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## USING THE PRINCIPLES OF «GREEN LOGISTICS» FOR ENVIRONMENTAL PROTECTION

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### SUMMARY

The article analyzes the results of studies by Russian and foreign authors on the negative impact of black carbon on the environment. The principles of «green logistics» are proposed to be used to reduce the negative impact of the results of a person's economic activity on the Earth's climate.

**Key words:** ecology, logistics, black carbon, climate, transport.

### INTRODUCTION

One of the problems of our time is the negative anthropogenic impact on living nature. Protection of the environment is a significant problem not only for the state, the public, but also for entrepreneurs, since the complex ecological situation is a direct result of their activities, including the result of the activities of the facilities of the material base between the sections of the logistics chain.

In particular, 60% of the pollution of the atmosphere is in vehicles. Therefore, in addition to the main, traditional questions: «what to buy», «how much to buy», «from whom to buy», «on what conditions to buy», modern conditions put before logistics other, no less significant problems, including such as environment protection. As a consequence of the above-mentioned problem in logistics, the direction of activity, called environmental logistics – «green logistics» has been outlined [5].

The purpose of the study is to explore the possibility of using the principles of «green logistics» to protect the environment from the effects of black carbon.

To achieve this goal, it is necessary to solve a number of tasks:

review current research on the effects of black carbon on the environment;

develop proposals aimed at reducing the negative impact of black carbon on the Earth's climate.

### METHODOLOGY

The study of the theory of the negative impact of industrial and other activities on the Earth's climate was carried out using the methodology of the system approach and the principles of ecological – «green logistics». General scientific methods were used, for example, analysis and synthesis. The method of analysis made it possible to identify the problem and to identify the main components in it, and the synthesis to determine the main directions for resolving current problems.

The methods of empirical knowledge include description, comparison, measurement. Based on the analysis of available literature sources, a complex ecological situation was described in the context of anthropogenic impact on nature.

### RESULTS AND DISCUSSION

#### A BRIEF OVERVIEW OF MODERN RESEARCH ON EFFECTS ON THE NATURAL SYSTEM OF BLACK CARBON

In 2011 – 2012 a number of survey studies on the effect on the climate system of short-lived «climatic factors», which include the release of substances into the atmosphere that are stored in it from several days to several years, rather than dozens of years, such as  $CO_2$ . Such emissions include «black carbon» (BC), which is a new substance from the point of view of its study.

Let's define the BC, consider its impact on public health, the environment and climate [1].

BC is a product of incomplete combustion of coal, diesel fuel, biofuel, biomass and is the strongest light-absorbing component of suspended particles. Its solid particles consist mainly of pure carbon, which absorbs solar radiation at all wavelengths. The BC is released directly into the atmosphere in the form of soot, consisting of small particles smaller than 2,5 microns [2].

BC is unique and important in the Earth's climate system, as it absorbs solar radiation, affects the formation of clouds, melting snow and ice cover. Most atmospheric concentrations of black carbon are due to anthropogenic activity.

BC is a separate type of carbon material, which is formed only in the flame during the combustion of carbon fuels. It differs from other forms of carbon and carbon compounds contained in the atmosphere, since it has a unique combination of the following physical properties:

absorbs visible light with a mass absorption of at least  $5 \text{ m}^2 \text{ g}^{-1}$  at a wavelength of 550 nm;

has refractory properties, that is, it retains its base form at very high temperatures, and its evaporation temperature is about 4000 K;

not soluble in water, in organic solvents, including methanol and acetone, as well as in other components of atmospheric aerosol.

A clear absorption of visible light in all visible waves with the help of BC is a distinctive feature that has caused interest in studies devoted to the radioactive radiation of the atmosphere. In the atmosphere in significant quantities there are no other substances having such a strong energy absorption per mass unit. BC has very low chemical reactivity in the atmosphere; its main process of removal is wet or dry precipitation. BC, as a rule, is in atmospheric aerosols containing a number of other materials, many of which are ejected together with BC from various sources.

It is possible to distinguish natural and anthropogenic sources of BC. On a global scale, the largest natural sources of black carbon are forest and steppe fires, some of which can be indirectly attributed to anthropogenic impact (fires caused by people). Anthropogenic sources include emissions associated with human economic activity. In Africa, Latin America, East, South and South-East Asia, open burning of grasses and forests is the most significant source of black carbon emissions.

In Europe and North America, the main source of BC are diesel engines of road transport (for example, diesel trucks and cars); diesel engines of other modes of transport (for example, trains, ships) and non-transport diesel engines (agricultural and construction equipment, generators). Diesel car engines in the volume of emissions of BC are in the first place, followed by diesel engines of other modes of transport.

According to the World Bank, in 2000 the automobile and marine sector produced about 4.8 million tonnes of BC, which is about 20% of global emissions. Emissions from the full cycle of air transport operations, including flight, landing and take-off, also constitute a significant share. However, in comparison with industrial activity, which is a significant source of mass emissions of BC on a global scale, emissions in aviation and shipping are insignificant. After entering the atmosphere, the BC moves on a regional and intercontinental scale and is removed from the atmosphere through wet and dry deposition on the Earth's surface (i.e., precipitated), resulting in an average lifetime of BC in the atmosphere of about a week [3].

Black carbon has a negative impact on human health and the state of ecosystems, on the conditions of illumination, visibility in the navigation of passenger and freight transport. Short-term and long-term effects are associated with diseases of the respiratory system and the cardiovascular system of man, as well as premature death. In addition, the increased content of BC in the atmosphere leads to a reduction in crop yields, damage to materials and buildings. BC particles can penetrate the human body through the lungs with inhalation, through the gastrointestinal tract, in contact with water and food, as well as through the skin and mucous membranes.

BC affects the climate in three ways: direct effect, the effect of reflectivity of snow (albedo) and interaction with clouds [4].

First, BC contributes to the warming of the atmosphere by absorbing solar radiation (direct action). The strongest climatic effect of BC is its direct atmospheric effect - successive changes in the atmospheric balance of the Earth due to increased absorption of sunlight in the atmosphere. When the BC is located above a reflective surface, such as clouds or snow, it also absorbs solar radiation reflected from this surface. Heating inside the atmosphere and reducing the sunlight reaching the surface can change the hydrological cycle by changing the latent heating, as well as by changing the convection.

Secondly, BC also interacts with clouds, which affects cloud stability, deposition and reflectivity. The particularly complex role of BC and other aerosols in the climate is associated with changes in the formation and radiation properties of liquid and ice clouds. BC particles can increase the reflectivity and lifetime of warm (liquid) clouds, causing cooling, or they can reduce cloudiness, which leads to warming. Aerosol particles can affect the formation of rain, snow clouds or mixed clouds (snow-rain).

