The cutoff point above which there was a marked survival benefit was  $13 \text{ mlDmin}^{-1} \text{ Dkg}^{-1}$  [3.7 metabolic equivalents (METs)] in women and  $15 \text{ mlDmin}^{-1} \text{ Dkg}^{-1}$  (4.3 METs) in men [8]. In our study, the baseline peak  $\text{VO}_2$  was  $18.0 \text{ mlDmin}^{-1} \text{ Dkg}^{-1}$  and the results showed significant improvement in exercise capacity, which is in line with most of the studies using combination of aerobic and resistance training in both

diabetic and non-diabetic participants [15-18,23]. Like other studies, the baseline exercise capacity was noted to be lower in diabetic participants. Evidence suggests that specific pathogenic mechanism such as poor glycemic control and myocardial dysfunction may have contributed to this phenomenon [28]. The increase in the peak  $\dot{V}O_2$  obtained from our study was very similar to the observational studies conducted over 1 year [15,23]. Moreover, epidemiological studies have indicated that for every  $3.5 \text{ mL Dkg}^{-1} \text{ Dmin}^{-1}$  (1 MET) increases in exercise capacity, there was a 13% decrease in all-cause mortality and 15% decrease in cardiovascular events implying the health benefits of cardiorespiratory fitness [13]. This further supports the outcome of our exercise intervention study which improved the exercise capacity by a mean of  $3.0 \text{ mL Dkg}^{-1} \text{ Dmin}^{-1}$ . Muscular strength and endurance are inversely associated with risk of death from all causes after controlling for potential confounders, including cardiorespiratory fitness [29]. In addition to greater strength, participation in resistance or strength exercise training may slow or even reverse the degeneration of bone mineral density in individuals with osteoporosis [8]. The muscular fitness assessments including total handgrip and half push-up showed significant improvement after the 12 weeks of exercise intervention. In our review, few articles assessed the effect of exercise on muscular strength and endurance, mostly showed significant improvement [18,24]. In addition, muscular fitness improves the ability to maintain functional independence in the elderly. Lastly, despite the lack of statistical significance in the tests for sit-up and flexibility, participants showed clinically meaningful improvement that is believed to reduce musculo-tendinous injuries and prevention of low back pain [8].

Glycemic control over the preceding 2 to 3 months is assessed by HbA1c level and it is a good long-term variable to reflect our exercise intervention for 12 weeks. In our study, HbA1c showed significant improvement with clear distinct in diabetic participants. HbA1c was significantly reduced in many exercise interventional studies involving T2DM patients [16,17,20,22,23,25] and was never used as a comparison variable in non-diabetic individuals. Each 1% concentration reduction in HbA1c in T2DM was associated with a 37% decrease in risk for microvascular complications and a 21% decrease in the risk of any end point or death related to diabetes [30]. Hence, our observed mean concentration reduction of 0.5% (Fig. 2-B) among the diabetic participants might be expected to produce 18.5% and 10.5% reduction risk for these complications, respectively. However, these risks reduction are derived

from pharmacotherapy studies and does not take into account improvement in cardiorespiratory fitness. The significant improvement in cardiorespiratory fitness demonstrated in our study might further reduce the morbidity and mortality in diabetic participants.

The changes in total cholesterol, HDL-cholesterol, LDL-cholesterol, and triglycerides were not statistically significant. Most studies examining the effect of exercise on cardiovascular health have found either weakly positive changes in lipid profile or no changes at all. More favorable changes were observed in those with more pronounced dyslipidemia [19], and have been related to significant loss in body fat [19] where the exercise intervention was for 16 weeks and 6 months, respectively. This supports the non-significant results in our studies where the baseline lipid levels were within the optimal range except for triglycerides which was borderline high. Moreover, dietary composition is an important confounding factor to influence lipid concentration and these study participants dietary habits were not observed closely. Similar results were observed in studies where the exercise intervention was conducted over 8 weeks [16,22] and 3 to 6 months [25], all in diabetic patients.

Nevertheless, clinical trials have indicated that 1% reduction in blood cholesterol level yields approximately a 2% reduction in coronary heart disease rates [31] meanwhile our study showed overall 4% reduction in total cholesterol which implies that our exercising participants have reduced about 8% of their risk.

Abdominal obesity measured by waist circumference is a major risk factor for cardiovascular disease and T2DM. The significant reduction in waist circumference demonstrated in this study, by a mean of 2.2 cm compares favorably with the results from previous trials [17-19,24]. These studies assessed the effect of either aerobic or resistance, or combination of both training programs in adults with or at risk of developing diabetes in which reduction in waist circumference ranging between 2.4 and 3.4 cm was observed after 12 to 24 weeks of exercise training. The reduction in waist circumference was accompanied by significant reduction in weight and body fat percentage. However, no significant changes were noted in lean body mass (muscle percentage). A longer duration of both aerobic and resistance exercise programs reaching up to 12 month have shown significant decrease of body fat percentage and significant increase in lean body mass [23], suggesting the need for longer exercise programs in order to achieve these outcome variables.

Our study showed significant reduction in diastolic BP by a mean of 2.6 mmHg meanwhile no significant changes were noted in systolic BP. A meta-analysis suggested that in most individuals whether hypertensive or normotensive, a reduction in diastolic blood pressure confer a lower risk of stroke and CAD [32]. However the difference in diastolic BP was not significant among the diabetic participants (Fig. 2-C). This finding is consistent with most observational studies that suggest exercise lowers BP in non-diabetic individuals but reduction in diastolic BP is less commonly seen in individuals with T2DM [28]. Moreover, significant reduction in both systolic and diastolic BP was observed mainly in studies conducted over 6 months to 1 year [23,25].

A low resting HR reflects good health condition, whereas higher values are related to high mortality risk. Studies suggest that exercise training produces higher resting vagal activity therefore accountable for lower resting HR [33]. Although our study showed 3% reduction in HR but this was not statistically significant. Moreover HR and BP are mainly dependent on pharmacological therapy than physical activity [23].

Interpretation of the study findings is limited by the lack of non-exercise or diet only control group. In addition, only one mode of exercise training program, was applied which is the combination of aerobic and exercise training; therefore, unable to determine the effect of either only aerobic or only resistance training. Furthermore, we attempted to control the information on medications and/or alteration in management and dietary habit. However, these factors were not monitored rigorously due to access of patients to several healthcare professionals including family physicians, treating primary care doctors, and endocrinologists. Muscular fitness and flexibility assessment may have been conducted by different fitness instructors consequently affecting the precision of the measurements. Additionally, the metabolic markers were not available in 12 out of the 58 participants used for comparison which might have contributed to the non-significant changes observed in the metabolic markers. Nevertheless, the generalizability of the study was enhanced with the population of diverse in age, sex, ethnicity and co-morbidities. Despite a population with many medical concerns, the exercise prescription was well tolerated and resulted in good exercise adherence.

#### 4. CONCLUSION

The twelve weeks of supervised exercise training produced substantial improvements in health-related indicators, similar to the response observed in other studies of longer duration. These results demonstrate the appropriateness of this form of exercise training in the prevention and management of glycemic control and cardiovascular risk factors. With the rising epidemics of non-communicable diseases in Kuwait, physicians and health educators should emphasize on similar supervised training programs for the achievement of long-term health benefits. Specifically, these include reduction in central obesity and improved health-related physical fitness. Furthermore, there is an evidence suggesting that fitness and exercise programs offered in community settings increase physical activity level and physical fitness for participating adults and older adults [34-36].

#### COMPETING INTERESTS

All authors must disclose no financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work.

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## ***Urinary Abnormalities in Asymptomatic Children of Ho Chi Minh City: A Population-Based Study***

### **ABSTRACT**

**Aims:** To estimate the prevalence of urinary abnormalities in asymptomatic children aged 3 to 5 and to estimate the prevalence of urological anomalies detected by renal ultrasound among children with abnormal urine findings in an urban district of Ho Chi Minh City.

**Study Design:** Cross-sectional population-based study.

**Place and Duration of Study:** Twelve kindergartens in Binh Thanh district, Ho Chi Minh City, Vietnam from March to June 2012.

**Methodology:** There were 11,093 children aged 3 to 5 attending 25 public and 17 private kindergartens including 2,657 in wealthy wards and 8,436 in non-wealthy wards. A total sample size of 2,402 children was required. Using a probability proportional-to size method, 8 kindergartens in public area and 4 kindergartens in private area were randomly selected. Overall, 2,433 children were enrolled including 1,244 boys. The children were screened by dipstick. Those with abnormal results were confirmed by a second dipstick. Children with two positive dipsticks were retested 3 months later and underwent renal ultrasound for urological anomalies.

**Results:** Abnormalities were detected in 7.8% of the subjects. Prevalence of proteinuria, hematuria, nitrituria, leucocyturia, and combined nitrituria and leucocyturia were 0%, 0.3%, 0%, 5.6%, and 0.2%, respectively. Girls had more abnormal results than boys (14.1% vs 1.8%,  $p < 0.001$ ). After a three-month period, the number of children with persistent abnormalities was 37. The renal ultrasound detected 5 (13.5%) hydronephrosis cases. No significant difference was found when comparing public to private kindergartens and wealthy to non-wealthy region.

**Conclusion:** In such a region with high population density, the high prevalence of nitrituria and/or leucocyturia in girls calls for a good education for parents and caregivers in order to prevent urinary tract infection, and the low

prevalence of proteinuria and hematuria suggests that the appropriate age for urinary screening in Vietnam might be over 6 years.

**Keywords:** Binh Thanh; Can Gio; chronic kidney disease; dipstick; Ho Chi Minh City; urinary abnormalities.

## ABBREVIATIONS

*ABU: Asymptomatic bacteriuria, CKD: Chronic kidney disease, CH2: Children's Hospital 2, HCMC: Ho Chi Minh City, UT: Urinary tract infection, VCUG: Voiding cystourethrogram, VUR: Vesicoureteral reflux.*

## 1. INTRODUCTION

Chronic kidney disease (CKD) is a public health problem worldwide. Its incidence is steadily increasing among children [1,2]. Vietnam is a country of 88,772,884 habitants with 34.6% of the population under the age of 15 years [3]. Vietnam is similar to other developing countries where there is no current national epidemiologic data on pediatric renal failure. Detection and management of renal problems in Vietnamese children are not conducted early enough to prevent complications [4-6]. It is clear that there is no global consensus on the usefulness of screening for CKD in children. Many well-established mass screening in Japan, Korea, and Taiwan showed the benefits of conducting such program. Dipstick remains the simplest and least expensive method for urinary screening among healthy children.

An epidemiological study carried out in Can Gio - a rural district of Ho Chi Minh city (HCMC) - Vietnam in 2011 showed that the prevalence of nitrituria and leucocyturia was 2% and 1%, respectively, and a hygiene education campaign for parents was necessary [7]. Abnormal findings were higher in communes with very low population density. Such data were not available in urban area. Binh Thanh is an urban district of HCMC with a population of 470,054 inhabitants over an area of 20.76 km<sup>2</sup> corresponding to a density of 22,642 persons/km<sup>2</sup>. Some general data of Binh Thanh and Can Gio are presented in Table 1.

**Table 1. General data of the district of Binh Thanh as compared with the district of Can Gio and with Ho Chi Minh City (HCMC)**

Indicators	Binh Thanh (Urban)	Can Gio (Rural)	HCMC
Area (km <sup>2</sup> )	21	704	2,095
Population (persons)	470,054	68,846	7,396,446
Population density (persons/km <sup>2</sup> )	22,642	98	3,531
Number of communes and towns	20	7	322
Number of general hospitals/total hospitals	3/4	1/1	59/93
Number of doctors per 10,000 inhabitants	NA	NA	13.4
Yearly average income per capita (USO)	1588	965	1475

*Source: Statistical office in Ho Chi Minh City*

The aims of our study were to estimate the prevalence of urinary abnormalities in asymptomatic children aged 3 to 5 in Binh Thanh district together with the prevalence of urological anomalies detected by renal ultrasound among children with abnormal urine findings. The results were then compared with published data in Can Gio to obtain a good view of urinary abnormalities among asymptomatic children in HCMC and to contribute education campaign for children's caregivers.

## **2. MATERIALS AND METHODS**

### **2.1 Sample Size and Sampling Method**

This cross-sectional population-based study was conducted in 2012 among healthy children aged 3 to 5 in Binh Thanh district, HCMC, Vietnam. It is estimated that about 90% of children aged 3 to 5 living in Binh Thanh are going to kindergartens. According to criteria of Ministry of labour, invalids and social affairs taking into account the average income of each ward, the People's committee of Binh Thanh district divided the district into 2 regions, 4 wealthy wards and 16 non-wealthy wards. In each region, there are both public and private kindergartens.

According to data provided by the District Office of Education, there were 11,093 children aged 3 to 5 attending 25 public and 17 private kindergartens in Binh Thanh in 2011 with 2,657 children in wealthy wards and 8,436 children in non-wealthy wards.

For a multistage sampling method, a sample size of 1,537 children was required to have a precision of 0.05 in estimating a prevalence of 0.5 with a correction for cluster effect of 4. With an expected missing data rate at 20% and a refusal rate at 20%, 2,402 children need to be enrolled in the study. Using a probability proportional-to-size method, we randomly selected 12 kindergartens, 8 out of 25 kindergartens in public area and 4 out of 17 kindergartens in private area. The final sample size was 2,744 children but parents of 2,433 agree to participate.

### **2.2 Data Collection**

In each selected kindergarten, all children were invited to participate. Their parents were informed about the study and signed an informed consent form. Before the screening day, the parents received a clean urine container and were instructed on how to obtain the specimen. The first morning midstream urine sample was collected at home in the supplied container and the signed consent form was brought to school in the early morning by parents. Results were read in the same morning by a pediatrician and a technician from the Children's Hospital 2 (CH2), with the help from the health stations staff of the ward where the kindergarten locates. Children with a positive result were proposed for screening by a second dipstick for confirmation. Those who were still positive after the second dipstick were proposed for

a third followed-up dipstick at CH2 after three months. Children with a third positive dipstick underwent urine culture and renal ultrasound at CH2.

Ten reagent dipsticks (under product name "Cromatest") and dipstick readers (DARA trademark) were supplied by Linear Chemicals (Spain). Dipsticks were considered abnormal if at least one of the following findings were detected: 1) Positive nitrite, 2) D 25 white blood cells/ $\mu\text{L}$ , 3) D 10 red blood cells/ $\mu\text{L}$ , 4) proteinuria D 150 mg/dL was detected.

### 2.3 Data Analysis

Data were analyzed using SPSS 20. Data are reported as number and percentage or as mean and standard deviation. Proportions were compared using Chi square tests. A p-value less than 0.05 was considered as statistically significant.

### 3. RESULTS

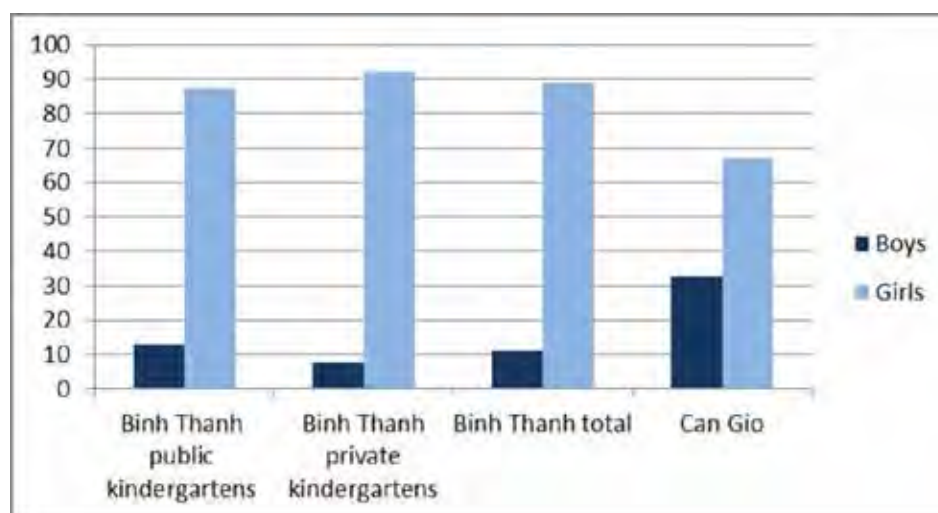
Among 11,093 children aged 3 to 5 in the district, 2,744 children from 12 kindergartens were invited to participate. 88.7% of parents gave their consent for the first dipstick, leading to a sample size of 2,433 children. Of the 2,433 children, 813 (33.4%) were from private kindergartens and 1,620 (66.4%) were from public kindergartens. Positive dipsticks were found in 350 children (14.4%). Twenty two of them were not confirmed by a second dipstick. The remaining number of fully screened children was 2,411 (Fig. 1). The mean age was  $4.2 \pm 0.6$  years and the boy/girl ratio was 1244/1167.

There were 188 (7.8%) children with two positive dipsticks out of the 2,411 screened children. This final percentage varied from 3.3% to 12.8% across kindergartens. One hundred and sixty five (87.8%) were girls. When comparing public kindergartens to private kindergartens, wealthy to non-wealthy regions, and area with population density 0-40,000 persons/ $\text{km}^2$  to area with population density  $>40,000$  persons/ $\text{km}^2$ , no significant difference was found (Table 2).

**Table 2. Percentage of children with urinary abnormalities after two dipsticks according to the type of kindergarten, the economic status and the population density**

	Number of children	Positive	%	p-value
<b>Type of kindergarten</b>				<b>0.63</b>
Public kindergartens	1603	122	7.6	
Private kindergartens	808	66	8.2	
<b>Economic status</b>				<b>0.13</b>
Wealthy wards	1193	103	8.6	
Non wealthy wards	1218	85	7.0	
<b>Population density</b>				<b>0.93</b>
0-40.000persons/ $\text{km}^2$	827	65	7.9	
$>40.000$ persons/ $\text{km}^2$	1584	123	7.8	

Fig. 2 pointed out that girls had more often abnormal results than boys with 14.1% versus 1.8% (165/1167 and 23/1244,  $p < 0.001$ ).