Thirdly, BC is deposited on snow and ice, reduces their reflectivity and thereby increases their absorption of sunlight and their subsequent melting.

BC, precipitating on ice or snow, also causes warming because it reduces the reflectivity of these surfaces, causing the absorption of solar radiation. Direct absorption of sunlight causes warming, which affects snow and ice, which leads to additional climate changes and, ultimately, to the earlier melting of snow.

The increase in the solar heating of snow covered with BC particles affects the aging of snow, which leads to a rapid increase in the size of the snow particles.

Coarse-grained snow has a lower reflectivity than fine-grained snow. BC accumulates on the surface. Climate change, caused by a decrease in the reflectivity of snow and ice, can affect the pathways of atmospheric transport of water vapor [3].

## **BASIC PROPOSALS ON THE APPLICATION OF THE PRINCIPLES OF «GREEN LOGISTICS» TO REDUCE THE NEGATIVE IMPACT OF BLACK CARBON ON CLIMATE**

For the rational management of transport, it is necessary to develop the theory of transport systems and incorporate the elements of logistics into it based on the application of the system approach, which indirectly will influence the reduction of black carbon emissions through the rational use of vehicles. Reducing emissions of BC is a potential strategy to reduce the anthropogenic impact on the natural environment.

The BC is discharged together with other suspended particles and gases and has a mixed effect on the climate. Therefore, when evaluating the possibilities for reducing BC emissions, it is necessary to take into account the side effects of other particulate and gas emissions. For example, the BC is about 75% of the emissions of suspended particles from mobile diesel engines, while in the combustion of biomass, mainly organic carbon is released. To reduce BC, it is necessary to use the basic principles of «green logistics» – environmental logistics.

«Green Logistics» is a system of planning, design and management using advanced logistics technologies and methods of ecological design in the field of pollution reduction and resource consumption [5, 7]. «Green logistics» is a new scientific direction, involving the use of advanced logistics technologies and modern equipment in order to minimize pollution and increase the efficiency of the use of logistics resources.

From the point of view of business, the methods of «green logistics» mainly include: management of the transportation system (combined transport, 3PL-logistics), packaging management (to reduce the environmental impact of packaging materials), organization of «green» communications and production, management warehousing and waste management [6, 7, 8].

The basic principles of «green logistics» include: rational use of natural resources; rational use of enterprise resources; maximum use of industrial waste, packaging and packaging, as recyclable materials or their environmentally safe disposal; the introduction of innovations and technologies to reduce the environmental burden on the environment; enhancement of environmental education and staff responsibility; environmentally sound safety of transportation and storage of material resources; minimum use of raw materials and packaging not recyclable or safety of disposal.

Using the above-listed principles of «green logistics» will allow to control direct emissions of suspended particles in the atmosphere and to help reduce emissions of BC. Recommendations for reducing emissions include improving energy efficiency to reduce the need for diesel generators; increasing efficiency of diesel engines; tightening standards for new engines or fuel standards to reduce emissions from mobile sources; as well as the replacement or modernization of industrial boilers and diesel generators.

The duration of stay of BC in the atmosphere is low, and the climate will quickly react to emission reductions. In addition, a reduction in black carbon emissions generally results in a reduction in the emissions of suspended particles PM<sub>2.5</sub> (solid microparticles and minute droplets of liquids from 10 nm to 2,5 microns in size), providing significant medical, environmental and economic benefits. It is estimated that by 2030, the benefits of reducing PM<sub>2.5</sub> suspended particulate emissions in the US range from \$ 290,000 to \$ 1.2 million per tonne of PM<sub>2.5</sub> suspended solids; the estimated costs to achieve such a reduction in emissions is much less [3].

Emissions of BC will be reduced in the coming years, as new technologies of vehicles and environmentally friendly fuel with low sulfur content are developed and introduced. However, in developing countries, it is expected that emissions will increase as transport activity increases and outdated technologies are used. In addition, diesel fuel standards that allow the use of fuels with a higher sulfur content can negate the benefits of some emission control technologies. This phenomenon can demonstrate the example of the US and China. While each of these countries has a similar level of transport activity, China's transport through 2050 will be a source of more than 50% of global carbon dioxide emissions, and US transport is less than 5% [4].

### **CONCLUSION**

Thus, the above brief analysis of the negative impact of black carbon on the environment allows us to conclude that the implementation of the environmental aspect in the management of material flows is necessary for the successful protection of the environment. Constantly increasing anthropogenic impact on the environment requires an intellectual approach and intervention of narrow specialists in the formation of transport systems and the configuration of the ratio of species and varieties of transport. The use of the principles of «green logistics» is a modern activity in a number of economic and technical disciplines.

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## THE ANALYSIS OF PERFORMANCES OF SPORTSMEN ON THE WORLD MILITARY SAILING CHAMPIONSHIP

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### РЕЗЮМЕ

В статье рассмотрены особенности организации и проведения Чемпионатов мира среди военнослужащих по парусному спорту (участники, лодки, очки), проанализированы результаты выступления украинских спортсменов.

**Ключевые слова:** парусный спорт, Чемпионат мира среди военнослужащих, программа, анализ, результаты.

**Actuality.** The International Military Sports Council (CISM) is one of the largest multidisciplinary organisations in the world. It organised various sporting events for the armed forces of 133 member countries. Soldiers, who may previously have met on the battle field, now meet in friendship on the sports playing field. This is in accordance with the philosophy and the ideals which were set in CISM's mission statement in 1998, signed by all the member countries.

Founded in 1948, CISM uses the playing field to unite the armed forces of nations across the globe. With the motto "Friendship through Sport," the ultimate goal of CISM is to contribute to world peace by uniting the armed forces through sport, as well as promoting solidarity among nations. CISM annually organises over twenty Military World Championships for different sports in which all member nations can take part. He organize continental and regional competitions and every four years the Military World Games and most recently Winter Games are held [2].

In Armed forces of Ukraine the Concept and the Program of preparation of sportsmen of Armed forces of Ukraine to Olympic Games, the world championships and the Europe, to the World games of military men is developed.

Results of performance and achievement of the Ukrainian military-sportsmen in the Military World Championships (MWC) and the Military World Games (MWG) are not presented enough in scientific articles [1, 3].

The detailed analysis of the reached results of the Ukrainian military sportsmen allows to reveal reserves which can be used for achievement of the maximum results in the further.

**The object of work** - carrying out of the retrospective analysis of performance Ukrainian military yachtsmen's on the the Military World Championships and the Military World Games.

**Tasks:** 1. To show features of the organization and carrying out of CISM sailing championships. 2.To analyse the results of ukrainian yachtsmen's performance at CISM sailing (2003-2018).