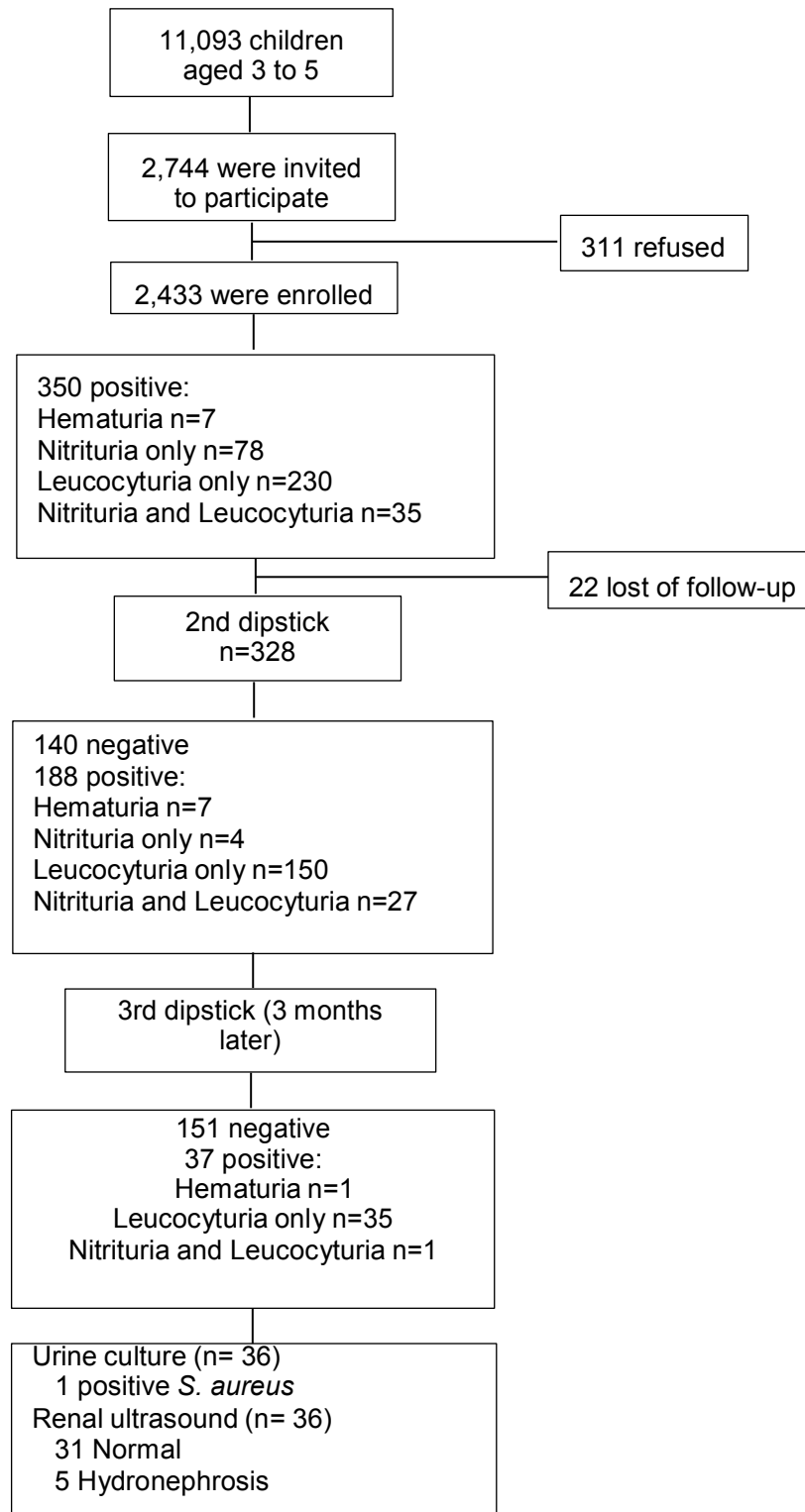
**Fig. 2. Positive nitrituria and/or leucocyturia in girls and boys at kindergartens of Binh Thanh, an urban district as compared with Can Gio, a rural district of Ho Chi Minh City**

Among the 188 children with two positive findings, there were 149 children who had two similar results with both dipsticks including 7 for hematuria, 136 for isolated leucocyturia and 6 for combined nitrituria and leucocyturia, accounting for a prevalence of 0.3%, 5.6% and 0.2%, respectively. Table 3 presents a comparison of these results of Binh Thanh district with results of Can Gio district [7].

**Table 3. Comparison of the results after two dipsticks in Binh Thanh and in Can Gio districts**

	Binh Thanh urban district	Can Gio rural district	p-value
Proteinuria	0/2411 (0%)	2/1957 (0.1%)	0.39
Hematuria	7/2411 (0.3%)	2/1957 (0.1%)	0.30
Nitrituria without leucocyturia	0/2411 (0%)	39/1957 (2%)	<b>&lt;0.001</b>
Both nitrituria and leucocyturia	6/2411 (0.2%)	5/1957 (0.3%)	0.79
Leucocyturia without nitrituria	136/2411 (5.6%)	19/1957 (1%)	<b>&lt;0.001</b>
Positive urine culture	1/2411 (0.04%)	5/1957 (0.3%)	0.13
Hydronephrosis	5/2411 (0.2%)	4/1957 (0.2%)	0.75

After 3-month follow-up, a third dipstick was examined at CH2 and revealed that the number of persistent nitrituria and/or leucocyturia was 37. Among them, 35 had isolated leucocyturia, 1 had combined nitrituria and leucocyturia, and 1 had hematuria. Out of 36 samples of urine that were cultured, one sample grew more than  $10^5$  CFUs of *Staphylococcus aureus* - the bacterial pathogen that are responsible to cause urinary tract infection. The renal ultrasound was performed at CH2, detecting 5/37 cases with hydronephrosis (code N13.30 in ICD-10).



**Fig. 1. Number of children with urinary abnormalities among asymptomatic children in Binh Thanh district of Ho Chi Minh City, Vietnam**



#### 4. DISCUSSION

Binh Thanh is located in the center of HCMC and is not far from Children's Hospital 2. The district has one district hospital, and two public general hospitals, all of which have department of pediatrics. Data on child healthcare are managed by Center for Disease Control and Prevention of Binh Thanh district. The healthcare system is controlled in the same manner with all other districts. The population density is extremely higher than the average density of the city (22,642 persons/km<sup>2</sup> vs 3,531 persons/km<sup>2</sup>) and is 230 times higher than the density in Can Gio district (98 persons/km<sup>2</sup>). In Binh Thanh district that has a very high population density, the positive rates of UTIs suggestive parameters were higher than in Can Gio (nitrituria and/or leucocyturia, 5.8% vs 3.3%) [7]. In a study conducted in USA, authors have shown that a high population density was associated with higher prevalence of water-associated infectious diseases, and it was also associated with a higher probability of outbreak occurrence [8]. In Can Gio, although there was a lower population density, hygiene conditions were not good because of a lack of fresh water. Whereas in Binh Thanh, there is a good system to supply clean water but the extremely high population density may worsen hygiene conditions.

Isolated leucocyturia was the most common abnormality compared to nitrituria in the population of the rural district-Can Gio [7]. After undergoing follow-up, it remains the highest positive parameter with 35/36 children having leucocyturia. The proportion is indicative of asymptomatic urinary tract infections (UTIs) and this is the reason why urine culture was done. Asymptomatic bacteriuria (ABU) is defined by a bacterial count  $10^5$  colony forming units per ml urine in asymptomatic individuals. Basing on the definition, this study found a low prevalence (0.04%) of ABU with only one case. The ABU prevalences in Nepal, Nigeria were at 1.39% and 4%, respectively [9,10]. Some other authors reported a prevalence that varies from 0.026% to 14% depending on age and gender [11-14]. In Vietnam, antibiotics are easily prescribed without any evidence of presence of bacteria. The irrational use of antibiotics is one of the factors that can affect the result of urine culture in both symptomatic and asymptomatic children. Another factor that can be taken into account is the microbiology laboratory techniques. Another study among children with unexplained fever consulting at Binh Thanh district hospital was conducted to obtain a relevant response and to estimate the UTIs prevalence in febrile children with nitrituria and/or leucocyturia. ABU was also observed in children with neurogenic bladder. Patients with neurogenic bladder often have an increased number of white blood cells in their

urine, which makes UTIs diagnosis difficult [15]. Because our population was made up of healthy children at toilet trained age, neurogenic bladder is not a concern and may not be responsible for the high proportion of leucocyturia in this study.

The percentage of children with isolated nitrituria in Can Gio was significantly higher than in Binh Thanh (2% vs 0%), whilst the ABU prevalence was low in both districts. A possible explanation is a greater number of false-positive results in Can Gio. Beside the possibility of prolonged specimen storage at room temperature due to large area of Can Gio, vaginal contamination may be the main cause of false-positive nitrituria because fresh water is problematic in the district. Vaillancourt et al. [16] proved that the contamination rates are within limits if the obtained urethral area is cleaned with soap and water. With improper cleaning, the incidence of contamination increases by three folds. As one can see, the prevalence of UTIs is higher in girls than in boys [15,17]. Therefore, the hygiene education campaign for girls in kindergartens and primary schools is necessary not only in rural areas but also in urban districts. In addition, according to a survey of knowledge, attitude and practice on urinary tract infection of children's caregivers in Can Gio district - Ho Chi Minh City (HCMC) - Vietnam, only 3% had proper knowledge about UTIs symptoms, 25% had appropriate knowledge about the care for prevention of UTIs and 23% had good attitudes towards prevention of UTIs [18]. We have therefore conducted a study in Can Gio to provide the knowledge and the correct practice guidance for children's caregivers to prevent UTIs. The proportion of children with isolated leucocyturia in Binh Thanh was significantly higher than in Can Gio (5.6% vs 1%). As previously discussed, this may be the result of false-positive leucocyturia which due to the use of some antibiotics (imipenem, meropenem, clavulanic acid), other sources of esterase (eosinophils, trichomonas, epithelial cells), or high urine pH. In this study, we didn't evaluate urine pH. Therefore, we could not find the exact reason of the high proportion of isolated leucocyturia in Binh Thanh. However, there is an investigable reason that in urban districts of Vietnam, antibiotics are much easier to find than in rural districts.

In this study which carried out among asymptomatic children, renal ultrasound is the noninvasive modality for screening abnormalities of urinary tract. Furthermore, ultrasound is free from radiation exposition. From the population of 37 children with three positive dipsticks, five subjects had hydronephrosis. The proportion of children with positive dipstick presenting hydronephrosis in Binh Thanh was similar to the results in Can Gio (0.2%). [7] This data suggests a proportion of

vesicoureteral reflux (VUR) in asymptomatic children. A renal ultrasound was suggestive VUR if “dilatation of the pelvi-calyces and/or “dilatation of the ureters and/or “dilatation of the collecting system of one or both kidneys were detected. Most of VUR cases are diagnosed after UTIs [19,20]. In diagnosing and managing of uncomplicated UTIs in children, ultrasound itself has little value because voiding cystourethrogram (VCUG) is the gold standard procedure for diagnosis of VUR [21]. Our data suggests that the real prevalence of VUR among asymptomatic subjects may be higher. The exact incidence of VUR is not known because it is not feasible to do VCUG in a large cohort of healthy children. Of the patients diagnosed with VUR following a UTIs, 65% were less than 7 years old [22].

Study in adults who were diagnosed with VUR in childhood revealed a high proportion of abnormal glomerular filtration rate among patients with bilateral reflux nephropathy [23]. The two most important factors that are believed to influence the probability of renal injury in patients with VUR are the severity of the VUR and the patient's age at the onset of UTIs. Other factors affecting the probability of renal scarring in children with VUR and UTIs include delayed treatment of UTIs, recurrent UTIs, and bacterial virulence [20]. Hence, after the screening, we distributed the leaflets and posters to provide the parents and health stations staff with knowledge about UTIs and UTIs prevention in children. Parents should be educated about healthy voiding and stooling habit as means of preventing UTIs. Parents should be made aware of the possibility of UTIs recurring once their child is diagnosed with VUR.

In Vietnam, the principal cause of pediatric end-stage renal disease was from glomerular origin [5,6]. That's the relevance for conducting the screening. Nevertheless, the proportion of 0% of proteinuria in our study was lower than data in any other regions or countries such as Tokyo, Malaysia, Lebanon, and Egypt [24-27]. On the other hand, the 0.3% prevalence of hematuria is lower than the prevalence from previous studies [25,28] and higher than what was reported in Nepal, Malaysia, and Japan [24,26,29]. Only persistent hematuria reveals the presence of kidney disease, therefore, a follow-up after three months was performed. The number of children with hematuria decreased to 1 case. The difference among countries can be explained by the age of screened children and by different etiologies among regions. From these results, we suggest that the appropriate age for urinary screening in Vietnam should be older than 6 years in urban area with high population density. In Binh Thanh, the low prevalence of proteinuria and hematuria suggests that it is necessary to conduct a cost-effective evaluation before setting up any urinary

screening for children. In the previous study in the remote district of Can Gio, the training for dipstick usage for all medical staff at health stations and in places with very low population density was proved necessary and routine urinalysis can be set up if close controls are conducted. Close controls included well-prepared training of dipstick usage, right method of collecting urine sample, good preservation of dipstick, and good maintaining dipstick readers. Furthermore, in Can Gio, a rural district with low socioeconomic status, with difficult access to healthcare services and with a very low population density, it is important to provide knowledge about the usefulness of dipsticks in district hospitals where there is no pediatrician.

## **5. CONCLUSION**

The high prevalence of nitrituria and/or leucocyturia among asymptomatic children found in the district of Can Gio and in Binh Thanh requires hygiene education and UTI prevention program for parents in remote areas and in region with extremely high population density. Because of a high prevalence of nitrituria and/or leucocyturia in girls, there is an urgent need of hygiene education for girls at pre-school age. The low prevalence of proteinuria and hematuria suggest that the appropriate age for urinary screening in Vietnam should be older than 6 years in areas with high population density. A cost-effective evaluation is also necessary before setting up any urinary screening for children.

## **ETHICAL CONSIDERATION**

Standards of ethics for studies conducted in Vietnam were respected. The study protocol was approved by the Ethical Committee of the HCMC Health Administration and by the Ethical Committee of Children's Hospital 2 in HCMC. The study was a collaboration between Children's Hospital 2 and Universite catholique de Louvain (Brussels, Belgium). The protocol was approved by the University. Informed consent form was obtained from parents of all children involved in the study, with standard assurances of confidentiality.

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The corresponding author has full access to all data of the study and has final responsibility for the decision to submit for publication.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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## ***Demographic Profile of Travellers Seeking Reproductive Tourism Services***

### **ABSTRACT**

Reproductive medical tourism is by some accounts a multibillion dollar industry globally. Transnationally, it involves the travel between nations of individuals seeking assisted reproductive technologies in foreign countries. Through a structured literature review, we identified the demographic characteristics of those seeking these services. Data from 14 peer-reviewed studies were synthesized. Most studies described travel within Europe, with Belgium being the destination most often cited. Key findings include that those travelling for reproductive purposes are typically over 35 years of age, likely to self-identify as homosexual, bisexual or transgendered. The most frequently mentioned reason for travel was the lack of appropriate services in the home country.

**Keywords:** ART; IVF; surrogacy; globalization; demographics; reproduction.

### **1. INTRODUCTION**

Reproductive tourism (RT) is an emerging, ethically problematic phenomenon at the interface between commerce and clinical care. Defined as "the traveling of [clients] from their country of residence to another country in order to receive a specific treatment or to exercise personal reproductive choice", [1] it typically involves the seeking of assisted reproductive technologies (ARTs), including in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), pre-implantation genetic diagnosis (PGD), gamete donation, and maternal surrogacy.

While this accelerating industry has loci in the USA, Eastern Europe, Latin America and Southeast Asia, India is thought to be the world's greatest provider of surrogate mothers, and is accelerating its provision of other ART services. The Indian industry is likely worth \$500 million [2] to \$2.3 billion [3].

Within Europe, travel for cross-border reproductive care is known to be vibrant, with several studies focusing solely on the European phenomenon. On the glo-

bal stage, it is anecdotally known that India attracts clientele from many different countries, and may actively seek patients from higher income countries [4]. Not much is known of clients' motivations for travel for ART. But it has been suggested that a combination of legal and pricing restrictions in the source countries and the openness of services in destination countries are likely incentives [5], as well as the desire for same-sex couples to start families.

With this study, we reviewed the published literature to summarize what is known about the demographic characteristics and motivations of international ART seekers.

## **2. METHODS**

We searched the Pub Med database for all instances, abbreviations and combinations of the following terms: reproductive tourism, tour, travel, assisted reproduction, cross border reproductive care, in vitro fertilization, pre-implantation genetic diagnosis, demographics, fertility, statistics.

Reference lists from each paper were also searched. Articles' titles and abstracts were scanned for relevance, with the entirety of the contents of resulting papers assessed by two raters for further relevance. Only papers reporting original data were included.

Descriptions of ART clientele and their motivations were extracted from each study, and the resulting data grouped according to themes: Description of traveller, Destination of travel, and Purpose of travel.

## **3. RESULTS**

The searched terms resulted in 1038 articles, which were narrowed down to 30 based upon title and abstract review. Of these, 14 were found to be relevant by both raters.

A summary of findings according to the aforementioned themes is presented in Table 1.