**The results of research.** In 2001 Canada hosted the first Military World Sailing Championships as Sailing became recognised as one of CISM's 26 World Sporting Disciplines. The current CISM programme includes 26 sports on world level: basketball, boxing, cross-country, cycling, equestrian, fencing, football, golf, handball, judo, marathon, modern pentathlon, orienteering, parachuting, sailing,shooting,ski, swimming, taekwondo, track & field, triathlon, volleyball, wrestling, aeronautical pentathlon, military pentathlon, naval pentathlon

Bahrain, Brazil, Denmark, France, India, Poland and Spain have since all hosted World Military Sailing Championships. Sailing was included as a sport in four of the 5 World Military Games that have scheduled by CISM. At the 1999 during the 2nd World Military Games in Croatia, sailing was not included as sport, and Denmark hosted a World Military Sailing Championship instead. [5].

There has been a World Military Sailing Championships every year since 1949 (with the exception of 15 years) making this sport one of the few sports that holds regular championships. Since 2000 there have been countries representing each of the continents at the championships and the number of countries participating has averaged at 20 per event. The least quantity of participants of competitions was marked in 2006 (15 countries) and in 2013 (14 countries). However the percentage parity of participants of a female gradually increases and makes 15-30 % now. In 2016, the largest number of participants in the competition - 198 athletes, of which 144 men and 54 women (Figure 1).



**Figure 1. Gender parameters of participants of competitions on sailing**

The World Military Games are organised every four years and the host nation shall determine whether sailing will be offered as one of the sports of the games.

The World Military Sailing Championships will normally be organised on an annual basis. In the years that the World Military Games are scheduled the World Military Sailing Championships shall be part of the Games. Should the Games not include sailing, then every effort shall be made to schedule a World Military Sailing Championship elsewhere.

The CISM Board of Directors shall approve the calendar for the organisation of the World Military Sailing Championships during the CISM Annual General Assembly.

Boats for the competition must be a multi-crewed (two or more crew members) international or national class of dinghy/yacht. The class of boat must be made known at least one year prior to the championship.

The boat selected for the championship must be of a design and configuration in which previous experience is not a dominating factor in the overall performance. The boat will also be of a design and configuration in which extreme athleticism, individual crew weight and size are a minor factor in the overall performance. The intent is to ensure that any skilled crew can quickly learn about the boat and sail competitively. At last competitions by organizers following classes of yachts which enjoy the greatest popularity in the world have been offered: «J24», «Omega», «Dragon», «Finn», «Monark 606», «Pirate», «Snipe», «Laser» and other. So in 2011 year it was «HPE 25», in 2013 – «Yngling», in 2014 – «470», in 2015 – «Laser 2000», in 2016 and 2018 – «J80». The sailing championships consist of twelve races. Five (5) races are required to constitute a regatta. Prizes receive the first three teams of Female Category and to the first three teams of Open Category. The Female Category be racing in both categories –but with different scoring [4].

The analysis of results of performances yachtsmen in the championships show, that leaders are sportsmen of Russia, Brazil and Poland (Table 2). The worthy competitor to these commands last years became a command of Ukraine. Into structure of the Ukrainian combined team in different years entered such known yachtsmen as Olympic champion Evgen Braslavets (2003, 2009, 2011), prize-winners of Olympic games George Leonchuk (2009), Anna Kalinina (2011), Svetlana Matevushcheva (2006), the world champion Timokhov Sergey (2009, 2011) [5].

In 2013 the Ukrainian sportsmen have conceded to Brazilians only one point and have taken the second place in a class of yachts "Yngling". In a command there were masters of sports Igor Tsvetkov (the participant of the championships of 2000 & 2003), Igor Severyanov and Andrey Yadrin. In competitions participated 5 female and 13 man's crews.

The 47th World Military Sailing championships was organized in Doha Sailing Club. The Boat was used in the CISM World Championships was 470 Class Boat. In 2014, Ukraine was represented by the men's crew of the yacht «470» Borys Shvets and Pavlo Matsyev who took second place. The female crew of Anna Kyselova and Anastasiya Krasko took the 4th place from seven countries.

Table 2

The results of yachtsmen’s performance at CISM sailing (2014-2016)

<b>50th World Military Sailing Championship (Match), Helsinki, June 16th to June 20th</b>	
<b>1. Brazil 2. Russia 3. Poland</b>	
<b>49th World Military Sailing Championship (Match), Karachi, Pakistan 27 October - 02 November 2016</b>	
<b>1. Russia 2. Pakistan 3. Norway, 4. Ukraine 5. Qatar 6. Poland 7. Finland 8. Brunei 9. The Netherlands</b>	
<b>6<sup>th</sup> CISM Military World Games, 48<sup>th</sup> World Military Sailing Championship Mungyeong, South Korea, 2–11 October 2015</b>	
<b>MALE</b> <b>1. Ukraine 2. Brazil 3. Russia</b> 4.KOR 5. IND 6. QAT 7. NOR 8. POL 9. ITA 10. FIN 11. USA 12. PAK 13. BRN 14. CHI 15. IND 16 ESP 17. DEN 18.CAN 19. RSA 20. ARG	<b>FEMALE</b> <b>1. USA 2. Russia 3. Brazil</b> 4.POL 5.UKR 6.CHI 7. NOR 8. DEN 9. IND
<b>47th World Military Sailing Championship, Qatar, Doha, 22-29 Nov 2014</b>	
<b>MALE</b> <b>1. Germany 2. Ukraine 3. Poland</b> 4.IND 5.QAT 6.FIN 7.NOR 8.USA 9.INA 10 TUR 11.PAK 12.SRI 13.DEN 14.CAN 15.TUN	<b>FEMALE</b> <b>1. France 2. Russia 3. Poland</b> 4.UKR 5.GER 6.USA 7.INA

The 2015 Military World Games, officially known as the 6th CISM Military World Games, was hosted in Mungyeong, South Korea. The Games were organized by the Ministry of National Defense Republic of Korea in accordance with CISM regulations and the rules of the International Sports Federations. The games is the largest military sports event ever held in South Korea, with approximately 8,700 athletes from 110 countries competing in 24 sports. In sailing, 72 male athletes from 20 countries and 42 female athletes from 14 countries were declared. Three regattas of Fleet Race (mixed and female) were held at Pohang Yeongildae Beach. Fleet Race mixed and Fleet Race female was race simultaneously [6]. In 2015, experienced yachtsmen Shvets Borys (from Kiev) and Matsuyev Pavlo (from Nikolaev) won gold medals in the yacht class «Laser 2000». The female crew of Gafenko Anastasiya and Krasko Anastasiya was the fifth. In 2016 on the boat «J80» sailors Borys Shvets, Pavlo Matsuyev, Igor Severyanov, Ivan Paveusyk, Valeriy Kudryashov took the 4th place [7].