**Table 1. Summary of findings from review of 14 studies, grouped according to theme**

<b>Description of traveller</b>	<b>Reference</b>	<b>Cases</b>
Middle aged (35 years+)	[6-11]	6: n = n/a, 7: n = 34.9% (aged 40 or older), 8: n = n/a 9: n = 93% (aged 30 or older), 10: n = n/a, 11: n = n/a
Single (unmarried)	[6,7,12,13,14]	6: n = n/a, 7: n = 6.1% of sample, 12: n = 6 (12% of sample), 13: n = 4 (18% of sample), 14: n = 6 (15% of sample)
Married or co-habiting	[7,8,11,12]	7: n = 93.9% of sample, 8: n = n/a, 11: n = n/a 12: n = 44 (86% of sample)
Homosexual / Bisexual / Transgendered	[6,12,13,14]	6: n = n/a, 12: n = 1 (2% of sample), 13: n = 5 (23% of sample), 14: n = 1 (2% of sample)
Heterosexual	[12,13,14]	12: n = 50 (98% of sample), 13: n = 13 (59% of sample) 14: n = 34 (83% of sample),
Educated	[7,12,14]	7: n = 87.2%, 12: n = 51 (100% of sample), 14: n = n/a
Previous failed fertility in home country	[6,9]	6: n = n/a, 9: n = 86% of sample
<b>Destination of travel</b>		
Within Europe, destination Belgium	[6-8,11,13,15]	6: n = 2,288 (38% of sample) from France; n = 1,763 (29%) from Netherlands; n = 738 (12%) from Italy; n = 594 (10%) from Germany; n = 273 (4%) from Luxembourg; n = 108 (2%) from UK; n = 93 (2%) from Spain; n = 233 (4%), 7: n = 29.7% of sample, 8: n = n/a 11: n = n/a, 13: n = n/a, 15: n = n/a,

**Table 1 Continued.....**

<b>Description of traveller</b>	<b>Reference</b>	<b>Cases</b>
Within Europe, destination Spain	[7, 8,11-13,15]	7: n = 15.7% of sample, 8: n = n/a, 11: n = n/a 12: n = 18 (36% of sample), 13: n = n/a, 15: n = n/a
Within Europe, destination Czech Republic	[7,11,13]	7: n = 20.5% of sample, 11: n = n/a, 13: n = n/a
Within Europe, destination Denmark	[7,8,13,15]	7: n = 12.5% of sample, 8: n = n/a, 13: n = n/a, 15: n = n/a
From Europe to North America	[8,12,16]	8: n = n/a, 12: n = 5 (10% of sample), 16: n =582 (32% of sample)
Within North America	[9,11,16]	9: n = n/a. 11: n = n/a, 16: n = 335 (50% of sample)
To India	[11,15]	11: n = n/a, 15: n = n/a
<b>Purpose of travel</b>		
Lack of availability of services in home country	[6,7,9-11,14, 15,17-18]	6: n =29% of sample 7: n = n/a 9: n = 12 (48% of sample) 10: n = n/a 11: n = n/a 14: n = n/a 15: n = n/a 17: n = n/a 18: n = n/a
Legal restrictions in home country	[1,6,7,8,10, 11,13,15,17]	1: n = n/a 6: n = 64% of sample 7: n = 54.8% of sample 8: n = n/a 10: n = n/a 11: n = n/a 13: n = n/a 15: n = n/a 17: n = n/a

**Table 1 Continued.....**

<b>Description of traveller</b>	<b>Reference</b>	<b>Cases</b>
Long wait times and other access issues in home country	[1,6,7,9,10, 14,17,18]	6: n =33% of sample 1: n = n/a 7: n = 7% of sample 9: n = 15 (60% of sample) 10: n = n/a 14: n = n/a 17: n = n/a 18: n = n/a
Cost too high in home country	[1,6,9,10,12, 14,17,18]	1: n = n/a 6: n =17% 9: n = 12 (48% of sample) 11: n = n/a 12: n = 13 (22% of sample) 14: n = n/a 17: n = n/a 18: n = n/a
Inability to receive services in home country due to demographic exclusions	[1,6,8,10,13,17]	6: n = 79% of sample 8: n = n/a 18: n = n/a 10: n = n/a 13: n = n/a 17: n = n/a
Perception of superior quality of care abroad	[7,9,12,14,15, 17,18]	7: n = 43.2% of sample 9: n = 12 (48% of sample) 12: n = 12 (20% of sample) 14: n = n/a 15: n = n/a 17: n = n/a 18: n = n/a
Gamete donor shortages in home country	[9,12,14]	9: n = 18 (72% of sample) 12: n = 27 (46% of sample) 14: n = n/a
Previous unsatisfactory experience in home country	[7,12,14]	7: n = 29.1% of sample 12: n = 7 (12% of sample) 14: n = n/a
Other reasons (eg, personal connection to destination country)	[8,11,14,15,17,18]	8: n = n/a 11: n = n/a 14: n = n/a 15: n = n/a 17: n = n/a 18: n = n/a

#### 4. DISCUSSION

In terms of raw numbers of travellers profiled, a plurality were described as homosexual, bisexual or transgendered. But these findings were explored in only 3 of the examined papers. Meanwhile, a majority of studies explored travel within Europe alone, most frequently to Belgium. And a lack of suitable or acceptable services at home appears to be the prime motivator for international travel for ART.

Obviously, these results may be more indicative of the priorities of researchers, who can choose the study population upon which to focus, than necessarily of the true trends of cross-border travel for ART. But as there is no conclusive study objectively seeking to apply a degree of epidemiological surveillance to this phenomenon, a literature synthesis approach is as yet our best attempt to gauge this phenomenon. It is nonetheless curious that so few studies captured the trend of clients travelling to India, which is the focus of most international ART profiles in the lay media.

Most interesting is the sense that limitations within the home country are the driver for travel. Colloquially, it has been suggested that economic considerations were most prominent, with the reduced rates offered by India's advanced reproductive tourism industry being particularly attractive [4]. However, this is not entirely unforeseen, as our previous work has indicated that the elimination of legislative barriers may play a role in the evolution of a domestic reproductive tourism industry [19]. Similarly, Shenfield et al. [7] found that "legal reasons were predominant for patients travelling from Italy, Germany, France, Norway and Sweden". Statutes concerning ART vary widely across all nations, even those with close economic and cultural ties, [20] such as the nations of Western Europe. It should be pointed out that "legal reasons" for travel include not only a desire to seek services not legally available in the home country, but also the seeking of services deemed inaccessible for demographic reasons (e.g., patient age, sexual orientation, or civil status).

A thorough study by Culley et al. [12] found that British subjects specifically had "complex" reasons for seeking ART abroad. These reasons included timely treatment with donor gametes, reduced cost and higher success rates abroad, and interestingly the less stressful environment perceived to be associated with foreign clinics. It stands to reason that compulsions will vary depending upon both the culture and country of origin of the travellers and the nature of the destination country. Some destinations may be perceived to be less stressful than others, perhaps due to their association with vacation experiences. Thus, it would be interesting to examine the motivations of travellers from more diverse parts of the world, including low income countries, who seek services in both developing and wealthier nations. Our exclusion of maternal surrogacy from the list of search terms employed likely reduced the number of studies found describing travel to India, which is best known for its provision of surrogate mothers.

Given the rapid expansion of that country's reproductive technology services, [4] it seems likely that a future studies on this topic will see a heightened Indian presence in those results.

## **5. CONCLUSION**

Publication activity on the nature of travellers seeking international reproductive technology services is clustered about those of a particular demographic bent seeking services within Europe, and who are motivated by the lack of available services domestically. If these results are reflective of the true profile of travellers, then they suggest the existence of a substantial portion of individuals being excluded from appropriate reproductive services within their home countries.

## **CONSENT**

Not applicable.

## **ETHICAL APPROVAL**

Not applicable.

## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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### **Description of contamination of surface impoundment of Ukrainian Danube Region by organochlorine pesticides (OP)**

**Abstract:** This article is devoted to description of contamination of surface impoundment of Ukrainian Danube Region by organochlorine pesticides (OP). Necessity of continuation of monitoring of maintenance OP for water of surface impoundment is proved.

**Keywords:** water, surface impoundment, organochlorine pesticides, Ukrainian Danube Region.

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### **Характеристика забруднення поверхневих водойм Українського Придунав'я хлорорганічними пестицидами (ХОП)**

**Анотація:** Стаття присвячена характеристиці забруднення води поверхневих водойм Українського Придунав'я хлорорганічними пестицидами (ХОП).

Обґрунтована необхідність проведення моніторингу їх вмісту у воді поверхневих водойм.

**Ключові слова:** вода, поверхневі водойми, хлорорганічні пестициди, Українське Придунав'я.

## Вступ

Відповідно до різних міжнародних угод близько 60 хімічних речовин увійшли в списки, які передбачають обмеження їх поширення та обов'язковий контроль вмісту в об'єктах навколишнього середовища [1]. Із цих списків Конвенцією про стійкі органічні забруднювачі (СОЗ) (Стокгольм, травень 2001 р.) виділена група, названа «брудною дюжиною», до якої входять, зокрема такі хлорорганічні пестициди (ХОП), як алдрин, ДДТ, гексахлорбензол, гептахлор.

Глобальність небезпеки ХОП підтверджується як поширеністю цих СОЗ в різних об'єктах навколишнього середовища [2], так і негативним впливом на здоров'я людини. Незважаючи на жорстку регламентацію вмісту ХОП у воді поверхневих водойм США, у Великих озерах виявлені рівні певних пестицидів перевищували національні нормативи у 6-32 % проаналізованих зразків [3].

Встановлено, що деякі ХОП можуть викликати діабет [4], ендокринні розлади, репродуктивні дисфункції [5], підвищувати ризик гіпертензивних розладів при вагітності [6].

Визнано, що в Україні найбільш забрудненими є відкриті водойми і підземні джерела у східних і південних областях, а також гирлові зони морського узбережжя. Однак, ці водні об'єкти є водночас найменш дослідженими з точки зору впливу на здоров'я людини.

Прикладом таких об'єктів є гирлова зона ріки Дунай та придунайські озера (Кагул, Ялпуг, Катлабух, Китай, Сасик), які останніми роками зазнають інтенсивного антропогенного забруднення [7]. Однак, інформація щодо забруднення цих водойм ХОП, головним чином, обмежена р. Дунай, стосовно ж озер, за нашими даними, відсутня.

Таким чином, мета роботи полягала в характеристиці забруднення ХОП поверхневих водойм Українського Придунав'я.

## Матеріали і методи

Зразки води поверхневих водойм Українського Придунав'я у 3-х повторностях відбирали 23, 24 липня 2014 р. в точках моніторингу стану поверхневих

вод, який виконує лабораторія Дунайського басейнового управління водних ресурсів (м. Ізмаїл Одеської області). Місця відбору зразків: р. Дунай (мм. Рені, Ізмаїл, Кілія, Вилкове) (зразки 1-4); оз. Кагул (5); оз. Ялпуг (6,7); оз. Катлабух (8, 9); оз. Китай (10, 11); р. Ялпуг (12); р. Карасулак (13); р. Єніка (14); зрошувальний канал р. Дунай - оз. Сасик (15).

Аналіз проб води на вміст ХОП ( $\alpha$ -ГХЦГ, ГХБ,  $\beta$ -ГХЦГ,  $\gamma$ -ГХЦГ (ліндан), гептахлор, алдрин, ДДТ та його метаболіти) виконано згідно методики Українського наукового центру екології моря (м. Одеса) на основі міжнародного стандарту [8]. Методика полягала у наступному. Пробу води об'ємом 1 дм<sup>3</sup> екстрагували методом твёрдофазної екстракції на мембранних дисках ENVI-S18. Цільові сполуки елюювали сумішшю розчинників (гексан, дихлорметан). Елюат очищали і фракціонували методом колоночної хроматографії на колонці із флоризилом, для елюювання цільових фракцій використовували суміші розчинників (гексан, дихлорметан). Упарені на роторному випарникові фракції аналізували методами газової хромато-мас-спектрометрії і газової хроматографії з мікро-електронно-захватним детектором. Застосовували розчинники (гексан, дихлорметан, метанол, етилацетат, ізооктан) виробництва фірми Merck (кваліфікація "for residue analysis"). Для градування приладу використовували стандартну суміш, яка містила 9 хлорорганічних пестицидів виробництва фірми Supelco з концентрацією кожного компонента 10 - 2000 мкг/см<sup>3</sup>.

### **Результати та їх обговорення**

Раніше в тих же зразках води нами визначено вміст ліндану, гептахлору, ДДЕ, ДДД, ДДТ методом газової хроматографії після екстрагування (рідина-рідина) на хроматографі «Кристал-2000» з електроно-захватним детектором (ЕЗД) [9]. У всіх пробах вміст ХОП знаходився за межею чутливості прилада. Однак, як показали попередні еколого-гігієнічні дослідження ропи Шаболатського (Будакського) лиману, в яких за цим методом ХОП також не виявлені, застосування більш чутливого методу хромато-мас-спектрометрії дозволило ідентифікувати певні рівні ХОП [10].

Вміст ХОП у воді поверхневих водойм Українського Придунав'я представлено у табл. 1.

Таблиця 1. Результати визначення ХОП (нг/дм<sup>3</sup>) у воді поверхневих водойм Українського Придніпров'я

№ зразка	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
α-ГХЦГ	0,06	≤0,05	0,07	0,19	≤0,05	0,06	0,12	≤0,05	0,05	0,06	0,06	0,11	0,21	≤0,05	1,16
ГХБ	0,04	0,08	0,11	≤0,05	≤0,05	≤0,05	≤0,05	≤0,05	0,06	0,85	0,08	0,05	0,12	≤0,05	0,94
β-ГХЦГ	2,92	3,02	5,63	4,64	1,68	1,6	1,87	2,94	1,24	5,55	1,17	4,34	7,38	8,3	2,57
Ліндан	0,1	0,18	0,23	0,1	0,05	0,05	0,1	≤0,05	≤0,05	1,27	≤0,05	≤0,05	2,29	≤0,05	0,8
Гептахлор	0,61	0,087	0,29	0,11	0,07	0,07	0,07	0,07	0,05	0,05	0,15	0,13	0,17	≤0,05	0,57
Алдрин	0,17	0,074	0,15	≤0,05	≤0,05	≤0,05	0,06	≤0,05	≤0,05	0,07	≤0,05	≤0,05	0,09	≤0,05	0,32
ДДЕ	1,46	0,78	0,89	0,83	0,39	0,67	0,19	0,21	0,91	0,82	1,26	0,41	0,29	0,42	2,87
ДДД	3,19	0,93	1,25	0,24	0,24	1,12	1,72	0,89	0,53	2,17	0,88	0,12	0,82	0,52	1,91
ДДТ	1,88	1,53	4,25	0,91	0,25	1,68	1,27	1,06	1,49	1,57	1,37	0,31	0,62	0,84	4,13

Як видно із представлених даних, у всіх пробах води сумарна концентрація ХОП значно нижча гранично-допустимої концентрації (ГДК) для суми ХОП, прийнятої в Україні [11], – 0,1 мкг/дм<sup>3</sup> або 100 нг/дм<sup>3</sup>. У найбільших концентраціях виявлені ДДТ і  $\beta$  – ГХЦГ: 0,25 - 4,25 нг/дм<sup>3</sup> і 1,17 і 8,3 нг/дм<sup>3</sup> відповідно. Максимальні рівні забруднення цими ХОП виявлені в зразках № 14 (р. Єніка) (8,3 нг/дм<sup>3</sup>  $\beta$  – ГХЦГ) і № 3 (р. Дунай, питний водозабір м. Кілія) (4,25 нг/дм<sup>3</sup> ДДТ).

Для оцінки давності забруднення пестицидами екосистем водою використовували співвідношення концентрацій  $\alpha$ - і  $\gamma$ -ізомерів ГХЦГ (ліндану); ДДТ та його метаболітів ДДД і ДДЕ. Високе значення коефіцієнта у першому випадку свідчить про тривалу присутність ХОП у середовищі; низьке значення характерне для «свіжого» забруднення. Як відомо, ДДТ існує у вигляді основного продукту і його метаболітів – ДДД і ДДЕ. Про час існування ДДТ в об'єктах судять по співвідношенню концентрацій ДДТ і його метаболітів ДДД і ДДЕ. Тут ситуація зворотня попередній: високі значення коефіцієнту ДДТ/ДДД+ДДЕ свідчать про недавнє забруднення ДДТ об'єкту навколишнього середовища, низькі – про його тривале перебування в системі і поступове перетворення в ДДД і ДДЕ [12].

В контексті співвідношення концентрацій ДДТ і його метаболітів ДДД і ДДЕ слід звернути увагу на зразок № 3, де концентрація ДДТ майже вдвічі перевищує сумарну концентрацію метаболітів. Це дає підставу вважати про наявність джерела забруднення ДДТ р. Дунай в районі питного водозабору м. Кілія. Характерними в цьому плані є також зразки № 2 (р. Дунай, питний водозабір м. Ізмаїл), 4 (р. Дунай, питний водозабір м. Вилкове), 6 (оз. Ялпуг, питний водозабір м. Болград) і 8 (оз. Катлабух, насосна станція НС-2 Суворовської зрошувальної системи), де відзначена порівнянність концентрацій метаболітів і ДДТ, що також дозволяє судити про певне надходження ДДТ в ці водні об'єкти.

У табл. 2 представлені співвідношення концентрацій  $\gamma$  - ГХЦГ (ліндану) і  $\alpha$  – ГХЦГ для тих зразків, де такий розрахунок доцільний.



**Таблиця 2. Співвідношення концентрацій ліндану до  $\alpha$ -ГХЦГ**

№ зразка	1	3	4	6	7	10	13	20
$\alpha$ -ГХЦГ	0,06	0,07	0,19	0,06	0,12	0,06	0,21	1,16
Ліндан	0,1	0,23	0,1	0,05	0,1	1,27	2,29	0,8
Коефіцієнт	1,7	3,3	0,5	0,8	0,8	21,2	10,9	0,7

Як видно із цих розрахункових даних, зразки № 10 (оз. Китай Червоноярська ГНС) та № 13 (р. Карасулак, яка впадає в оз. Ялпуг - кордон з Молдовою) вирізняються дуже високими значеннями цього коефіцієнту (21,17 та 10,90 відповідно), що свідчить про дуже тривалу присутність цих пестицидів у воді. Тоді, як у зразках № 4 (р. Дунай питний водозабір м. Вилкове), 6 (оз. Ялпуг, питний водозабір м. Болград), 7 (оз. Ялпуг, с. Нова Некрасівка Ізмаїльського району), 15 (зрошувальний канал р. Дунай - оз. Сасик) забруднення лінданом носить «свіжий» характер, тобто мова йде про його вимивання у воду, можливо зі складів отрутохімікатів або полів.

### **Висновки**

1. ХОП є значимими забруднювачами водних об'єктів, що обумовлено токсичними та віддаленими ефектами при впливі цих сполук на організм теплокровних тварин і людину.

2. Отримані результати визначень ХОП у воді поверхневих водойм Українського Придунав'я свідчать про наявність недавнього надходження ДДТ та ліндану в р. Дунай та оз. Ялпуг, що особливо небезпечно для питних водозаборів, які розташовані в цих водних об'єктах.

3. Наявність забруднення ДДТ та лінданом обумовлює необхідність моніторингу їх вмісту та інших ХОП, встановлення та вилучення джерел забруднення.

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## ***Hematological and oologicheskies indicators house sparrow (passer domesticus) in highly nature use***

**Abstract:** This article presents the results of research of hematological parameters and biochemical parameters oomorfo house sparrow in a highly urbanized environment. Material for the study served as the blood taken from the axillary vein in individuals of different age and sex, as well as the urban sparrow eggs. With the use of classical methods of investigation failed to establish: the average content of hemoglobin in the blood, red blood cells, white blood cells, hematocrit in the house sparrow. Just set the average egg weight, shell, IF, the hydrogen ion concentration, refractive index of albumen and yolk in the studied birds.

**Keywords:** sparrow brownie, blood concentration, hematologic studies.

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## **Гематологические и оологические показатели домового воробья (*passer domesticus*) в высокоурбанизированной среде обитания**

**Аннотация:** В данной статье представлены результаты исследований гематологических показателей и ооморфо-биохимических показателей домового воробья в условиях высокоурбанизированной среды обитания. Материалом для исследования послужила кровь, взятая из подкрыльцовой вены у особей разного возраста и пола, а также яйца городского воробья. С использованием классических методов исследования удалось установить: среднее содержание гемоглобина в крови, эритроцитов, лейкоцитов, гематокрит у домового воробья. Так же установлены средняя масса яиц, скорлупы, ИФ, концентрация водородных ионов, коэффициент рефракции белка и желтка у исследуемых птиц.

**Ключевые слова:** воробей домовый, кровь, концентрация, гематологические исследования.

### **Введение**

Домовый или городской воробей (горобец) – *Passer domesticus* (отряд Воробьеобразные – *Passeriformes*, семейство Ткачиковые – *Ploceida* род Воробьи – *Passer*) совсем не похож на других птиц, живущих рядом с человеком [4].

Поведение воробьев довольно пластично, и в целом они хорошо приспосабливаются к жизни в современных населенных пунктах [5]. Основная часть гнезд домового воробья располагается в постройках человека (82,4%), высота расположения его гнезд варьирует от 2 до 7 м и выше [7]. Живая масса птиц составляет 21—37 г, длина 14—18, крыло 7,3—8,5, размах крыльев 22—27 см. У воробья всего 1359 перышек [2]. Поэтому перьевой покров воробьи всегда содержат в чистоте, и в гнездо таскают ветки полыни, кресс-салат и петрушку, чтобы ее запах отпугивал клещей и пухоедов. В журнале «Biology Letters» появилось сообщение о том, что в Мехико воробьи собирают окурки сигарет, целлюлозные фильтры которых служат мягкой подстилкой для птенцов, а никотин – надежной защитой от клещей, что также является примером их адаптации к городской среде. Температура тела городского воробья 44°C, в покое сердце совершает от 600 до 860 ударов в минуту, во время полета – до

1000. Частота дыхания около ста. В морозы воробей дышит еще чаще, стимулируя, таким образом, теплообразовательные процессы. Поле зрения каждого глаза воробья составляет  $150^\circ$ . Воробьи развивают скорость 35 километров в час, делая при этом 13 взмахов крыльями ежесекундно [6]. Размножаться воробьи начинают ранней весной, когда устанавливается плюсовая температура воздуха –  $6\text{--}10^\circ\text{C}$ . Гнездо шарообразной формы. Наружный диаметр гнезда  $120\text{--}130$  мм, внутренний – около 80 мм, высота гнезда  $80\text{--}100$  мм, диаметр летка  $70\text{--}80$  мм. Обычно у домового воробья бывает 2–3 выводка – с весны и до середины лета [1]. Половая зрелость у молодых птиц наступает в возрасте 7–8 месяцев. Самка производит откладку от 2 до 10 яиц в течение 4–5 дней. Чаще в кладке 3–7 матово-белых, бледно-желтых или бледно-голубых яиц с буровато-желтыми пятнами и серовато-бурыми крапинками, размеры яиц  $22,32 \times 16,34$  мм, масса 2,83 г. Н.В. Чурсиновой (2010) установлено, что по ряду ооморфологических показателей обнаруживается межгодовая, сезонная и ландшафтная изменчивость, где факторы изменчивости тесно связаны между собой и действуют комплексно. Насиживание яиц длится всего 11–12 суток. Выкармливание птенцов в гнезде продолжается от 13 до 15 дней, в процессе выкармливания детенышей принимают участие самка и самец. В гнездовой период в течение дня пара воробьев приносит в гнездо 500 различных насекомых. Воспитание после вылета из гнезда продолжается в течение 12 дней [4]. После окончания гнездового сезона у воробьев наступает послегнездовая линька, во время которой они полностью меняют свое оперение [3]. Осенью домовый воробей съедает до 5–6 г зерна в день, в его корм входит 8 основных культур, в том числе подсолнух, конопля, рис, гречиха, просо, пшеница. В осенне-зимний период пищей воробьев являются семена дикорастущих растений и остатки пищи человека [1].

Воробьев можно использовать как птиц-нянек для разведения некоторых редких или ценных видов птиц. Эксперименты в природе по замене яиц воробьев на яйца таких дупло-гнездников, как синицы, горихвостки и даже мухоловки, зачастую завершались успешно.

Средняя продолжительность жизни воробьев составляет 9–21 месяц, однако есть и 9–11-летние долгожители. В неволе воробьи живут до 15 лет [2].

Ежегодно поступают сообщения о том, что популяция городских воробьев во многих странах сократилась вдвое, поэтому весьма своевременным является оценка степени влияния урбанизированных территорий на гомеостаз этих птиц.

**Целью исследования** являлось изучение гематологических показателей и ооморфо-биохимических показателей домового воробья.

#### **Условия, материалы и методы исследования**

Наблюдения проводились в Ставропольском крае и г. Иваново в июне-июле 2014 года при среднесуточной температуре 24,7—26,3°C. Исследования выполнены на кафедрах морфологии, физиологии и ветеринарно-санитарной экспертизы; акушерства, хирургии и незаразных болезней животных ФГБОУ ВПО «Ивановская государственная сельскохозяйственная академия имени академика Д.К. Беляева».

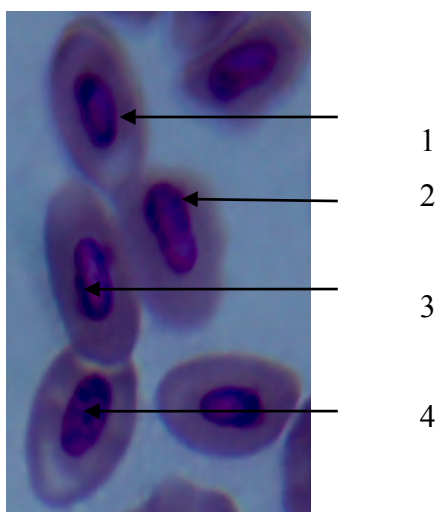
Материалом для исследования послужила кровь, взятая из подкрыльцовой вены у особей разного возраста и пола, а также яйца городского воробья.

Гематологические исследования выполняли по стандартным методикам: дифференцированный подсчет лейкоцитов в мазках крови под микроскопом при увеличении  $\times 1600$  (окуляр  $\times 16$ , объектив  $\times 100$ ), окрашенных по Diff-Quick, определение соотношения гетерофилов и лимфоцитов (Г/Л); в качестве уточняющего показателя – число эозинофилов и моноцитов; подсчет количества лейкоцитов и эритроцитов в камере Горяева; определение гемоглобина методом Сали; определение гематокрита с помощью специального прибора – гематокрита.

Для оценки яиц использовали овоскопию, морфометрию, расчетные методы для определения ИФ (индекс формы); определение pH при помощи pH-метра; коэффициента рефракции белка и желтка на рефрактометре.

#### **Результаты и их обсуждение**

Содержание гемоглобина у *Passer domesticus* подвержено значительным колебаниям – от 170 г/л у взрослых самцов, до 254 г/л у молодых птиц, покинувших гнездо. Концентрация эритроцитов в периферической крови у большинства птиц составила  $2,87 \times 10^{12}/л$ , однако диапазон этого показателя составляет  $(1,20—3,88) \times 10^{12}/л$ .



**Рис. 1. Эритроциты (окраска по Diff-Quick, увеличение  $\times 1600$ ) 1 – оболочка; 2 – цитоплазма; 3 – ядро; 4 – ядрышки**

Эритроциты (рис. 1) у городского воробья крупные, овальные, содержат ядро эллиптической формы. Наличие ядра в эритроцитах является показателем интенсивного потребления кислорода самими клетками. Густота окраски эритроцитов обусловлена их емкостью (размерами и толщиной), а также содержанием гемоглобина. В ядрах эритроцитов отчетливо просматриваются ядрышки.

Гематокрит колеблется в пределах 48—68% в зависимости от количества форменных элементов в крови.

Лейкоцитов у городского воробья  $(3,56—5,98) \times 10^8/\text{л}$ .

При дифференцированном подсчете клеток белой крови установлено преобладание лимфоцитов – 75% (рис. 2). Среди лимфоцитов доминируют малые (до 78—83%), большие составляют всего 2%. Моноцитов насчитывается 7—8%.

Эозинофилы составляют 8—9%. Гетерофилы не однородны по структуре (рис. 3), количество их не превышает 9—10%.



лимфоцит

**Рис. 2. Лимфоцит (окраска по Diff-Quick, увеличение  $\times 1600$ )**



гетерофил

**Рис. 3. Гетерофил (окраска по Diff-Quick, увеличение  $\times 1600$ )**



Коэффициент Г/Л составил 0,13, что свидетельствует о высоком уровне стресса у городского воробья.

Яйца домового воробья имеют характерную для данного вида птиц форму, скорлупу молочно-розоватого цвета с темными коричневатыми крапинами, слабовыраженной мраморностью, чистую, гладкую, блестящую, без наложений и шероховатостей. Средняя масса яйца составляет  $2,49 \pm 0,45$  г, скорлупы –  $0,30 \pm 0,07$  г толщиной  $0,22 \pm 0,08$  мм.

Характерным для яиц домового воробья, по-видимому, является индекс формы равный  $68,18 \pm 0,88\%$ . ИФ варьирует у данного вида в очень узких пределах – от 67 до 70%. Этот показатель оказывает существенное влияние на выводимость яиц: уменьшение, равно как и его увеличение, снижает выводимость на 4—12%.

Все исследуемые яйца были на ранней стадии инкубации.

Концентрация водородных ионов в белке составила  $6,80 \pm 0,20$ , в желтке –  $6,00 \pm 0,00$ . Во время насиживания, как правило, pH белка смещается в кислую сторону, а желтка – в щелочную, и на определенном этапе инкубации происходит сближение pH белка и желтка. При увеличивающейся разнице pH, в дальнейшем желток становится более щелочным, чем белок. Однако на этот показатель существенное влияние оказывает температура.

Высокая температура воздуха вызывает ускорение перехода солевой части белка в желток, что приводит к быстрому снижению электропроводности белка и увеличению электропроводности желтка, и, в свою очередь, потенцирует изменение коэффициента рефракции. Так при исследовании выявлено, что коэффициента рефракции белка составил  $1,3557 \pm 0,0004$ , желтка –  $1,3491 \pm 0,0010$ .

Таким образом, в ходе проведенного исследования установлены основные гематологические и оологические показатели домового воробья, а именно:

1. в среднем в крови содержание гемоглобина составило 221,70 г/л, эритроцитов –  $2,87 \times 10^{12}$ /л, лейкоцитов –  $4,80 \times 10^8$ /л, гематокрит – 52%;
2. средняя масса яиц 2,49, скорлупы – 0,30 г, ИФ – 68,18%;
3. концентрация водородных ионов, коэффициент рефракции белка и желтка 6,8 и 6,0 ед.; 1,3557 и 1,3491 соответственно.

В заключении необходимо отметить, что исследование влияния антропогенных систем на гематологические и оологические показатели городского воробья требует дальнейшего изучения.

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## ***Physiological adequacy of drinking water***

**Abstract:** A comparative analysis of drinking water sources in terms of physiological adequacy of water was conducted. It was determined that the water of decentralized water supply has more level of adequacy than sources of centralized water supply.

**Keywords:** drinking water, physiological adequacy, stiffness, calcium, magnesium, morbidity.

## ***Физиологическая полноценность питьевых вод***

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**Аннотация:** Проведен сравнительный анализ источников питьевого водоснабжения по показателям физиологической полноценности вод. Установлено, что воды децентрализованного водоснабжения физиологически полноценнее, чем источники централизованного водоснабжения.

**Ключевые слова:** питьевая вода, физиологическая полноценность, жесткость, кальций, магний, заболеваемость.

В последние десятилетия отмечается ухудшение состояния общественного здоровья, связанное с воздействием факторов социально-экономи-

ческого и экологического характера. Питьевая вода является одним из главных факторов окружающей среды, который может оказывать как положительное, так и отрицательное влияние на здоровье населения [4,7]. Поскольку вода, которую мы пьем, проникает в каждую клетку нашего организма, ее качество, возможно, важнее, чем качество продуктов питания. Определяющее влияние на микро- и макроэлементный состав питьевой воды оказывает уровень локального и регионального геохимического фона. Определение местных особенностей состава питьевой воды необходимо для разработки профилактических мероприятий [6].

В настоящее время во многих странах важное значение уделяется такому понятию как «физиологическая полноценность» питьевых вод. В Российской Федерации понятие физиологической полноценности питьевой воды и соответствующие нормативы впервые были введены в 2002 году с момента утверждения и введения в действие санитарных правил на бутилированную воду – СанПиН 2.1.4.1116–02 [12].

Критерий «физиологической полноценности» определяется необходимостью обеспечения организма необходимыми в физиологическом отношении макро- и микроэлементами в оптимальных количествах (то есть не только максимально допустимых, но также минимально необходимых уровней содержания их в питьевой воде). Критерий физиологической полноценности - это своего рода «диапазон полезности» [5].

Хозяйственно-питьевое водоснабжение г. Уссурийска осуществляется в основном по централизованному типу, охвачено 93% населения, 7% населения используют воду из децентрализованных водоисточников (скважинные водозаборы и колодцы общего пользования). При наличии нескольких источников водоснабжения равной санитарной надежности и равной возможности обеспечения населения водой выбор источника должен осуществляться с учетом физиологической полноценности [2].

Целью данной работы - оценка физиологической полноценности питьевых вод источников централизованного и децентрализованного водоснабжения города Уссурийска.

Для определения степени физиологической полноценности проведена сравнительная оценка минерализации, содержания биогенных макро- и микроэлементов в питьевой воде водопроводов, в воде скважин и общес-

твенных колодцев города. В таблице 1 приведены данные о содержании концентрации показателей характеризующих физиологическую полноценность питьевых вод города Уссурийска за период 2012-2014 гг.

Питьевая вода коммунального водопровода по показателю общей минерализации и жесткости не соответствует оптимальному содержанию физиологически полноценной питьевой воды. Наличие в воде необходимых солей и микроэлементов важно для обеспечения водно-солевого баланса, кислотно-щелочного равновесия. Жесткость – важнейший параметр качества питьевой воды, имеющий значение для нормальной деятельности сердечно-сосудистой системы. В последние годы сформировалась теория, согласно которой вода с низким содержанием электролитов, обуславливающих жесткость, способствует развитию сердечно-сосудистых заболеваний. По результатам эпидемиологических исследований была выявлена статистически значимая, хотя и не очень сильная, обратная корреляционная связь между степенью жесткости питьевой воды и уровнем смертности населения от сердечно-сосудистых заболеваний – чем мягче вода, тем выше риск [9, 13].

**Таблица 1. Диапазоны концентрации показателей, характеризующих физиологическую полноценность вод источников питьевого водоснабжения г. Уссурийска**

Показатели	Единицы измерения	Коммунальный водопровод	Колодцы общего пользования	Скважинные водозаборы	Нормативы физиологической полноценности питьевой воды, в пределах
Общая минерализация (сухой остаток)	мг/л	76-210	134-750	320-480	100-500
Жесткость	мг-экв/л	0,52-3	3,9-12,0	3,9-11	1,5-7
Кальций (Ca)	мг/л	4,6-15	26-121	21-90	25-130
Магний (Mg)	мг/л	5,4-13	6,2-18,6	9,9-21,4	5-65
Калий (K)	мг/л	0,5-0,7	3,2-5,6	4,1-7,8	2-20

Хлориды ( $\text{Cl}^-$ ), мг/л	мг/л	39,7-45,6	74,5-83,5	57,7-65,8	70-100
Сульфаты ( $\text{SO}_4^{2-}$ ), мг/л	мг/л	5,1-24,4	25,7-55,5	9,4-82,5	5-30
Фторид - ион ( $\text{F}^-$ )	мг/л	0,7-0,9	0,7	1,1-1,3	0,5-1,5

Общая минерализация в общественных колодцах выше норматива физиологической полноценности питьевой воды, что связано с недостаточной защищенностью грунтовых вод от антропогенного загрязнения и выщелачиванием растворимых солей из поверхностного слоя почвы и горных пород. В пределах физиологической нормы находятся питьевые воды скважинных водозаборов.

Высокое значение жесткости отмечено в общественных колодцах и скважинных водозаборах. Статистическими исследованиями установлено и экспериментально подтверждено влияние жестких вод на частоту возникновения мочекаменной болезни [2].

Особое значение для организма человека имеют ионы кальция [3], как основной структурный компонент в формировании опорных тканей. Низкие концентрации кальция отмечены в централизованных источниках водоснабжения, что не соответствует физиологической норме. Недостаток в организме кальция ведет к остеопорозу, вызывает учащение сердечного ритма и повышение кровяного давления, а недостаток его в водном обмене ведет к отекам.

Вторыми по значимости для организма человека являются ионы магния [10]. Они активно участвуют в обменных реакциях, в построении ряда ферментных систем, необходимы для осуществления гексокиназной реакции, т.е. для фосфорилирования глюкозы и использования ее клетками организма. Во всех исследованных нами источниках питьевого водоснабжения содержания магния находятся в пределах физиологического оптимума.

Калий – основной внутриклеточный катион, макрокомпонент организма, играет важную роль в поддержании осмотического давления, углеводном обмене, синтезе белков. В среднем питьевая вода источников децентрализованного водоснабжения отвечает соответствующим нормативам. Низкое содержание калия характерно для водопроводной воды города. Этот факт, видимо, объясняется особенностями водоподготовки природной воды.

Гигиеническая оценка химического состава питьевой воды по содержанию макрокомпонентов показала, что содержание хлоридов в водопроводной воде и скважинных водозаборов находится ниже минимального порога оптимальной нормы. Концентрация хлоридов в колодцах общего пользования на протяжении всего времени исследования не превышала физиологическую норму. Установлено, что хлориды определяют совокупность находящегося в теле хлора, который способствует поддержанию кислотно-щелочного баланса жидкостей и играет важную роль при производстве желудочной кислоты [8]. По содержанию сульфатов наблюдались кратковременные сезонные превышения нормативов в общественных колодцах и скважинных водозаборах. При повышенном содержании сульфатов в воде, нарушается функция системы пищеварения [5, 10].