During with 2003 for 2007 in a command of Ukraine on sailing recession was observed; since 2008 there was a distinct tendency to rise of sports results in the World Military Sailing Championship. It testifies to real opportunities of further positive dynamics of results Ukrainian yachtsmen (a double line) on the Military World Summer Games in Helsinki, Finland (2018) (Table 3). But unfortunately the Ukrainian sailing team was not delegated to these competitions due to the difficult financial and political situation in the country.

Table 3

The comparative characteristic of results of performances of a combined team of Ukraine on the World Military Sailing Championship (2000-2018)

Year	Total Place									
	1	2	3	4	5	6	7	8	12	
2000	1									
2003						1				
2006								1 w		
2007										1
2008			1w							
2009	1 mix									
2011	1									
2013		1								
2014		1		1w						
2015	1				1w					
2016				1						
2018		prognosis								

The venue 50th World Military Sailing Championship was Helsinki, Finland. The International Military Sports Council (CISM) has entrusted the organization of the 50th World Military Sailing Championship to the Finnish Defence Forces.

The main organizer was Finnish Navy. During this jubilee Championship also Finnish Defence Forces and Finnish Navy celebrated the 100 years anniversary. The championship was take place at Finnish Naval Academy on the outskirts of Helsinki, from 14 June to 21 June 2018. The racing area was at Kruunuvuorenselkä in front of the city center of Helsinki. The event was sailed in J80 class keelboats modified for Match Racing. The number of crew (including the skipper) was 4 or 5. All registered crew shall sail all races. The total weight of the crew, including the skipper, dressed in at least shorts and shirts shall not exceed 350 kg.

The event format of the competition was as follows:

1 First Stage - Round Robin

(a) All skippers will sail a single round robin, a double round robin or double round robin in groups.

(b) The four (4) highest scored skippers shall qualify for the next stage.

2 Second Stage Semi-finals

(a) The highest scored skipper from Stage 1 shall choose their opponent when requested by the RC to do so. The remaining two (2) skippers shall race each other.

(b) In each semi-final the higher scored skipper from Stage 1 will be starboard entry in the first match.

(c) The first two (2) skippers to score at least three (3) points shall proceed to the finals. The other two (2) shall proceed to the Petit Finals.

4 Fourth Stage – Petit Finals

(a) The higher scored skipper from Stage 1 will be starboard entry in the first match.

(b) The first skipper to score at least two (2) points shall be awarded third place, the other fourth place.

5 Fifth Stage – Finals

(a) The higher scored skipper from Stage 1 will be starboard entry in the first match.

(b) The first skipper to score at least three (3) points will be the winner, the other second place.

Participating Countries in World Military Sailing Championship (Final Entry) was: Bahrain, Brazil, Canada, China, Denmark, Spain, France, Pakistan, Netherlands, Poland, Qatar, Russia, Serbia, Turkey, Venezuela, Finland. . The three best teams were as follows: 1. Brazil, 2. Russia, 3. Poland.

## CONCLUSION

1.Sailing is popular among military men all over the world. The program of the Championships and the Military World Games constantly changes. It is fixed the tendency to increase at competitions of quantity of women-participants.

2.Differences in the admission of sportsmen to competitions on sailing and requirements to classes of yachts are shown.

3.It is revealed, that the Ukrainian sportsmen are leaders in sailing, on a number with such countries as Brazil and Poland that have won the greatest quantity of medals of various advantage the World Military Sailing Championship.

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## CONCEPTUAL BASIS OF DEVELOPMENT OF INNOVATIONS.

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### ABSTRACT

In the article main regulations of innovative theory are studied. It is explained its nature. The meaning of two aspects of innovation are highlighted ---- first, as results of commercialization and “development” process of results of science and technologies on received object (result, product, object); second, as on the received process of these results as necessary social (subject, object)relations for fulfilling the given process. On the basis of innovations of foreign countries’ practice, the study and generalization of its main theories, it is formed main characteristics of innovations- long-term competitiveness, its determination, succession, systematization , novelty, that is the difference from the existing one, radicalism- great importance and speed, its mastering ability.

**Keywords:** innovative process, innovative strategy, innovative infrastructure, innovative model, innovative entrepreneurship, innovations, innovative politics, innovative characteristics.

### 1. INTRODUCTION

It is the 21<sup>st</sup> century, the epoch of knowledge, development of intellectual capital and innovations. Today the main task of modern social- economic development is transfer to its innovative way, maximal usage of principally new factors of economic growth that is characteristic to post-industrial informative epoch. This task is very important for modern Georgia, where the necessity of transfer of economic development to innovative way requires activation of innovative business, first of all, economic subjects, suitable scientific-technical processing on enterprise level, effective investing politics and other conditions. It gives the possibility of reorganization of national economics on the basis of scientific production it becomes possible to overcome Georgia’s big and traditionally increasing backwardness (in different spheres of economy compared to highly developed countries of the world).

Nowadays our country owns quite a good level of scientific- technical potential but because of economic crisis, in conditions of transitional period, the country importantly fell behind compared to the world level. Accordingly, new terms and categories are required to characterize innovative development of enterprise, new vision of theoretical genesis of innovations, also, in general, elaboration of innovative sphere, innovative business, its social nature, economic indicators and more importantly, correct innovative politics methodology of strategy.

Herewith, transfer to economic methods influencing on economics effectivity conditions the necessity of formation of new mechanism of production management in whole as well as on the point of economic development. Also, social aspects of innovative business, innovative and ventura manufacturing, state regulation of innovative business, innovative infrastructure, innovative management marketing organization, estimation of innovative business effectivity, innovative strategies, funding of innovations, management of innovative projects and the necessity of studying other problematic topics were highlighted.

My aim is to say something new about scientific research, studying and analyzing even the above mentioned topics of innovations and novelties. The mentioned problems are quite actual and timely, because as mentioned at the beginning of the article, “rescuing “or “dying” of the third millennium of development of civilization depends on prognosis of correct strategy of the hardest process of innovations and politics of its effective fulfillment.

The topic given in the work becomes more difficult because it is not only hard and serious, but because of its various kinds and character. We will from the beginning- from basis. What is innovation, how its development takes place in innovative business. We will explain main characteristics of innovations, we will review main aspects of formation of innovations, we will discuss sources of novelties and will try to explain cycling nature of development of innovations.