Фтор является необходимым средством профилактики кариеса, а также целого ряда сопутствующих заболеваний желудочно-кишечного тракта и выделительной системы, аллергии организма. Превышение его содержания тоже плохо, так как способно вызвать флюороз (противоположность кариесу) [10,13]. Питьевые воды города по содержанию фторидов соответствуют физиологическому оптимуму.

Оценка физиологической полноценности питьевой воды централизованных источников показала, что содержание хлоридов, кальция и магния, а также показатели общей минерализации и жесткости находятся ниже минимального порога оптимальной нормы.

Таким образом, установлено, что воды децентрализованного водоснабжения физиологически полноценнее, чем источники централизованного водоснабжения.

Известно, что недостаток поступления необходимых минеральных веществ в организм человека может привести к развитию полигипомакро- и микроэлементозов [2, 6, 8]. Для восполнения дефицита минеральных веществ при употреблении питьевых вод из источников централизованного водоснабжения, необходимо потребление питьевых вод расфасованных в емкости: доочищенные из водопроводной сети, кондиционированные, добываемые из подземных водоисточников, а также минеральные питьевые природные столовые воды, реализуемые в розничной торговой сети города.



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## ***Comparative survey of measles, mumps and rubella – epidemiological and social aspects***

**Abstract:** The objective of the survey is to present the epidemiological and social aspects of measles, mumps and rubella in Pleven region, Bulgaria for eleven period. On the background of immunoprophylaxis, changes in the characteristics of epidemic process for measles, mumps and rubella were noted.

**Keywords:** measles, mumps, rubella, epidemic process, social aspects.

**Introduction.** Measles is an airborne disease which spreads easily through the coughs and sneezes of those infected. It may also be spread through contact with saliva or nasal secretions. Susceptibility is very high. The significance of measles is defined by the complications that are being observed in about 30% of the cases [1]. It most frequently affects children below the age of 5 and adults over 20 years, immune - compromised patients, people with deficiency of vitamin A [2]. Depending on involved system, the complications are: respiratory (primary interstitial pneumonia, bacterial superinfections as medial otitis and pneumonia), gastro-intestinal (gastroenteritis, hepatitis, appendicitis, mesenterial lymphadenopathy), involvement of central nervous system (meningitis, encephalitis, encephalomyelitis, myelitis, neuritis, sub - acute pan encephalitis) [3]. The disease is spread all over the world [4]. It is known that during the period without vaccine over 90% of the children up to 12 years of age have suffered from measles. Every 5-6 years period, epidemics have been recorded. Upon introduction of immunoprophylaxis during the 60-ties of XX century the character of the epidemic process was changed. The cases of the disease were reduced and were displaced to older age groups; in number of countries process of elimination appeared, that is, continuous periods are recorded without measles cases. As a result of observed changes WHO adopted a Program for elimination of measles to year 2010. Actually that did not happen and

implementation of the program was postponed till 2015. As reason for the failure of the program the insufficient vaccine range was pointed out, “breakthrough” in immunization and cases of import from other countries [5]. Outbreaks of measles are still being recorded in USA and Europe [4,6]. Local Measles strain in Bulgaria was not recorded for the period 2002-2006 when the disease returned in the country and epidemic occurred during the period 2009-2010. The immunization against measles in Bulgaria commenced in 1969, initially only once with mono vaccine (strain Leningrad 16) for healthy children 1 to 8 years old. Since 1983 two staged immunization was introduced at 10 months and at 4 years in 1986, on the second year the second dose applied. Since 1992 immunization with triple vaccine at 13 months and mono vaccine at 12 years is applied. Since 2001 two-fold immunization with triple vaccine is performed at 13 months and 12 years of age [7].

Rubella is an acute infectious disease that is progressing with moderate intoxication, specific rash and enlarged lymph nodes. The causative virus spreads by respiratory route of transmission and through the conjunctiva. The susceptibility is high. The disease is in progress during winter and spring. Most susceptible are children up to 2 years old. The impact of rubella infection is determined by teratogenicity [8] of rubella virus during pregnancy manifested by spontaneous abortions, perinatal mortality or congenital rubella syndrome including blindness, deafness, cardiac abnormalities and other organs’ damages of newborn [9,10]. During the period without vaccine the disease was progressing and greater part of children up to 14 years being suffering. Large scale epidemics used to occur every 6-8 years. Upon introduction of the vaccine against rubella epidemic periods reduced to 3-5 and morbidity rate decreased. During the recent years cases of congenital rubella have not been recorded. The immunization system in Bulgaria actually has three stages of implementation: introduction of selectable immunization of girls (16-18 years old) in 1988-1991, scheduled immunization with MMR vaccine at 13 months and rubella vaccine for girls at 12 years, adopted in 1992 and applied since 1993. Since 2001 two-fold immunization was introduced with triple vaccine at 13 months and 12 years for all children, completed the respective age. The program for elimination of measles includes elimination of congenital rubella. The implementation of the program is in progress now.

Mumps is an acute infectious disease with affecting salivary glands, pancreas, testis, or meninges [11]. More frequently the disease is with benign course.

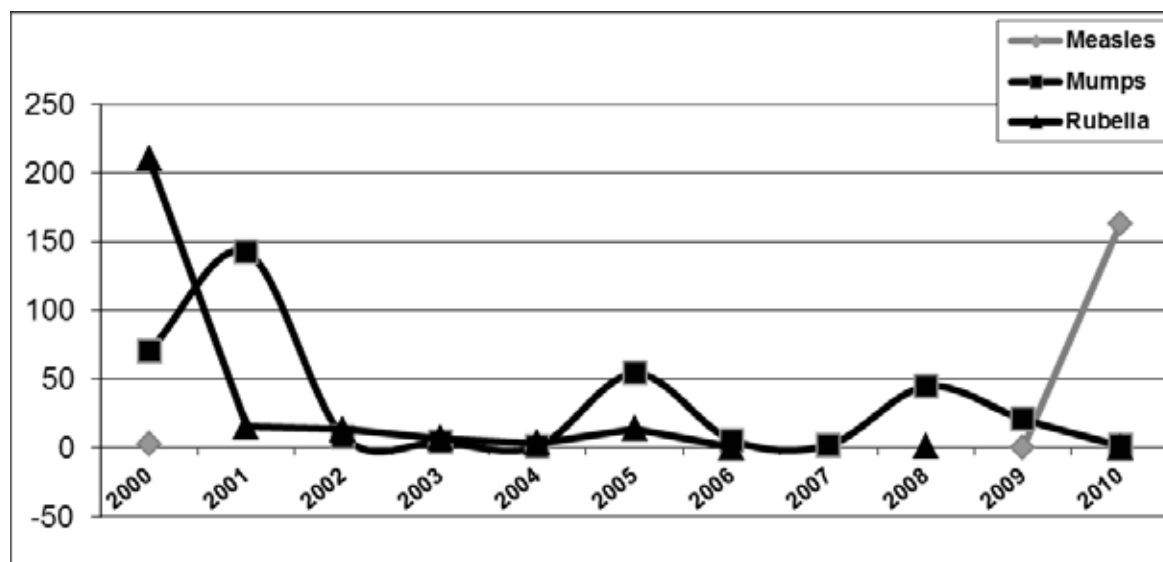
The impact of the mumps is related to possibilities of late sequels. The inflammation of testis (orchitis) is met with 30% of suffering adolescents during puberty. At about 5% of orchitis azoospermia and sterility appear. Diabetes is possible to occur after mumps pancreatitis. Upon damage of the acoustic nerve deafness may occur. During the immunization period without vaccine the mumps is one of the most spread infections by respiratory route of transmission. The more often affected children were to 15 years of age. Contagious index is about 50-60%. Outbreaks were progressing slowly and continuously. There are intermediate periods lasting 6-8 years. Upon the introduction of the vaccine in 70-ties of XX century, intermediate periods shortened and vulnerability decreased and shifted to older age groups. The immunization in Bulgaria started in 1974 and staged to 1976 including target groups in all regions. Initially, Bulgaria introduced vaccine strain Sofia 6 up to 1982. As a result of rare neurological complications after implementation and re-immunization, production and application was suspended from 1982 to 1986. During that period the susceptible population in Bulgaria increased and in 1986 large epidemics broke out characterized with intensity, greater than the one for the period without vaccine. Since 1987 Russian mumps vaccine strain Leningrad has been applied till 1992, when triple vaccine was introduced for 13 months of age and since 2001 used for re-immunization at completion of 12 years of age. During recent years in Europe and Bulgaria epidemic occurred, the reason to look for insufficient vaccine coverage [12], missing of immunization, insufficient immunogenicity of vaccine [13].

**The objective** of the survey is to compare the progress of epidemiological and social aspects of measles, mumps and rubella in Pleven district, Bulgaria for the period 2000-2010.

**Materials and methods.** A retrospective epidemiological survey has been performed. Information from reports of Regional Health Authority – Pleven has been used. Epidemiological method and epidemiological analyses enclosed. Patients, suffered from the three infections – specified by sex, age number and monthly distribution of cases have been analyzed. Results were processed with MS Excel 2003 package.

**Results and discussion.** The number of patients with three infections in Pleven district amounts to totally 2437. The patients with mumps are 1112 (45%), followed by rubella – 843 (35%) and measles – 482 (20%). Morbidity rate of those diseases is showed on **figure 1**. As seen, the three curves of morbidity are different.

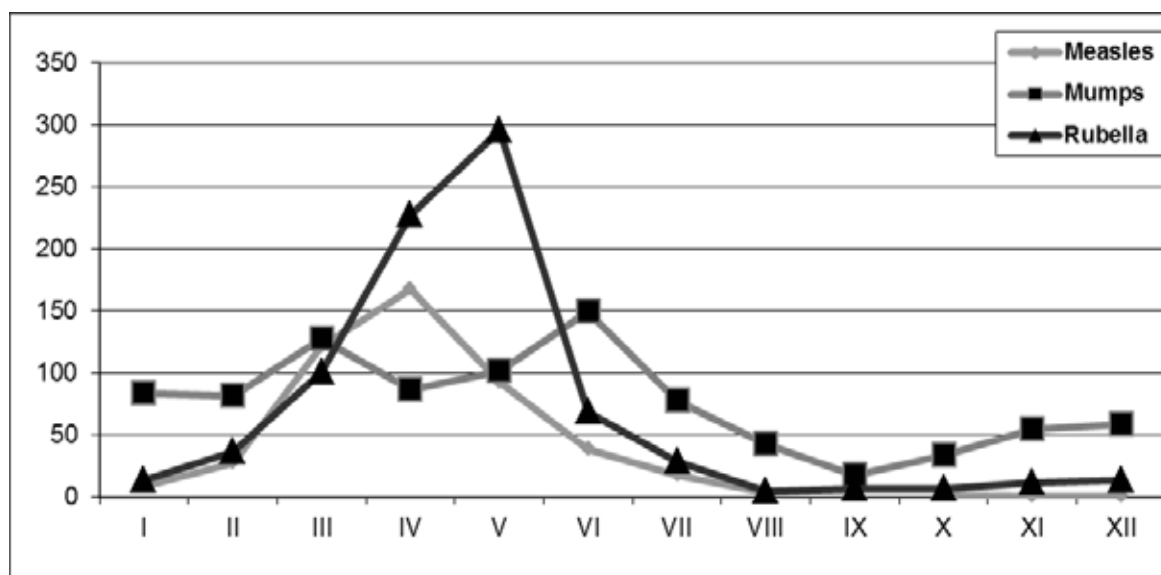
Interruption of the epidemic process of measles is observed for eight years (2001-2008). Temporary elimination of the disease in Bulgaria was recorded for the period 2002-2006. Similar trend was noted for other European countries – Ireland and Slovenia do not record cases of local measles for prolonged period; in other countries interruption of the epidemic process is observed.



**Figure 1. Morbidity rate (to 100 000 population) of measles, mumps and rubella in Pleven district for the period 2000-2010**

Despite that there are countries where the spreading of disease was not interrupted. It proves that despite the high immunogenicity of the vaccine still there is not covered population. At the end of 2009 in Pleven district started measles outbreaks and its peak was in 2010 with morbidity rate – 162, 43 to 100 000 population. That responds to the already commenced in the country epidemics of measles. Increased rate of morbidity was noted with rubella at the beginning of referenced period of the survey (2000) – 210.74 per 100 000 population and trend to reduce the morbidity rate of sole cases – there were not recorded such in 2007 and 2009. It shows that by the introduction of the doubled scheme of immunization, rubella infection is under control and there are years without registration of cases. In difference, interruption of the epidemic process with mumps was not to be noted. Cases are being recorded and two epidemic outbreaks for the referenced period were recorded – in 2001 and 2005 with morbidity rate respectively – 142.47 and 54.11 per 100 000 population. The different rate of morbidity for the three infections

despite equal scheme of immunization suggests lower immunogenicity of mumps vaccine strain and that explains the lack of recorded cases in Pleven district and Bulgaria. The surveyed diseases are characteristic for winter and spring. The monthly distribution for the period 2000-2010 is shown on **figure 2**.

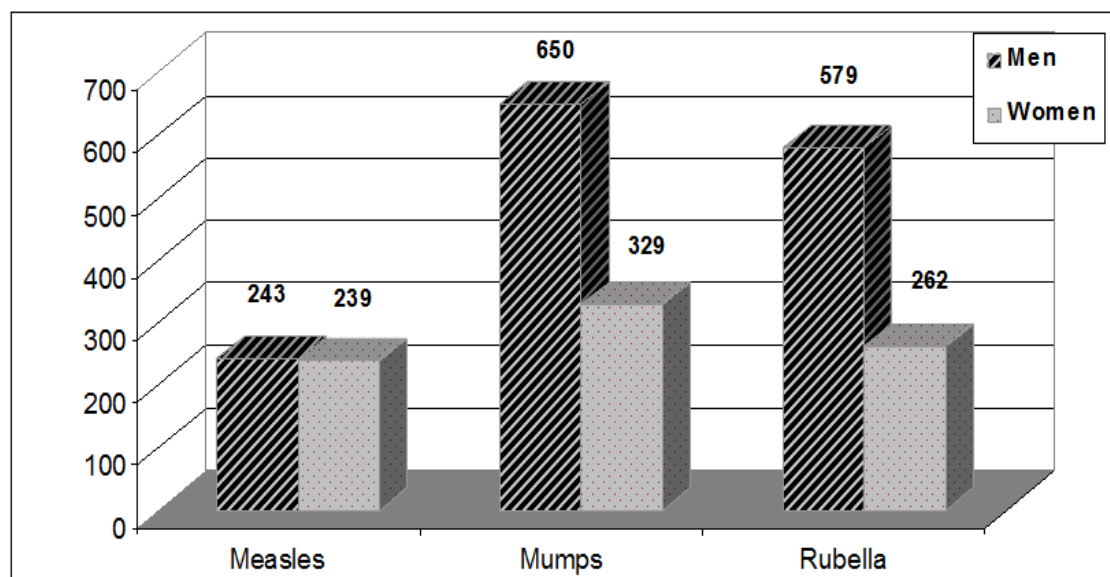


**Figure 2. Monthly distribution of measles, mumps and rubella patients in Pleven district for the period 2000-2010**

The curves of seasons show that the greatest number of measles registered cases is in April – 165. The curve is symmetric and demonstrates rapid increasing of number of patients in March, reaching a peak in April as well substantial reduction of their number in May and June. During the remaining months of the year only few cases have been registered. The trend for spreading out is preserved for winter and spring seasons. Slight shift of the curve towards summer months has been recorded with cases of rubella. A rapid increase is observed in April – 228 cases compared to March – 101. The biggest number of registered cases was in May – 296 followed by distinct reduction of their number in following months. During the remaining months the cases of rubella are sporadic. Mumps cases are registered during all over the year. Their greatest number is in June – 150, followed by cases in March – 128. The information of mumps shows that in the course of conducted immunoprophylaxis the characteristic seasonal morbidity is not to be noted, registered during in the period without vaccine. On **figure 3** data of the distribution of morbidity regarding sex for the three infections are shown. About measles the ratio of affected males: females is 1:1

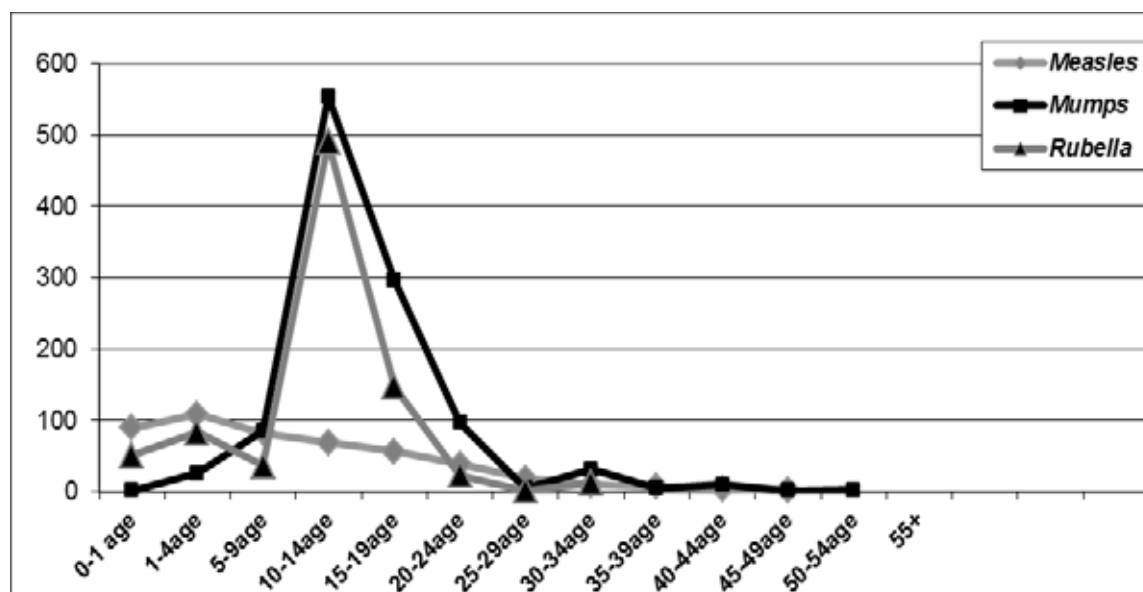


similar for the years during the period without vaccin. The mumps preserves the trend to affect males 2:1. At rubella the ratio 2:1 is also in favor of males.