### 2. STUDYING LEVEL

Interest towards the theory of innovations and problems of practice is increasing greatly. A lot of articles are written and much is spoken about development of innovative economics in the countries of transitional economics. Endless speech about the fact that post- communist states should truly transfer to the innovative model of economic development can be

considered as necessary beginning condition of their sovereignty. The above mentioned idea is proved by numerous publications about innovative economics in neighboring countries and fulfillment of the idea of creating this manual as well.

The situation of modern innovative sphere proves serious oppositions in its functioning. Quite high scientific-technical potential of the country appeared to be on the edge of breakdown threat of economic reforms. In conditions of developing marketing economics innovative entrepreneurship is not only to strengthen success of marketing reforms but also to support the country's honorable place in the world economics and herewith, deserving life for its population. To reach this aim it is necessary the country's economics to be oriented on innovative direction of development.

For realization of innovative model of the country' economic development it is necessary to realize deeply the meaning of innovative entrepreneurship. It becomes necessary to form and develop the whole system and strategic aims, to transform its intellectual structure, to change scientific and experimental – inculcational organizations, mechanisms of relations with the consumers of their production, the necessity of adaptation towards the requirements of marketing economics of scientific – technical development.

On the way of formation of innovative entrepreneurship some problems slow down its development. They are: social-psychological, economic and lawful topics. The problem of creation, formation and development of innovative entrepreneurship is that the given processes should develop in short terms while there are not many conditions for its development.

### 3. REVIEW OF LITERATURE

The authors consider to mention that innovations, innovative business and their influential problems on economic growth are discussed in fundamental works of:

J. Schumpeter, V. Anshin, E. Bruce, Ch. Litbert, E. Mansfield, E. Rogers, B. Sakhto, P. Drewker, D Johnson, I. Iakovets, O. Golichenko, A. Kravets, V. Kim, B. Gorfinkel, N. Marenkov, B. Medinsky, E. Kargadan, F. Lemerle, B. Lundval, R. Nelson, S. Popper, C. Rouse and other famous scientists. About theoretical research of innovative business in Georgia important works were published in recent years \_ Chiqava L., 2006; Qoqiauri L., Qoqiauri N., 2015; Abralava A., Gvajaia I., Qutateladze R., 2009., Jolia G., Sekhniashvili D., 2010., Chalaganidze sh., 2000., Baratashvili E., Datashvili V., Nakaidze G., Qutateladze R., 2008., Baratashvili E., Nakaidze G., 2001. We have published scientific articles [ Gvajaia L., 2003; Gvajaia L., 2001; Maisuradze T., 2014; Ghavtadze G., Girgvliani S., 2015; Qoqiauri L., 2017; Baratashvili E., Tsimintia K., Zarandia J., 2008; Margvelashvili K., 2016] Though life is going fast, there are numerous theoretical and practical problems in innovative sphere to be solved . We will present some of their resumes.

**Schumpeter J.**, 1982. Theory of Economic Development. M.: Economica. P. 131. He mentioned the word innovations for the first time. In the book "Business Circles" Published in 1939 he defined innovation as a new combination of enterprise factors. It should be mentioned that he didn't give the meaning of innovation directly, but mentions that innovation makes a combination of factors and with the help of inculcation of novelties it is possible to overcome earlier situation. Schumpeter base new science innovatics.

**Porter M. E., Stern S.** 1999. New Challenge to America's prosperity: Findings from the innovation index. Washington. P.3/ Innovation in the work is discussed as basis of long-term competitiveness, which supports economic progress. None of advanced economics can maintain high salaries, high standards of life and settle down on the world markets with standard production and standard methods. The authors define innovation as knowledge transformation in processes, products, service and includes much more than only science and technologies.

**Lemerle P.**, 1994. Innovation Theory: Sources and Perspectives of Development. Translated from French, Kiev: arena-press, p. 119. In the monograph the author discusses different aspects of innovation – on the one hand, "commercialization" and "objectivization" process of science and technologies; on the other hand , as social(subject-object) relationship created for fulfilling the given process.

**Sakhto B.**, 1990. Innovations as Means of economic Development. M, Progress. P. 43-44. The author discusses innovation as social technological-economical process, which creates excellent items by practical using of ideas and inventions; innovations which are oriented on profit give additional income while appearing on markets.

**Drucker P F., 1998.** The Discipline of Innovation // Harvard business review. Vol.76.N6.p.156-165. Together with studying essence of innovations and main characteristics. He mentions that purposeful, systematic innovation should begin with analysis of sources of possibilities. They may appear to be inside as well as outside the environment.

**Qoqiauri L., Qoqiauri N., 2015.** Innovations. Tb. GTU. P. 668. In the presented work the authors have highlighted the whole specter of forms, problems and topics of innovative economics. Among them the essence and tendencies of development of innovations and innovative business, innovative process are discussed in the last millennium; cycling nature of innovative development is described in order, great attention is paid to intellectual capital, as a factor of innovative development of economics, also basic topics of intellectual innovative business of an organization; instruments of state innovative politics and its prior directions are discussed in relevant order; An important place is given to the methodology of innovative management, dynamics of development of innovative management, development of innovative management organization on macro, mezzo and microeconomic levels; a great interest is shown to strategic role of innovations, generality of goods idea, elaborating innovative projects, planning an organization and methodology, also the whole complex of difficult and important topics.

**Qoqiauri L., Qoqiauri N., Gechbaia B.2018.** Innovative Economics. Tb. publ.house “Kalmosani” p. 650. The manual “Innovative Economics” presents preparing and receiving system oriented on support and development of formation of the whole country, enterprise and companies’ innovative – technical potential. It is discussed a large specter of creation, function and development of innovation economics. In the book innovative process is shown as basis of economic development. For the first time in economic space successively is given social aspects of innovation business; great attention is paid to the necessity of creation of intellectual resources and intellectual capital of enterprises and companies. The authors highlighted innovation entrepreneurship, problems of rising innovation business, main characteristics of clusters and their place in innovation business; completely is presented theoretical- methodological basis of innovation management and marketing, main topics of their organization on macro, mezzo and microeconomic levels, other main problems of innovative economics and the ways of their solution.

#### 4. MAIN PART

##### 4.1. Theoretical Genesis of Innovations.

Creation of effective system of innovation business requires relevant theoretical basis, etymological apparatus, management methodology and adequate instrumentarium. Elaboration of forms and ways of managing innovations effectively conditions clear formulation of their aims, subject, management tasks. So, at first we decided to define basic conceptual notion and categories of the above mentioned topics. It will give us a possibility to represent the contents of innovative process completely and accurately as an object of management.

The word “innovation” first appeared in the XVI century and meant bringing in some elements of one culture into another one. The term “innovation” means “novelties” in English but is accepted differently by different authors.

Comparatively common explanation of main regulations of innovative theory in the world practice is based on new combination of conception of Schumpeter’s entrepreneurship factors. In his work “Theory of Economic Development” he showed that big stimulus for enterprise business is profit and is got by presenting new items produced with minimal expenses on market. By Schumpeter’s classification the term “novelty” is discussed as:

\_Usage of new material;

- Fulfillment of reorganization of entrepreneurship and its material-technical support;
- To master new markets of materials (Schumpeter J., 1982).

But still, what is innovation?

Nowadays the notion innovation is in fashion and is widely used in governing practice. At the beginning of the XX century it was quite a vague notion and was seldom used even by theoreticians. A scientist-economist who first mentioned this notion towards an organization was an Austrian scientist J. Schumpeter. In his book “Business Circles” which was published in 1939, he first defined innovation as a new combination of entrepreneurship factors. This is something new that didn’t exist before. Obviously, there is not a vivid explanation of the term: “innovation” but it is said that “innovation makes a new combination of factors” and by inculcating novelties it is possible to overcome earlier situation.” {Schumpeter J. A. 1961}.

Schumpeter created a new direction in the development of economic science. He laid the foundation of a new science –innovatics. Innovatics is a science which studies theoretical and practical aspects of scientific novelties i.e. processes of novelties formation and their expansion.

In the 1960s **L.Perre's** definition of innovation is very important- any change of economic organism in inner structure that transfers from the first position into another, **P.Witfield's** definition –a development of creative idea and its transformation into integrated products, process or system; **P. Drucker's** formulation –special instrument, means, that gives a chance to entrepreneurs to use changes to carry out a new kind of business or service; **K.Night-** to calculate something new in connection with a branch or its environment, a special case of an enterprise organization process and so on.

WE consider that from the discussed explanations P.Drucker's definition is the most important- Maybe it is "late" in time but expresses Schumpeter's classical definition quite completely. Herewith, it highlights entrepreneurial factor in the growth of enterprise development effectivity.

#### 4.2. Problematics of Innovation Theory Terminology.

Besides the growth of foreign researchers' great attention and the number of scientific researches towards terminological problematics of innovation theory it is not time to make conclusions about vivid advantages or priorities of any conception; also to make decisive ideas about formation of categorical apparatus in innovative sphere, because comparatively narrow group of specialists substantiate the second, quite convincing version of innovation, namely, the main category of innovation theory is discussed from the position of concrete kinds of technique, technologies, creating and inculcating other new productions. Herewith, in some cases scientific-technological and innovative aspects of entrepreneurship are identified, which is not always correct.

Definition of innovation with the given point is very common because the basis put in it-the principle of separating from scientific-technological positions of innovation- reflects their meaning and aims in social development. Also, it supports to carry out manufacturing processes on micro and macro level. In these frames it is comparatively easy and clear to search quantitative and qualitative parameters of innovations, to define economical and effective kinds of their practical usage. The main difficulty of enlarging the area of this practical inculcation is lack of common idea of their service about "innovation" and its entrepreneurship. The essence of discussion may be formed as following: **Is innovation result or process?**

The difficulty is the following: besides wide practical usage of activity in quite different spheres innovation plays the role of different category. So we think that before realizing comparatively common views it is necessary to state what kind of **qualities** are the basis of terminological system of "**innovation politics**" and "**innovation business**". Let's discuss innovations in two aspects – on the one hand, as a subject received as a result of commercialization and objectivization process of scientific and technologies result ( result, product, object); and **on the other hand** as a process received from the results, as social (subject-object) relationship for carrying out the given process.

According to the first position the essence "innovation" expands on a new product and service, the ways of their production, organizational, financial, scientific-technological and the novelties of other spheres; it also includes other products that support economy of expenses or such kinds of economic conditions [Lemerle P., 1994].

Followers of processional explanation discuss innovations as new inculcating way of processes of importantly modernized entrepreneurship [Harman A., 2000]. R. Johnson considers innovations as creating new in different firms' activities or perfecting old processes and products.

Herewith, in all above discussed cases innovation expresses new initiative and requires deep changes in compare with earlier directions of development.

#### 4.3. Innovations as main approaches of definition of the main category of innovative theory.

In foreign countries' practice the main approaches of the main category of innovative theory may be grouped in the following way:

Main approaches of the term "innovations" in foreign countries' researches.



Definition of the term "innovation"	Schumpeter	Lapierre	Witfield	Drucker	Knigh	Demerly	Johnson	Harman	Sakhto
Any change	+	+	+		+				
result						+			
process							+	+	+
means				+					

Source: Qoqiauri L., Qoqiauri N. 2015 Innovations. P.4.

Methodological research of the problems of innovations management, elaboration of supporting topics of practical requirements in categorical apparatus of this sphere condition scientists' great interest and actuality towards them.

Most scientists interested in the mentioned problems in former post- communist countries agree on one of them. Let's discuss some of their views.

- "Innovations, as purposeful changes deliberately input in reproducing process in order to form requirements of new society or satisfy the existed one better." (L Bliakhman);
- "Any kind of different technological, organizational, economical and managerial changes input in active practice of the given enterprise". ( A. Brewton);
- "Gathering novelties on stages of technologies, technique, mastering of their creation, diffusion, management."(A. Pregogine).
- **As a process** – "Complex process of creating, expending and using new practical means to satisfy people's requirements better" ( V.Lapine)
- "Creating process of new technological product and its extension in the whole economics, and in a long-term perspective it is principle source of welfare" (G .Keeperman).
- **As a result** –"A result of creativity which is directed to elaborate, create and spread a new competitive kind of production on production world market; also inculcation of new organizational forms and methods, new economic structures of economic market conditions and so on." ( G. Kiperman)
- "Getting an idea, practice or product- as novelties" (N. Moiseva, I. Anyskin")

As a result of the role and meaning of innovations, in the role of effective developing factor, economists think that innovation is a complicated system with the help of which ideas and inventions will become commercial reality (goods) (Muravyev). The latter is close to Drucker's opinion, namely, innovation is not only the aim of development but a means as well.

Besides sharp differences of varieties, forms and contents of the term "innovations" definition, we think that there are some priors of their creation.

It is interesting to mention one moment. Our specific interpretation of innovations category gives definite advantage and additional possibilities to researchers. As it is commonly known, Latin word "innovate"( means renew, improve) is the basis of the English word "innovation".

In Georgian language the meaning of this word is "innovation", "to create new", "novelty". So, in native economic researches three definitions are used instead of one and two of them have different meanings. The mentioned situation causes divarication of the main category of innovative theory. On the other hand, the very terminological differences give possibility to regulate the existed views. And it is the way to solve methodological problems, mechanism of regulation. **Novelty is the result of innovation business, "to create new" is the process of inculcating novelty in economy practice.** In addition, synonyms: "technique", "new technique," "new production," "scientific production" and so on are associated with the term innovations.