**Figure 3. Distribution of measles, mumps and rubella patients as per sex in Pleven district for the period 2000-2010**

Age distribution is shown on **figure 4**. Data show that at measles the greatest number of cases refers to age group 1-4 years, followed by 0-1 years. The morbidity rate is highest for children up to 12 months.



**Figure 4. Distribution of measles, mumps and rubella patients as age groups in Pleven district for the period 2000-2010**

That trend is characteristic for the distribution of the infection during pre-immunization period. It is due to lack of mother's antibodies. In recent years more cases are registered in elder age groups.

Most affected cases with mumps and rubella are at 10-14 years of age, followed by 15-19 years and 20-24 years old. That corresponds to tendency in the years of immunoprophylaxis to shift the morbidity rate to older age groups, as suffering persons are those without immunization or with single one, the immunity after vaccination decreased with them.

**Conclusion.** The introduced in Bulgaria twice scheme of immunization with vaccine against measles, mumps and rubella resulted in reduction of the morbidity rate of mumps and rubella and to interruption of the epidemic process at measles for a long period. The measles epidemics in 2010 and the epidemic rise of mumps in 2001 and 2005 show gaps in immunization, that leads to increasing of susceptible and vulnerable population. Mainly non-immunized or once immunized individuals are with risk for the diseases. In order to accomplish elimination of that vaccine-preventable diseases, a high immunization range of over 95% is needed as well strict epidemiological control of immunizations.

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### ***Biological test-check of the peat humic acids in the Middle Priobye on the perennial leguminous herb seeds***

**Abstract:** Biological effect of peat humic of various genesis in Khanty-Mansiysk autonomous area is studied for the first time. The research is conducted on the *Trifolium pratense*, *Medicago sativa* seeds. The biological test-check showed that humic acid influence percent on seed sowing qualities is 24%.

**Keywords:** peat, humic acids, leguminous herbs, seeds, the Middle Priobye.

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### ***Биологический тест-контроль гуминовых кислот торфов Среднего Приобья на семенах многолетних бобовых трав***

**Аннотация:** Впервые изучено биологическое действие гуминовых кислот торфов различного генезиса Ханты-Мансийского АО. Исследования проведены на семенах *Trifolium pratense*, *Medicago sativa*. Биологический тест-контроль показал, что доля влияния гуминовых кислот на посевные качества семян составила 24%.

**Ключевые слова:** торф, гуминовые кислоты, бобовые травы, семена, Среднее Приобье.

Все виды бобовых трав содержат много твердых семян, не прорастающих или медленно прорастающих в год посева [1]. Твердосемянность - это непроницаемость семенной оболочки для воды и воздуха. Прорастание семени начинается с роста корешка, который прорывает оболочку и начинает быстро расти в длину.

Некоторые химические вещества могут в сильной степени изменить характер прорастания и оказать большое влияние на биохимические особенности развивающегося проростка. В настоящее время все больше расширяется применение гуминовых кислот для активизации ростовых процессов растений. Гуматы, благодаря их положительному влиянию на внутриклеточный метаболизм, процессы пролиферации и дифференциации клеток, способствуют ускорению и развитию растений.

Исследования были проведены на семенах многолетних бобовых травах клевера лугового (*Trifolium pratense*) и люцерне изменчивой (*Medicago sativa*), выращенных на полях ГНУ НИИСХ Северного Зауралья в 2008 году. Лабораторные исследования проведены в институте. Семена за три дня до посадки на всхожесть были обработаны гуминовыми кислотами разного биологического происхождения. Норма расхода препарата 2 мл на 1 литр воды. Семена проращивали в чашках Петри на фильтровальной бумаге при постоянной температуре 200 С в термостате. Энергию прорастания определяли у клевера на 3 день и люцерны – 4 день, лабораторную всхожесть – на 7 день, согласно ГОСТа Р 52325-2005.

Результаты исследований показали, что культуры не одинаково реагируют на обработку семян гуминовыми кислотами. На клевере луговом во всех вариантах отмечено превышение над контролем на 1-4 % по энергии прорастания и на 1-5 % по лабораторной всхожести. На достоверном уровне выделены варианты с гуминовыми кислотами 4,0; 5,4; 7,4 (таблица 1, 2).

На люцерне посевные качества семян повысились на 1-2 %, обработанные гуминовыми кислотами 4,0; 7,0; 7,1. В вариантах 3,4; 3,5; 6,11; 4,2; 5,1; 5,3; 5,4; 6,2; 6,3; 7,4; 8,1 наблюдался ингибирующий эффект гуминовых кислот, где энергия прорастания была снижена в сравнении с контролем на 1-12 %, лабораторной всхожести на 1-10 %. Достоверное снижение ( $HCPO5 = 3,3$ ) отмечено у препаратов 4,2; 5,1; 5,3; 6,3 (таблица 1, 2). В вариантах 3,5; 4,0; 4,1; 4,2; 4,9; 5,4; 6,1; 7,0 остались твердые семена. Гуминовые кислоты 3,5; 4,0; 4,2

оказали стимулирующее действие на микрофлору семени и зараженность фитопатогенами составила 3-6 %.

**Таблица 1. Биологический тест-контроль гуминовых кислот на бобовых культурах (энергия прорастания)**

Вариант (гуминовая кислота), и вид торфа	R%	Энергия клевера, %	Отклонение от контроля		Энергия люцерны, %	Отклонение от контроля	
			±	%		±	%
1	Контроль	92	0	100	94	0	100
3,4 сфагновый	20	94	2	102	93	-1	99
3,5 травяной	25	94	2	102	92	-2	98
4,10 древесный	65	96	4	104	95	1	101
4,1 травяно- сфагновый	55	94	2	102	94	0	100
4,11 древесный	60	95	3	103	93	-1	99
4,2 травяной	40	95	3	103	90	-4	96
4,3 вахтовый	15	95	3	103	94	0	100
4,9 осоковый	25	93	1	101	94	0	100
5,1 осоковый	45	93	1	101	90	-4	96
5,3 осоковый	35	94	2	102	82	-12	87
5,4 древесный	45	96	4	104	94	0	100
6,1 фускум торф	15	95	1	101	94	0	100
6,2 фускум- торф	0	93	1	101	90	-4	96
6,3 осоковый	25	95	3	103	86	-8	91
7,0 травяной	15	95	3	103	96	2	102
7,1 травяной	0	95	3	103	95	1	101
7,4 древесный	10	96	4	104	93	-1	99
8,1 травяно- сфагновый	35	96	4	104	88	-6	94

Примечание: R%, степень разложения исходного торфа

НСР05 для частных различий 4,95

НСР05 по фактору А (культура) 1,14

НСР05 по фактору В (препарат) 3,50

НСР05 по взаимодействию АВ 3,50

**Таблица 2. Биологический тест-контроль гуминовых кислот на бобовых культурах (лабораторная всхожесть)**

Вариант (гуминовая кислота), и вид торфа	R%	Лабораторная всхожесть клевера, %	Отклонение от контроля		Лабораторная всхожесть люцерны, %	Отклонение от контроля	
			±	%		±	%
Контроль	--	93	0	100	95	0	100
3,4 сфагновый	20	94	1	101	94	-1	99
3,5 травяной	25	95	2	102	94	-1	99
4,10 древесный	65	97	4	104	95	0	100
4,1 травяно-сфагновый	55	94	1	101	94	-1	99
4,11 древесный	60	96	3	103	94	-1	99
4,2 травяной	40	96	3	103	91	-4	96
4,3 вахтовый	15	96	3	103	95	0	100
4,9 осоковый	25	95	2	102	95	0	100
5,1 осоковый	45	94	1	101	91	-4	96
5,3 осоковый	35	94	1	101	85	-10	89
5,4 древесный	45	97	4	104	94	-1	99
6,1 фускум торф	15	96	3	103	95	0	100
6,2 фускум-торф	0	95	2	102	93	-2	98
6,3 осоковый	25	96	3	103	88	-7	93
7,0 травяной	15	96	3	103	96	1	101
7,1 травяной	0	96	3	103	96	1	101
7,4 древесный	10	98	5	105	95	0	100
8,1 травяно-сфагновый	35	96	3	103	92	-3	97

*Примечание: R%, степень разложения исходного торфа*

*НСР05 для частных различий 4,7*

*НСР05 по фактору А (культура) 1,1*

*НСР 05 по фактору В (препарат) 3,3*

*НСР 05 по взаимодействию АВ 3,3*

Факторный анализ влияния культуры и препарата на посевные качества семян показал, что в общей дисперсии одним из основных факторов является препарат. Его показатель, как при определении энергии прорастания, так и лабораторной всхожести составила 24 %. В два раза ниже доля влияния культуры 12 % (энергия прорастания) и 11 % (лабораторная всхожесть). Взаимодействие 2-х факторов (культура x препарат) составила соответственно 23 и 17 %. В нашем опыте очень высокое остаточное варьирование 41-48 % (таблица 3).



**Таблица 3. Факторный анализ влияния препарата на посевные качества семян, %**

Показатели	Фактор А (культура)	Фактор В (препарат)	Взаимодействие факторов АВ	Остаточное варьирование
Энергия прорастания	12	24	23	41
Лабораторная всхожесть	11	24	17	48

### **Выводы**

1. Выявлена целесообразность применения ряда гуминовых кислот для обработки семян многолетних бобовых трав. Доля влияния препарата (гуминовых кислот) на посевные качества семян составила 24 %.

2. Гуминовые кислоты оказали стимулирующее действие на ростовые процессы семени в большей степени на клевере луговом, чем на люцерне изменчивой.

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### **Structure of humic acid electron-paramagnetic resonance studies of peat of the Khanty-Mansi and Nefteyugansk areas**

**Abstract:** For the first time by means of the EPR (electronic paramagnetic resonance) method the level of electronic paramagnetic of the humic acids (HA) of peat of Khanty-Mansi Autonomous Area is investigated. Their distinctions which allowed to diagnose features of molecular structure of preparations, depending on botanical composition of initial peat, its extent of decomposition and specifics of formation are revealed.

**Keywords:** humic acids, electronic paramagnetic, peat, vegetable raw materials, Khanty-Mansi Autonomous Area.

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**Исследование электронного парамагнетизма  
гуминовых кислот торфов Ханты-Мансийского и  
Нефтеюганского районов**

**Аннотация:** Впервые с помощью метода ЭПР (электронный парамагнитный резонанс) исследован уровень электронного парамагнетизма гуминовых кислот (ГК) торфов Ханты-Мансийского АО. Выявлены их различия, которые позволили диагностировать особенности молекулярной структуры препаратов, зависящее от ботанического состава исходного торфа, его степени разложения и специфики формирования.

**Ключевые слова:** гуминовые кислоты, электронный парамагнетизм, торфа, растительное сырье, Ханты-Мансийский АО.

**Введение.** Накопление ГК в торфяных отложениях происходит благодаря тому, что эти соединения обладают наибольшей термической устойчивостью по сравнению с другими компонентами, входящими в состав органического вещества торфа. ГК оказывают большое влияние на физические и химические свойства торфа в целом и во многом определяют своеобразие экологических условий торфяных болот. Однако оценка роли ГК в природных процессах пока еще существенно ограничивается ввиду их переменного состава и недостаточности сведений о химической природе и молекулярном строении.

Электронный парамагнетизм является важным свойством ГК, характеризующими своеобразие их молекулярной структуры в целом. Анализ спектров ЭПР позволяет извлекать многообразные сведения о среде, в которой находится парамагнитная частица.

Для сравнительной оценки препаратов ГК различных торфов, по интегральной интенсивности сигналов ЭПР существенную информацию предоставляет определение количества парамагнитных центров в исследуемых веществах, которая дает возможность вычислить условную среднестатистическую молекулярную массу. Простая форма сигнала ЭПР дает основание сделать допущение о наличии в молекуле только одного не спаренного электрона.

Объекты и методы исследования. Нами изучены гуминовые кислоты торфов типичных для данной территории, в основном верховых и переходных болот.

Образцы отбирались из поверхностных слоев торфа в Нефтеюганском и Ханты-Мансийском районах Ханты-Мансийского АО. Выделение ГК проводили

по ранее описанной методике [1]. Ботанический состав сгруппированных по видам торфов приведен в таблице 1.

**Таблица 1. Ботанический состав исследованных торфов**

Шифр	Основная, составляющая торф растительность, в %	%	R	Тип и вид торфа
<i>Сфагновые торфы</i>				
1.1	Сфагнум узколистый лишайники	35 20	30	Сфагновый верховой
1.4	Сфагнум бурый	90	15	Сфагновый фускум-торф верховой
2.7	Сфагнум бурый (фускум) лишайники	25 20	40	Сфагновый фускум-торф верховой
2.8	Сфагнум бурый (фускум)	50	35	Сфагновый фускум-торф верховой
<i>Древесные и древесно-травяные торфы</i>				
1.2	Сосна	70	25	Древесный переходной
2.4	Береза пушистая Осока вилуйская, омская, дернистая	25 45	65	Древесно-осоковый низинный
2.6	Сосна		50	Древесный переходной
<i>Осоковые и осоково-травяные торфы</i>				
2.2	Осока вздутая Вахта	30 45	40	Осоково-вахтовый переходной
2.3	Осока вздутая Вахта	45 40	45	Осоково-вахтовый переходной
2.5	Осоки кочкарные	90	50	Осоковый переходной
2.9	Осока шаровидная	55	30	Осоковый верховой
2.10	Осоки не определенные Пушица	35 50	55	Осоково-пушицевый переходной
<i>Шейхцериевый торф</i>				
2.1	Шейхцерия	80	30	Шейхцериевый переходной

Примечания: R-степень разложения; Первая цифра шифра образцов; 1-Нефтеюганский район, 2-Ханты-Мансийский район

Измерения ЭПР всех образцов в полном объеме проводили на радиоспектрометре Bruker-ESP 300 с двойным резонатором, который необходим для точных измерений q-фактора образца относительно эталона – ТЭМПО ( $q = 2,0059$ ) без перестройки СВЧ, путем переключения направления СВЧ-потока.

Точность определения концентраций  $\pm 8\%$ . Расчет положения линий проводился по программе WIN-EPR.

Спектры поглощения снимались на спектрофотометрах фирмы Perkin Elmer instruments. Исследование элементного состава на CNH-анализаторе фирмы «Hwlet Packard» модель 185 «В».

Результаты и обсуждения. Для идентификации чистоты препаратов ГК был проведен элементный анализ и исследованы спектры поглощения.

Средний элементный состав ГК исследованных торфов следующий: С-57,13%; Н-4,68%; N-1,76; О-36,43%, зольность – 0,843% [2,3].

В инфракрасной области спектра светопоглощение ГК не имеет принципиальных отличий, что свидетельствует об аналогии их строения. Результаты исследований абсорбции света ГК в видимой области подтверждают это положение. Электронные спектры всех ГК описываются кривыми одинаковой формы с монотонным увеличением поглощения в сторону коротких длин волн [4]. Индекс Д4/Д6 изменяется не значительно (от 4,9 до 6,4). Данные исследования не выявили принципиальных отличий и являются достаточно однородными для всех препаратов, в отличие от электронного парамагнетизма.

Количественное определение парамагнитных центров в ГК показывает, что различные препараты имеют не одинаковое содержание не спаренных электронов [5]. Оно колеблется от  $9,20 \cdot 10^{-14}$  до  $2,36 \cdot 10^{-14}$  на 1 мг. образца, кроме того, определение удельного числа спинов на мг. в образцах ГК торфа, дает возможность вычислить «молекулярную массу» (табл. 2). Молекулярная масса, вычисляемая по содержанию парамагнитных центров (ПМЦ), имеет определенное преимущество перед другими методами, так как характеризует твердое состояние ГК, в то время как ее величина, определяемая другими способами, относится к макромолекулам в растворе. Следствием этого может являться пониженная величина молекулярного веса ГК по сравнению с величинами, характеризующими их твердое состояние [6].

$$M=N_0/N_e,$$

где М – молекулярная масса;

$N_0$  – число Авогадро ( $6,02 \cdot 10^{23}$ );

$N_e$  – число парамагнитных центров в 1 мг вещества.

В наших исследованиях наименьшую молекулярную массу имеет ГК осокового торфа обр. № 2.9 –  $0,65 \cdot 10^{-6}$  и наибольшую ГК древесного торфа обр. № 1.2 –  $2,55 \cdot 10^{-6}$ , который содержит 70% сосны (табл. 2).

**Таблица 2. Содержание ПМЦ и «молекулярная масса»  
в ГК торфов ХМАО-Югры**

№	Тип и вид торфа	Концентрация спинов в образце, спин/мг.	Условная молекулярная масса
<b>Сфагновые торфы</b>			
1.1	Сфагновый верховой	$3,20 \cdot 10^{-14}$	$1,88 \cdot 10^{-6}$
1.4	Сфагновый фускум-торф верховой	$3,33 \cdot 10^{-14}$	$1,81 \cdot 10^{-6}$
2.7	Сфагновый фускум-торф верховой	$3,16 \cdot 10^{-14}$	$1,90 \cdot 10^{-6}$
2.8	Сфагновый фускум-торф верховой	$5,88 \cdot 10^{-14}$	$1,32 \cdot 10^{-6}$
<b>Древесные и древесно-травяные торфы</b>			
1.2	Древесный переходной	$2,36 \cdot 10^{-14}$	$2,55 \cdot 10^{-6}$
2.4	Древесно-осоковый переходной	$4,04 \cdot 10^{-14}$	$1,49 \cdot 10^{-6}$
2.6	Древесный переходной	$5,46 \cdot 10^{-14}$	$1,10 \cdot 10^{-6}$
<b>Осоковые и осоково-травяные торфы</b>			
2.2	Осоково-вахтовый переходной	$4,32 \cdot 10^{-14}$	$1,39 \cdot 10^{-6}$
2.3	Осоково-вахтовый переходной	$4,37 \cdot 10^{-14}$	$1,38 \cdot 10^{-6}$
2.5	Осоковый переходной	$6,25 \cdot 10^{-14}$	$0,96 \cdot 10^{-6}$
2.9	Осоковый верховой	$9,20 \cdot 10^{-14}$	$0,65 \cdot 10^{-6}$
2.10	Осоково-пушицевый переходной	$7,82 \cdot 10^{-14}$	$0,77 \cdot 10^{-6}$
<b>Шейхцеривый торф</b>			
2.1	Шейхцериный переходной	$3,60 \cdot 10^{-14}$	$1,67 \cdot 10^{-6}$

Проведенные количественные измерения парамагнитных центров относительно стандарта «ТЭМПО» показали, что наибольший уровень электронного парамагнетизма имеют ГК, полученные из осоковых и осоково-пушицевых торфов ( $9,25 \cdot 10^{-14}$ ,  $6,25 \cdot 10^{-14}$ ), для них характерно наименьшее значение молекулярных масс ( $0,65 \cdot 10^{-6}$ ,  $0,96 \cdot 10^{-6}$ ) и более глубокий уровень гумификации. В ГК древесных, осоково-вахтовых, шейхцеривого и сфагновых торфов концентрация спинов в образцах изменяется от  $2,36 \cdot 10^{-14}$ ,  $5,88 \cdot 10^{-14}$ , что свидетельствует о более ранних стадиях гумификации и высоких значениях

молекулярных масс (от  $1,38 \cdot 10^{-6}$  до  $1,90 \cdot 10^{-6}$ , вследствие наличия нерегулярных периферических цепей сформированного из данного ботанического состава торфа. У препаратов, имеющих меньшую молекулярную массу, возрастает интенсивность светопоглощения, что подтверждается исследованиями методом электронной спектроскопии, на основании которой можно предполагать, что интенсивность поглощения световой энергии пропорциональна площади поперечного сечения молекулы. Отсюда следует, что важными факторами, определяющими разнообразие ГК ХМАО-Югры, являются различия в размерах макромолекул, неодинаковое количество ядер в конденсированных ароматических системах (5-6) и изменение количества двойных связей, образованных углерод-углеродными двойными связями с сопряжением, которое обеспечивает свободное движение делокализованных электронов в пределах всей молекулы.