Practice shows that "innovation" and "to create new" are synonyms and in different situations are used to mean relevant processes and events. Herewith, a different idea is put in the notion "novelty". A lot of authors still use the synonyms of the given term - "to create new" and "novelty" while defining innovation as a result of creative process. Representatives of the first direction of scientific idea don't share such opinion (they understand innovation as any change). On the contrary,

they consider “innovation“ and “to create new” as synonyms and novelty- the result of these two. The latter position is rational as it specifies main categories of innovation theory.

Thus , let's sum up the above mentioned discussion . **Novelty is concrete result of inculcating new scientific idea.** It has a model form of technique, a kind of constructional material for producing some production and so on. So, it is different from the existed one and conditions growth of producing effectivity. Novelty can be presented as scientific, technical or other forms of documentation. Precisely, it is information that describes technological, informational, managerial or other processes and events of non-material character.

Novelty and creation of new is the result of innovation business which improves industrial basis and accordingly, supports the growth of social development level.

Thus, in local and foreign economic literature we come across different explanations of the notions “novelty”, to create new” and “innovation”.

Novelty of consumer character is an important mark of innovation, create new. Innovations are formed while using the results of scientific-researching and experimental-constructive works that is directed to perfect industrial process, economic, lawful and social relations in science, culture, education and other spheres of social activity, “creating new” is goods which can't be used without suitable knowledge, professional preparation and specialists being informed. The specific mark of these goods is ability of unlimited growth of income (multiplication). In this case creating new turns out to be as intellectual goods, invention, information, know-how and so on, which can be protected lawfully and be sold as many times as a consumer can be found.

Analyzing scientist-economists' different opinions of definitions about notions, innovation, creating new and novelties, we can make the following conclusion:

1. **Innovation** is “science –technique- industry”, the last creative result of a stage, which is objectivized in a created product and it has the highest consumer features in the given period of time;
2. **Novelty (novation)** - it is technological and organizational- managerial decision of tasks without time.

So, innovation should have social and practical recognition, i.e. it should be used in any sphere of human activity to get commercial profit.

One of the important conditions of carrying out innovations in events chain “science-technique- production” is investment of its every circle, i.e. carrying out operations related to monetary funds, carrying out investment projects that will support to get material profit by an enterprise (organization) during definite period of time.

In commercial practice it is common to differ the following types of such investments:

- Investments in physical actives;
- Investments in financial actives;
- Investments in non-material (invisible) actives. That is, as we call it, intellectual values. {Qoqiauri L., 2009}.

Industrial buildings and constructions are meant in physical actives, also any kinds of machines and equipment, technologies.

Financial(monetary) actives- is a right to get monetary sources from a physical and juridical people, e.g. deposits in a bank, bonds, shares, and so on.

Non- material (invisible)or intellectual actives mean values got by enterprises and organizations as a result of carrying out programs of re-preparing staff and qualification growth, technical decisions, creating and elaborating goods marks, industrial sources, buying in licenses.

Investments in securities are called portfolio investments and investments in physical actives are often called investments in real actives. So, investments are one of the most necessary conditions of maintaining innovative enterprise vitality.

#### 4.4 Main Characteristics of Innovations

Innovations are not spontaneous and elemental changes because innovations have the same character and always mean to get definite results. They should be oriented on definite, clear and accurate aim and should be carried out successively and systematically.

In other words, innovations are purposeful and planned transformations. They are always presented as a kind of some project and appear in large, extended form.

If we generalize these characteristics of innovations, we get its clear explanation. Innovation is purposeful and planned transformations, which quite quickly condition to create such configurations (included elements) that did not exist in its activity before. There are three main characteristics of innovation:

1. Directions (purposefulness, consequentiality and systematic nature).
2. Novelty (difference from early existed).
3. Radicalism (great importance and speed).

Nowadays a lot of people agree on the opinion that industrial subjects who subordinate their business on successful orientation. Simply, they are made to carry out innovations constantly. Herewith, in Drucker's opinion, "purposeful, systematical innovation should start with analysis of new possibilities" (Drucker, P F., 1998). They may appear to be inner and outer environment. If inner possibilities mean unexpected events, unsuitability, technological requirements, technical or basic changes, outer possibilities are created by social and intellectual environment, changes in thinking and new knowledge. But with formed limits innovation sources are very developed, also the question about what their nature is and how they form new possibilities of organizations is vague.

Searchers face various questions: what is the basis of innovations? How were they originated? How is the idea of novelty born which an enterprise should inculcate?

#### **4.5. Originality of Innovations.**

We can separate three main forms of innovations originality:

1. Technological- when novelty is experimental-constructive, engineering, social-organizational or direct result of other kinds of processes;
2. Functional- directly oriented on those wishes who want to become consumers of novelties (clients, partners, firm staff, etc)
3. Combined-which means creation of novelties with close collaboration with its potential consumers and the latter ones not only appreciate novelty but in fact participate in creating new ideas.

Technological originality of novelties means that it is formed on the basis of knowledge and operations, which have ability to solve any industrial, organizational or technical problem. In other words, some technological possibility is obvious and it will be found out later in what direction it can be used. Herewith, it is natural that practically, potential consumer's idea, opinions and preference will not be taken into consideration. It is not always profitable for an organization, but instead, when such novelty "finds" a real consumer, an organization has already found large market that enables to be firmly ahead of its competitors.

A clear example is creation of integral schemes. They have not been created on the basis of market requirements. Creators of complicated electronic systems faced a task: to connect effectively working equipment to transistors but it meant reduction of working quality of a system and reliability because of multiplicity of wirings when the use of silicon (germanium) was offered not only for transistors but for other components of electric system. It removed the topic about connecting transistors from agenda and electronic schemes turned out to be unified (integral), in spite of separating from market realities, these schemes were immediately used in the spheres that were far from the first used spheres and conditions to create numerous new branches.

And still, that has pure technological originality, cannot be understood by a customer or neglect it. It was not known in advance how it would suit a customer's requirement,

Differently from technological, functional novelty is formed in close interrelationship with those ones who are interested to use it. It comes from concrete requirements and appears to be a possibility to satisfy this requirement. In most cases the stimulus of creating such novelty is to solve specific problem that later spreads over new spheres of activity in general and standard way.

Functional approach is common for most successful firms but some of them including entrepreneurs of technically complicated workplace, don't do anything until they find a client who is ready to co-operate with the latter one in the sphere of carrying out experimental works. For example, American instrument-making corporation "Alen Bredly" experiments its produced robot technique not itself but in enterprises of those companies which are going to use it. Herewith, feedback support will be reached before its serial production. Sometimes it happens so that novelty is worked by influence of one of the leading client.