### **Выводы**

Впервые с помощью метода ЭПР получены данные о молекулярном строении ГК различных типов и видов торфов Ханты-Мансийского АО.

Гуминовые кислоты торфов Ханты-Мансийского АО обладают электронным парамагнетизмом. По содержанию ПМЦ, которое в определенной мере характеризует размер сопряженной системы, все ГК можно расположить в убывающей последовательности по группам: 1-осоковые и осоково-пушицевые торфы; 2-древесно-осоковые, осково-вахтовые; 3-древесные, сфагновые и шейхцеривые торфы.

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### ***Oil and petroleum products purification route***

**Abstract:** The results of studies in development of new progressive methods for upgrading the quality of oil varieties and petroleum products through its consistent dehydration, desulfurization, desalting, demetallization controlled viscosity measuring by electrochemical methods on asymmetric alternating current at different frequencies are presented.

**Keywords:** oil, dehydration, desulfurization, desalting, demetallization, electrochemistry, alternating current, resonance.

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## **Методы очистки нефти и нефтепродуктов от загрязняющих веществ**

**Аннотация:** Представлены результаты исследований по разработке новых прогрессивных методов повышения сортности нефти и качества нефтепродуктов путем ее последовательного обезвоживания, обессеривания, обессоливания, дemetаллизации, направленного измерения вязкости электрохимическими методами на асимметричном переменном токе на различных частотах.

**Ключевые слова:** нефть, обезвоживание, обессеривание, обессоливание, дemetаллизация, электрохимия, резонанс.

Известно [1], что за один год человечество расходует энергетические запасы, на образование которых природе требуется миллион лет. Почти на 90% мировое энергопотребление обеспечивается за счет ископаемых углеродных источников, из которых почти 40% приходится на долю нефти. При этом, доля нашей страны составляет всего около 5% доказанных мировых запасов этого вида сырья.

Одним из путей повышения эффективности использования нефти является разработка физических, химических, биологических, а также комбинированных методов повышения качества нефти, вплоть до марки Brent, стоимость которой на мировом рынке на 30% выше марки Urals, составляющей основу экспорта РФ.

Повышение сортности нефти возможно путем ее обезвоживания, обессоливания, обессеривания, глубокой дemetаллизации и очистки от других гетероатомных соединений, а также управлением ее вязкостью. Для увеличения эффективности процесса транспортировки вязкую нефть подвергают предварительной обработке. Существует большое количество различных способов обработки нефти с целью уменьшения ее вязкости.

Наиболее распространенным и надежным является способ горячей перекачки. Однако следует отметить, что печи путевого подогрева являются источником выброса вредных веществ. Не исключается возможность возникновения аварийных ситуаций, что может привести к экологическим и техническим проблемам.

Известен способ создания эмульсии нефти в воде при помощи веществ-эмульгаторов, но это требует использования больших объемов воды. При этом возникает необходимость процесса восстановления нефти из эмульсии. К сожалению, не исключается отрицательное влияние на экологическую обстановку.

Для транспортировки чаще стали применять депрессорные присадки, которые затрудняют формирование единой кристаллической структуры парафинов при охлаждении нефти. Таким образом, улучшаются реологические свойства нефти, а именно: снижается температура застывания, падает эффективная вязкость и снижаются потери напора на трение [2].

Известны и другие способы воздействия на жидкие среды различными видами электромагнитного излучения и их комбинациями, включая различные сочетания постоянных и импульсных магнитных полей высокой напряженности, ультразвука и др. [3 – 4]. К их недостаткам можно отнести невысокую производительность способа, высокие энергозатраты и необходимость специальных мер безопасности при эксплуатации установок.

Обработка с помощью ультразвуковых колебаний высокой интенсивности обеспечивает снижение вязкости жидкости, поступившей в трубу и достигшей участка размещения излучателей, однако данный способ не предусматривает предварительной обработки вязкой жидкости до поступления в трубу для перекачки, что не всегда практически реализуемо.

Разработанная авторами технология управления вязкостью нефти различных марок и происхождения позволяет как существенно повышать вязкость, так и понижать ее. Понижение вязкости позволяет решать проблемы ее транспортировки (увеличение производительности работы технологического оборудования), а повышение связано с увеличением теплотворной способности нефти (появляется возможность изготавливать на ее основе высококачественные топливные элементы либо продукты ее глубокой переработки).

Другой особенностью предлагаемой технологии является ее гибкость: после определенных преобразований она в принципе позволяет проводить

обезвоживание, обессеривание, деметаллизацию и экстракцию из нефти ценных продуктов.

В работе предлагаются два пути решения указанной проблемы: химический и электрохимический.

По первому способу затвердевшую, густо запарафинированную нефть с высоким показателем вязкости и низким параметром текучести легко восстановить добавлением органо-минерального компонента, который по своей природе, структуре и строению подобен нефти. Разработанная добавка хорошо сочетается с рассмотренными выше комбинированными воздействиями, с электрохимическими, магнитными, ультразвуковыми, СВЧ и др.

После обработки и регенерации нефти не только восстанавливаются ее свойства, но в ряде случаев они значительно улучшаются. Например, на 15 – 20% повышается ее теплотворная способность. Сущностью электрохимического метода является разрушение тяжёлых фракций нефти под действием переменного асимметричного тока в условиях низкочастотного электрохимического резонанса [5 – 6]. Экспериментально найденная частота составляет  $f = 25 \pm 1$  Гц.

Для разрушения более тяжёлых фракций нефти необходимо оборудование (блок питания) с частотой, лежащей в диапазоне 0,1–20 Гц. Эксперименты по обессериванию нефти проводились следующим образом. Исходную нефть с содержанием серы  $17 \times 10^{-3}$  г/мл пропускали через проточные камеры электролизера. Каждый раз после 60 мин электролиза анализировали пропущенную нефть на содержание серы; непроточные камеры заполняли новой порцией буферного раствора. Изменяли плотность тока, остальные параметры оставались прежними.

Нефть с содержанием серы  $17 \times 10^{-3}$  г/мл подвергали электролизу, пропуская через проточные камеры электролизера. Каждый раз после 60 мин электролиза анализировали пропущенную нефть на содержание серы, непроточные камеры заполняли новой порцией буферного раствора. Изменяли величину соотношения  $I_k:I_a$  (соотношение величины тока катодного полупериода и величины тока анодного полупериода), остальные параметры не изменялись.

Таким образом, предлагаемый способ очистки нефти от серы путем электрохимической обработки в электролизере, отличается тем, что с целью повышения степени очистки и упрощения способа, электрохимическую обра-

ботку проводят переменным асимметричным током с частотой 88 – 91 Гц, плотностью  $3 \times 10^{-4} - 4 \times 10^{-4}$  А/см<sup>2</sup> при соотношении величины тока катодного и анодного полупериодов, равном 1:8 в электролизере, состоящем из двух ячеек, каждая из которых содержит разделенные анионообменной мембраной проточную камеру, через которую пропускают нефть, и непроточную камеру, заполненную буферным раствором.

**Таблица. Влияние различных факторов на степень очистки нефти от серы**

Показатели	Режим	Содержание серы в нефти после электролиза, $\times 10^{-3}$ , г/мл	Степень очистки, %
Параметры частоты, Гц	88	1,40	91,8
	90	1,18	92,4
	92	1,30	92,2
Плотность тока, $10^{-4}$ А/см <sup>2</sup>	2,5	1,63	80,0
	4	1,40	92,0
	5	1,87	89,0
Соотношение $I_k:I_a$	1:8	1,70	90,0
	1:9	1,53	91,0
	1:10	1,39	91,8
Время электролиза, мин	45	1,30	92,0
	60	1,18	93,0
	75	1,18	93,0

Результаты этих экспериментов представлены в таблице, из которой видно, что изменение частоты тока свыше 91 Гц и ниже 88 Гц ведет к снижению степени очистки [7].

Отличительной особенностью всех предлагаемых в работе электрохимических методов модифицирования и рафинирования нефти является единый подход к методам переработки сырья на резонансных частотах на асимметричном переменном токе при индивидуальных оптимальных режимах достижения технического результата. Производительность созданных с этой целью установок может быть увеличена, так как все они устроены по принципу единой модульно-структурной организации и не зависят от качества исходного сырья. Относительная простота в изготовлении, техническая и экономическая

целесообразность электрохимических методов может составить основу будущих прогрессивных технологий нефтеподготовки и повышения ее качества.

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## ***Occupational therapy strategies for children with development coordination disorders***

**Abstract:** In the recent years, the interest in the Development Coordination Disorders (DCD) grew significantly. Many researchers confirmed their heterogeneity in various motor, sensory and behavioral problems. Children with DCD indicate the presence of difficulties, as well as in motor coordination, as well as difficulties in their abilities in a broad range of activities. The research describes criteria characterizing DCD and the most common motor disorders. Significant attention is paid to the occupational therapy resources to correct violations in motor disorders, for the development of fine motor skills, and academic skills.

**Keywords:** occupational therapy, development coordination disorders.

### **1. Introduction**

Development coordination disorders (DCD) is a syndrome of the disturbed motor coordination, including physical clumsiness and motor delay that affects the child's ability to perform its daily tasks [1].

This disorder affects 5-6 % of the children of school age. DCD is present ever since the birth of the child, but the motor problems are mostly demonstrated during childhood and teenage years, when the formal education begins[8]. They continue in the adulthood and this could lead to significant long-term secondary impacts [34]. For the children with coordination difficulties each school activity comprising a motor component requires enormous efforts and frequently ends up unsuccessfully. The coordination difficulties have an impact also on child's life outside the classroom. The early and continued coordination insufficiency leads to poor academic results, low self-confidence, behavioral problems and frequently leads to depression [5, 36, 38].

In 1989 DCD as a nosological group has been added to DSM-III of APA (2000) though the symptoms were well known long time ago. The academic circle accepts the presence of a group of children having difficulties in motor sphere which do not result from a general medical disease [22]. Many definitions were given to these children with otherwise a normal development [32]: clumsy [44], lacking physical skills [43], as well as children with perceptive-motor dysfunction [20], dyspraxia of development [7], or children having a sensor-integrative dysfunction [2]. However, all these terms do ignore the specific difficulties that are stated in DCD children [28]. In 1994 during an international meeting, the term “development coordination disorders” /DCD/ has been accepted [32].

It is important to mention that DCD is frequently combined with other disorders that happened during childhood [15,46], such as dyslexia [17], attention deficit and hyperactivity (ADHD) [31], language/speech disorders [12,45] or a combination of the abovementioned disorders [19].

Main reasons for DCD development is the main brain damage (cerebral paralysis, hemiplegia and muscle dystrophy are excluded) [13,14] and impaired sensory processing [5,13,33].

DCD children have a broad spectrum of dysfunctions [10, 27, 29, 36, 47, 51, 52, 53] that can be united in three spheres: motor, sensory and psycho-social [54]. *Motor disorders* - DCD children have problems with general and fine motor skills or with both [23]; they demonstrate neurological characters such as primitive reflexes persisting, muscle hypotonia, and non-mature balance reactions which prevent the development of general motor skills [10,35]. In addition there can be defined lack of orientation, poor estimation of distance and motor power, poor manipulative skills [16,25, 49].

First signs for DCD presence are the difficulties to handle, dress up, draw and write [30,37,39,40,47]. The activities that require good hand-eye coordination represent a strenuous task to DCD children [5,9]. *Sensory problems* cover different sensory modalities. DCD children have problems with visual-spacious skills and motor coordination [4,18], their difficulties are connected with the slow processing of information, with perception, motor skills and cognitive processing [2,5,13,26,33]. *Psychological-social problems* - DCD children are more introvert, they consider themselves as less skillful in physical and social skills in comparison with the children of their age. When certain motor tasks have to be done they are more anxious. They

demonstrate low sense of content and tolerance, low motivation and low self-confidence [36,38,48]. They have problems in the social relations with children of the same age [10], they have fewer friends and are rarely invited to play with other children [11,36,38]. Schoemaker & Kalverboer (1994) and Fitzpatrick & Watkinson (2003) mention that frequently DCD children find ways to hide their motor problems, such as retrieval from social situations and engagement in socially unacceptable behaviour. Frequently DCD children have organizational difficulties [21,24].

## **2. Aim of the Research**

To specify the coordination and motor dysfunctions in DCD children and to estimate the impact and advisability for the application of motor rehabilitation – kinesitherapy and occupational therapy to correct these disorders.

**Applied Method.** Motor and coordination skills were surveyed via Bruininks-Oseretsky test [3] and via I. Lesny test [50]. A total of 48 children with an average age of 8,5 years were tested. They were divided in two groups - DCD children – total of 15 children - 4 girls and 11 boys, and children within the norm - total of 33 children – 17 girls and 16 boys.

## **3. Results and Analysis**

When data of this survey of the motor skills with Bruininks-Oseretsky test are compared we noticed considerably poorer development of motor skills in DCD children (Table 1). The difficulties in motor skills, dealing both with general and fine motor skills, were easily found. The research defined that DCD children have difficulties in a number of motor skills – balance, visual-motor coordination, dexterity and speedy performances. DCD children face difficulties to throw and catch a ball, to stand up with closed eyes, to copy figures etc.

The results for bilateral coordination, balance, upper limb coordination, reaction for speed and visual-motor coordination (subtest 2,3,5,6 and 7) are the poorest.

One of the most important main components which determines the general motor skills is the balance. Balance is important to set up a particular pose that is needed to perform a certain activity. All tested DCD children have poor results in the eight subtests on balance. Presentation in the static balance tests is considerably poor. The results are considerably poorer in the closed eyes tests, i.e. when eye control is eliminated.

Табл. 1. Generalized results from Bruininks-Oseretsky test and Lesny test

	Generalized motor control	General motor skills	Fine motor skills	Upper limb coordination	Lesni test	
					Left hand	Right hand
<b>DCD children</b>	$\frac{102,42 \pm 6,32}{107,35 \pm 3,89}$	$\frac{56,63 \pm 8,64}{60,46 \pm 6,96}$	$\frac{29,13 \pm 5,57}{43,38 \pm 2,42}$	$\frac{10,87 \pm 5,64}{13,51 \pm 2,15}$	$\frac{26,09 \pm 5,42}{28,48 \pm 3,82}$	$\frac{27,59 \pm 4,21}{30,86 \pm 4,03}$
<b>Children with in norm</b>	146,81±8,58	72,48±12,76	58,29±8,23	16,04±4,72	32,19±1,21	33,89±0,67
<b>p</b>	p<0,001	p<0,05	p<0,001	p<0,001	p<0,05	p<0,05

Remark : Numerator – starting research, denominator – final research.

Results from the survey of dynamic balance show better values. Probably the poor presentation in balance-connected tests is a result of the delayed functional maturation of nervous system or of a sensor dysfunction.

Poor results in subtest 3 (bilateral coordination) are not a surprise. They confirm the presence of difficulties in crossing the vertical and horizontal median line. The survey of bilateral coordination demonstrated the presence of some typical difficulties – they defined hardships in these tests that require isolation of fine hand movements from the general movements.

Results from the survey of coordination of upper limb movements also demonstrate poor values. The execution of these movements requires good coordination between general and fine motor skills.

Movements with bilateral coordination constitute a comparatively complex motor task. Their execution requires the child to understand well and perform the instructions and to imitate the demonstrated movement. The bilateral coordination tests depend on the ability to counterpoise, i.e. to count changes in the center of gravity before making a move. Balance control is affected by several brain structures like vestibular analyzer and small brain. As it is well known in DCD children these structures have dysfunction.

Dysfunctions in fine motor skills are one of the main diagnostic factors to determine if DCD children are fitted for school. Dysfunctions in fine motor skills constitute the basis of the difficulties monitored in some everyday-life, academic and professional activities of these children.

Considerable difficulties were defined in the visual-motor control though the test was done in sitting position and the given instructions were elementary.

Survey of manual praxis defined also difficulties in manipulation with both hands. Despite the results' values, pursuant the rating scale DCD children are within the limit - 27-26 units, i.e. within the norm limits, and still their results are considerably poorer than these of the children within the norm. The most difficult for performance appeared to be the ninth subtest, there the results are the poorest – left hand  $23,54 \pm 6,98$  and right hand  $28,31 \pm 3,62$ . Poor results were found also at eight and fifth subtests. In all subtests, the left hand results were poorer.

Touwen (1997) declares the necessity of a good interconnection between the coordination of upper and lower limbs for the development of manipulative skills. Movement coordination is a predisposition for development of fine manipulative skills. Lack of coordination skills is the reason for higher dysfunction. It can be considered that dysfunctions in coordination and manipulative skills are responsible for the poor results for speed and dexterity of upper limb.

#### **4. Conclusions**

Results from the survey of motor skills demonstrate that DCD children have poorer motor skills compared with the children within the norm. They indicate the presence of serious dysfunctions in the execution of basic motor skills. More serious deviations can be found in the fine motor skills. One-sidedly we can not accept that the stated dysfunctions resulted only from motor difficulties. Other factors have also an impact, like motivation, nature of the motor task, presence of primitive reflexes.

Data from the results of the performed occupational program are indicative of improvement of motor skills. The improvement was found in three out of the four directions of Bruininks-Oseretsky test, i.e. in general motor development, in fine motor skills and in upper limb coordination. The results demonstrate that there is a considerable improvement of fine motor skills. This increase of the indices for fine motor skills could be explained on one side with the improvement of general motor skills, especially with the improvement of balance reactions, and on other side - with improvement of upper limb coordination.

This can lead to the conclusion that the skills acquired during the application of a respective rehabilitation program that takes under consideration the individual needs of the surveyed children and is being systematically applied are essentially important for development and improvement of motor skills [54]. Improvement of the

function of orthostatic musculature, together with improvement of the model for muscle activation, has a positive impact on the upper limb coordination and respectively – on the fine motor skills.

In general, our surveys confirm that the application of occupational therapy has a positive impact on the development of motor skills. However, it is necessary to point out that selection of the therapeutic approach while correcting motor skills dysfunctions should be changed in accordance with the sensor and motor profile defined for every child.

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### ***Clinical significance of ultrasonography in evaluation of morphofunctional state of liver and portohepatolienal bloodstream in chronic diffuse liver diseases***

**Abstract:** In randomized three-phase prospective cohort controlled research which included 2564 persons with chronic diffuse liver diseases (1865 cases of fatty liver disease, 462 cases of chronic hepatitis, 100 cases of liver cirrhosis) and 137 healthy controls, the clinical significance of ultrasonography in quantitative evaluation of liver parenchyma morphofunctional state and portohepatolienal bloodstream in patients with chronic diffuse liver diseases was estimated. Twenty-seven ultrasound and two additional, derived from laboratory tests index parameters were testified for the grounding to be included into diagnosis-prognostic algorithm for patients with this pathology, which has been developed, validated and recommended for practical application. Further perspectives are related to fundamental logico-statistical analysis of the data for development of mathematic model of pathologic process and its application to practical health care service.

**Keywords:** Fatty liver disease, chronic hepatitis, liver cirrhosis, ultrasound diagnosis, prognosis.

Chronic diffuse liver diseases cause not only significant medical problem, promoting portal hypertension, hepatocellular failure, oncological diseases etc. [1], but also social and economical, associated with loss of ability to work in active population; particularly, mortality due to liver cirrhosis in European countries vary from 100 to 400 per 1 million of male population and from 40 to 150 per 1 million among females [2, 3, 4, 5].

In last decade is an impetuous development of chronic diffuse liver disease takes place. Technical progress, improvement of hardware and software have made it possible to significantly go forward in understanding of etiology and pathogenesis of hepatobiliary pathology, noticeably improve treatment results. In many respects these changes became possible only due to introduction and development of new

highly-technological methods of radiation (visual) diagnosis in general and ultrasonography – as well [6, 7].

Results of radiological diagnostic methods are widely used in order to build prognostic models and calculate a prognosis in each certain clinical case about functional compensation of liver, presence of indications for radical intervention etc. [8]. Both mathematical [9, 10, 11, 12] and virtual [13], dimensional models based on morphological investigation of liver come in handy and give an opportunity to more exactly and objectively evaluate changes which develop in vivo, formulate an individual prognosis for a patient.

Despite the availability of wide spectrum of other modern non-invasive and low-invasive radiation methods of diagnosis for chronic diffuse liver diseases, ultrasonography does not lose its topicality and is the leader of practical application in public health service. Undoubted perspective is characteristic for methods which base not only on immediate primary results of investigation, but on results of their further objectivization using mathematical modeling and building of prognostic model of the pathological process. Reasonability of ultrasonography application for diagnosis of chronic diffuse liver diseases is related to its following characteristics: non-invasive [14], safe [15], easily done [16], relatively cheap and capable to simultaneous evaluation of comorbid pathology [17], also in dynamics, reproducible and precise, standardized [18], easily combined with other methods [19, 20], capable for further improvement, including contrast-enhance.

While, some limitation of ultrasonography in diagnosis of chronic diffuse liver diseases takes place in medical practice [21, 22]. This problem may be solved by improvement of ultrasonography diagnosis approach with automation of image analysis [23], introduction of index parameters etc.

Thus, despite general success of ultrasonography in diagnosis of chronic diffuse liver diseases, till nowadays improving of this approach remains vital.

**Aim** of research – optimization of diagnosis of chronic diffuse liver disease by improving of ultrasonographic approach with evaluation of diagnostic power and information capacity of its parameters.

**Materials and methods.** On first phase an estimation of diagnostic capabilities (values) of ultrasonography in chronic diffuse liver diseases was performed. It included investigation of 103 cases of chronic diffuse liver disease: fatty liver disease (n=63), chronic hepatitis (n=12), liver cirrhosis (n=28), cases with intact

liver (control group, n=2). This phase was conducted on the base of Kharkiv Regional Clinical Hospital – Center of Emergency Medical Care and Disaster Medicine in 2012–2013 with the aim of evaluation of accordance of ultrasonographic data with results of liver autopsy (both n=105).

Second phase was aimed on development of a diagnosis-prognostic algorithm of ultrasonography application and profound instrumental-laboratory tests (apart of ultrasound – anamnestic and physical data collection, complete blood count and biochemical blood tests) were performed. Two hundred fifty three persons, including patients with fatty liver disease (n=142), chronic hepatitis (n=43), liver cirrhosis (n=27), and 50 healthy people shared this phase of the research. It has been conducted in clinical hospital of Grigoriev Institute of Medical Radiology of National Academy of Medical Science of Ukraine in 2013–2014. All participants underwent detailed repetitious instrumental and laboratory investigations. In this cohort male and female age medians did not significantly differ.

Third phase was most large in the research as aimed on evaluation of ultrasonography capabilities in prospective evaluation of chronic diffuse liver disease course by validization of developed diagnosis-prognostic algorithm for pathologic process severity evaluation and course prediction, and also building a mathematic model of pathologic process. In order to reach the goal, 2206 persons were examined, including patients with fatty liver disease (n=1660), chronic hepatitis (n=416), liver cirrhosis (n=45), control healthy individuals (n=85). This phase of the research was performed on the base of LTD Medical Diagnostic Center «Expert-Kharkov» in 2013–2014. Age median was 56.1 (47.1; 64.1) years, 55.0 (44.3; 64.2) years in men, 56.4 (47.7; 64.1) years in women (difference is reliable by  $p=0,053$ ).

Ultrasound investigation was performed with Xario SSA 660A system (Toshiba Medical Systems, Japan). Pathomorphological investigation has been conducted according to standard protocols with evaluation, where applicable, of liver steatosis [24] and liver fibrosis intensity degree [25], level of activity (Knodell R. G., 1981). Nonparametric methods of statistical analysis were applied [26]. Median (Me) and interquartile interval with representing lower, 25 %, quartile (LQ) and upper, 75 % quartile (UQ) were calculated, result was expressed by Me (LQ; UQ) way for shortness. Kruskal-Wallis ANOVA & median test method, Mann-Whitney U-criterion, Wilcoxon method, correlation by Spearman, Fisher angular transformation were used where applicable. Comparative analysis in groups of separate diagnostic criteria

distribution using ANOVA and Wald sequential analysis (Wald A., 1947) in its interpretation for medical diagnosis (Genkin A. A., 1962; Gubler E. V., 1978) by ranging of parameters by their differential-diagnostic information capacity allowed to define diagnostic value, prognostic significance and influence power of factors on parameters divergence in clinical groups and prognostic coefficients. Only independent prognostic parameters were included in the algorithm. In cases when correlation strengths between factors was more than  $|0,70|$ , one of factors was excluded from list of parameters. Ranking of parameters by influence strengths, evaluation of prognostic and information capacity of parameters allowed to choose the most reliable parameters. At the last phase, mathematic modeling using discriminant analysis and building of artificial virtual neural networks with their further training was performed.

**Results and discussion.** In 1<sup>st</sup> phase the age median was 62 (46; 71) years without significant gender differences, while gender comparisons in different nosologic groups showed the age difference ( $p=0.0001$ ) – the oldest in fatty liver disease group, 64.0 (60.0; 73.0) years; youngest in chronic hepatitis group, 41.6 (31.0; 52.5) years; intermediate in liver cirrhosis group, 52.0 (41.5; 65.5) years. Age comparison in different nosologic groups in further phases showed above mentioned (in 1<sup>st</sup> phase) differences in general and among women (both  $p<0.001$ ).

Pathomorphological verification of ultrasonography results in evaluation of disease character in patients with chronic diffuse liver diseases revealed 1.9 % probability of false-positive ultrasound diagnosis of this pathology, diagnostic capacity of 14–97 % (with central value of 56 %).

Using results of profound clinical, instrumental and laboratory investigation including frequency of separate ultrasonography parameters and prognostic value of each of criterion the screening algorithm was elaborated in order to predicting of complication risk. It has table form, which includes demographic-antropometric (age, gender, body mass index), sonographic (liver size, characteristics of capsule, parenchyma, ascites, hepatic vein circulation, caudal to right lobe transverse size, degree of steatosis, congestion index, modified hepatic index, hepatic vascular index, index of arterial perfusion, portolienal venous index, pulsatory index of spleen artery, platelets to spleen diameter ratio, right lobe width to albumins ratio) parameters, appropriate prognostic coefficients and prognostic result evaluation scale. By each parameter its presence or absence has to be evaluated, corresponding prognostic



coefficients are to be summarized. By achievement of threshold sum of coefficients a risk group was stated by using the scale: if equal or less than -19.8, risk is minimal; if more than -19.8 and less than 19.8, risk is uncertain; if equal or more than 19.8, risk is high.

For each of three diseases canonic discriminant functions were built. Predicted appliance to groups of low, uncertain, high progression risk in fatty liver disease was 78.9 %, 69.3 %, 99.7 % accordingly; in chronic hepatitis – 63.7 %, 61.1 %, 93.2 % accordingly; in liver cirrhosis – 93.1 %, 64.8 %, 99.7 %.

Neural networks (three-level perceptron with descending number of nodes) were built, trained and sensitivity, specificity evaluated. After training the square below ROC-curve to each of risk groups became increased > 80 %.

**Conclusions.** 1. Prospective randomized three-phase populational (on 3<sup>rd</sup> phase) research has proved the clinical significance of ultrasonography in evaluation of morphofunctional state of liver and portohepatolienal bloodstream in chronic diffuse liver diseases (fatty liver, chronic hepatitis, liver cirrhosis).

2. Diagnosis-prognostic algorithm which includes anthropodemographic, clinical and ultrasonographic parameters has been elaborated, intending on forecast of risk of unfavourable course of chronic diffuse liver diseases.

3. Predicting value of ultrasonography has been boosted by discriminant mathematic model development, artificial virtual neural networks application.

4. Longitude multicenter study of proposed approach in diagnosis of chronic diffuse liver disease using non-invasive ultrasonography and evaluation of treatment efficacy might be further perspectives of the research.

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## ***Study of Carduus crispus dense extract anti-inflammatory activity***

**Abstract:** This article deals with the results of a study of anti-inflammatory activity of thistle dense extract. As a result of studies, it was found that the analyzed thistle dense extract exhibits anti-inflammatory activity, acting on the leukotriene mechanisms of inflammation.

**Keywords:** dense extract, *Carduus crispus*, anti-inflammatory activity, pharmacological research.

**Introduction.** *Carduus crispus* grows in the southern regions of Kazakhstan and its raw material resources are estimated at thousands of tons per year.

Chemical composition of this plant is not studied well, but it is known that it contains polyphenolic compounds and flavonoids, which ensure antimicrobial effect of *Carduus crispus*.

In folk medicine *Carduus crispus* is used as anti-inflammatory agents, however, to date in official medicine and pharmacy this plant is not found application.

Therefore, the introduction of this type of raw materials in the pharmaceutical technology is promising and meets the modern challenges of the pharmaceutical industry of the Republic of Kazakhstan.

**Objects and methods of research.** As object of research was chosen *Carduus crispus* dense extract.

The study investigated the pharmacological activity of dense thistle extract started with an evaluation of anti-inflammatory activity.

Studies were conducted on models of acute exudative inflammation caused by the injection of carrageenan and zymosan, to assess the impact of the substance on cyclooxygenase and lipoxygenase system respectively. Studies have been conducted on the non-linear mature male rats weighing 220 – 250 g.

Acute carrageenan edema induced by subplantar administration under the aponeurosis of the hind limb of rats 0.1 ml of 1% solution of carrageenan [2]. The experiment was conducted as follows: the experimental animals were divided into six experimental groups. The animals of the first three groups were given analyzed dense *Carduus crispus*, stabilized with Tween in doses of 10, 25, 50 mg / kg 1 hour before the injection florgotropic agent. The animals of fourth and fifth groups were administered reference drugs in the same mode. As the reference drugs were used reference nonsteroidal antiinflammatory drugs sodium diclofenac (manufactured by FF "Health", Kharkov, Ukraine), at a dose of 8 mg / kg, and drug based of herbal extract with the same activity as studied - Silibor (production FF "Health", Kharkiv Ukraine), at a dose of 25 mg / kg. Animals of sixth control group were administered the equivalent amount of water. About the severity of inflammation was judged by the increase in the volume of the affected limb, which determined by a mechanical onkometer [4]. The volume of the limb was measured before the experiment began and in 3 hours after administration of carrageenin solution - at this point the level of prostaglandins in inflammation reaches the maximum value (prostaglandin phase).

Antiinflammatory activity was calculated by the formula:

$$A = \frac{P_k - P_d}{P_k} \times 100 \%,$$

where  $P_k$  – the average difference in volume of diseased and healthy limbs in the control group;

$P_0$  – the average difference in volume diseased and healthy limbs in the experimental group.

**Results and discussion.** The results of *Carduus crispus* dense extract anti-inflammatory activity studies are shown in Table 1.

**Table 1. *Carduus crispus* dense extract anti-inflammatory activity on the model of Acute carrageenan edema**

Conditions of experiment	Control pathology	Carduus crispus dense extract			Silibor, 25 mg/kg	Sodium diclofenac, 8 mg/kg
		10 mg/kg	25 mg/kg	50 mg/kg		
The value of edema cond. units.	15,01±1,08	11,5±1,41***	10,0±0,64*/***	12,1±1,17***	10,98±1,31	7,8±0,51*
Antiinflammatory activity %	-	23,3	32,8	20,1	26,8	48,0

Note: \* - the differences are significant in relation to the control ( $p \leq 0,05$ );

\*\* - Differences are significant in relation to the Silibor ( $p \leq 0,05$ ).

\*\*\* - Differences are significant in relation to the Sodium diclofenac ( $p \leq 0,05$ ).

The data obtained show that the dense *Carduus crispus* extract during acute carrageenan inflammation exhibits moderate antiinflammatory activity: sodium diclofenac (48%)> dense *Carduus crispus* extract, 25 mg / kg (32.8%)> Silibor, 25 mg / kg (26.8)> dense *Carduus crispus* extract, 10 mg / kg (23.3%)> dense *Carduus crispus* extract, 50 mg / kg (20.1%).

The most pronounced antiexudative effect dense *Carduus crispus* extract shows at a dose of 25 mg / kg and reduces the severity of inflammation by 32.8%. By the severity of antiinflammatory effect investigated dense extract at a given dose exceeds the reference drug at a dose of Silibor 25 mg / kg (antiexudative effect 26.8%), but inferior to sodium diclofenac, which at a dose of 8 mg / kg reduced the edema by 48.0%. Anti-inflammatory effect of thick *Carduus crispus* extract at doses of 10 mg / kg and 50 mg / kg was not statistically different from the effect of Silibor at 25 mg / kg.

Zymosan edema in rats induced by the subplantar injection of 0.1 ml 2% zymosan suspension [1].

The experimental scheme was constructed as follows: the animals of the first experimental group were administered with investigated dense t *Carduus crispus* extract at 25 mg / kg 1 hour before the injection of a zymosan suspension. The animals of the second and the third experimental groups were administered reference drugs. The fourth group was the control. The volume of the limb was measured at the moment of maximum edema development - 0.5 hours after zymosan administration. As the reference drugs were used quercetin (manufactured by CJSC "Borschagovsky Chemical-Pharmaceutical Plant", Kyiv, Ukraine), at a dose of 50 mg / kg and Silibor (production FF "Health", Kharkov, Ukraine), at a dose of 25 mg / kg. Activity of drugs and studied dense *Carduus crispus* extract was calculated by reduction of edema and expressed in % according to the guidelines. The results are given in table 2.

**Table 2. *Carduus crispus* dense extract anti-inflammatory activity on the model of Acute Zymosan edema**

Conditions of experiment	Control pathology	<i>Carduus crispus</i> dense extract, 25 mg/kg	Silibor, 25 mg/kg	quercetin, 50 mg/kg
The value of edema cond. units.	15,01±1,08	10,51±0,41*	10,91±0,47*	9,17±0,786*
Antiinflammatory activity %	-	29,98	27,31	38,90

Note: \* - the differences are significant in relation to the control ( $p \leq 0,05$ );

\*\* - Differences are significant in relation to the Silibor ( $p \leq 0,05$ ).

\*\*\* - Differences are significant in relation to the quercetin ( $p \leq 0,05$ ).

The data presented in Table 2 indicate the ability of dense *Carduus crispus* extract at a dose of 25 mg / kg limit the development of exudative inflammation induced by the administration of zymosan, which is probably due inhibition of lipooxygenase activity, which plays a key role in the early zymosan inflammation. Thus, it can be concluded that dense *Carduus crispus* extract shows anti-inflammatory effect, by acting on the leukotriene mechanisms of inflammation.



By severity of antiinflammatory activity at zymosan inflammation test substances may be arranged as follows: quercetin, 50 mg / kg (38.90%)> dense *Carduus crispus* extract, 25 mg / kg (29.98%)> Silibor, 25 mg / kg (27 , 31%).

Administration of the studied dense *Carduus crispus* extract significantly reduced edema to 29.98% compared with control animals. The reference drug Silibor, as well significantly reduced edema, but somewhat inferior in activity to thick *Carduus crispus* extract, whereas quercetin was more active with an anti-inflammatory action (antiexudative activity 38.90%).

**Conclusion.** On basis of the conducted studies we can conclude that investigated dense *Carduus crispus* extract exhibits anti-inflammatory effects by acting on the leukotriene mechanisms of inflammation.

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