But in spite of eminent practical nature and comparatively fewer expenses, functional novelties are not of universal character. Pure functional attitudes towards innovations separates an enterprise from advanced edges of technological progress and when it reaches short-term effectivity in its business, it loses competitiveness in long-term perspective and limits possibilities of solving created problems (technical arsenal).

In the last decade of the last century 60 % were expunged from the list of 500 best firms of the journal "Fortune". It is somehow similar to extinct process of dinosaurs. The strongest leading companies unnaturally quickly gave in their positions in competitive battle and these positions were held by so-called "predators" who appeared in the world from nearly "nowhere".

What really happened?

Nothing special. Old leaders were mainly oriented on competitiveness. They had great power and influence but reacted more upon other sellers' actions than played their own part. Their vision stopped at horizon, they couldn't see anything beyond it, but good knowledge of existed markets can't make compensation of vague vision about creating novelties but in dynamic, turbulent universe prediction of new possibility is more important than using the existed one. So, former leaders could not resist future exam. While fighting with competitors they forgot those clients who did not want to get pleasure from quality service of old production and searched new ones. "Circle" competitiveness (in unchangeable delivery conditions) tied them to "imitative" market where sellers resemble with each other, "copy" goods and only those who have ability to refuse "circle" competitiveness can advance and leave competitors behind business.

As W. Kim and R. Mauborgne fairly noted \_ "In the universe where industrial conditions don't define corporative welfare any more, as companies can overcome these conditions by using systematic usage of innovations, a firm doesn't have to fight for its own share for specific requirement – it can create new requirement" [Kim W.c., Mauborgne R., 1999]. For such innovative enterprise it is easily possible to be in the head of rating. It refers even to those firms which fought for survival in the past and had nearly no chance to succeed. That's why pure functional novelties are maybe more viable in compare with technological ones especially in such epoch in which in economic subject's life changes happen in colossal speed and reaction on them is impossible without orientation on knowledge and engineering treatment.

It is not surprising that combined approach towards innovations are becoming more extended. It means that technological idea of novelty which we find perspective doesn't subordinate to treatment at once, but it first opposes to potential beneficiaries' demands, in other words, until it turns into concrete model of novelty to inform target audience or some part of it and join in finding main parameters of the model.

There is no problem if novelty will be created together with active consumers in process. In this case in working environment those indicators will be formed which novelty should answer.

However, some difficulty appears in this situation. The mentioned consumers' advantages may not fully match the demands of the remaining part of target "audience", but if their interaction conditions are not unique, novelty may still spread over the whole target audience, over the whole segment of consumers by specific modification of indications.

But what if there are not such partners together with whom novelty is created? How can we construct a model based on perspective technological idea? Especially when possible consumers cannot always realize in advance what novelties can bring to them. Novelty creating idea is not always direct answer to a consumer's demand.

In order to model this novelty it is necessary to construct the line (chain, and sometimes quite long) which connects it to a consumer's demand. Herewith, a consumer doesn't often have the beginning requirement which is connected to the first idea of creating novelty. It becomes necessary to reveal hidden demands or if necessary, to challenge them artificially, i.e. we should make potential consumers have a willing on a new product with us. While establishing feedback with them technologically or materially, it may happen to define meanings of main parameters of novelty model and then to work out technological idea so that the received result to be put in the frames of these meanings.

## SOURCES OF NOVELTIES

No matter what the originality of novelties is –technological, fundamental or combined- They should be taken from somewhere; obviously, main supporters of new ideas are subdivisions of private scientific-research and experimental-constructive works existed in an enterprise. Firstly, only large enterprises have these subdivisions. Smaller enterprises can't spend important sources on independent researches and treatment, and second, even strong and rich firms have to limit their scientific researches with themes, creative staff and working resources, but their interest about innovations go

beyond the frames of the given theme. So, naturally it becomes necessary to search additional sources of novelties which will be able to compensate limit and fault of inner searching programs.

Although in the modern world new and perspective information is not accessible for everyone. In most cases it is aimed not for free circulation but is discussed as the biggest advantage of success in the battle with competitors and in order to use it, it is necessary to strengthen your own rights by means of organizational and financial events.

Comparatively easier and cheaper way to access novelties is to place orders on them in offices or high schools. For example, even in the 70-80s of the last century solid and long-term agreement of research and treatment were made with sponsors in return for receiving practically oriented theoretical results. For example, a ten –year long agreement between chemistry firm “ Monsanto” and Harvard medical school considered subsidy of 23 million dollars and later, between Massachusetts Technological Institute and corporation “Eksons” considered 8 million dollars funding in the same term.

Besides, special organizations have been set up since 80s of the last century which aim to unit willing of other business organizations to support active research programs. For example, under the aegis of American semi-conductor industrial association, a cooperation was set up which chose for its business place such companies as “Sygnetics”, “Fairchild”, “Motorola,” etc. and supported works related to integral schemes.

The mentioned organization carried out not only choice and funding of perspective searching projects but also it spread the “received” scientific-technical information among sponsor corporations.

Creating joint centers is a higher stage of scientific organizations integration with innovative organizations which are purposeful to solve industrially oriented fundamental researches (tasks).

Such centers get great support from the government. Herewith not only big but also middle and small businesses join them in searching innovations and in this way they keep up with scientific-technical progress. It gives financial stability to joint centers and gives them a chance to enlarge their sizes.

Massachusetts Technological institute with participation of USA national scientific fund set up Polymer searches center, which studies opposite features of polyester hit. After five years subsidies from business organization reached 500 000 dollars per year. After this it was possible to reject financial support from scientific national fund. Searches received from interested corporations were quite enough to carry out arranged works.

Sometimes initiation comes from the very scientific department. In Stanford University integral systems center was funded independently the function of which was creation of “vertical Structures” – beginning from components up to equipment. Immediately 17 corporations were ready to fund it. They gave 250 000 dollars to the center fund during the first three years and at the same time funded Pentagon searching projects of applied character by 8 million dollars.

But the most interesting fact is that business organizations were interested not only in applied searches and experimental-constructive works but also fundamental knowledge and activity take part in searching ways and means of their commercialization. Usually scientific departments with the help of different scientific research fund create special corporations which are determined to put commercial potential of their discoveries in leading spheres (e.g. in biotechnologies, microeconomics). Then those big companies join the corporation which are interested in future results (namely by purchasing shares). In this way they support to develop theoretical researches and in this way contribute in practical usage of fundamental researches.

## CONCLUSION

We know from the world experience that in the twentieth century only those countries reached high results whose governments carried out purposeful long-term innovation politics. National economics experience rising and falling periods. But the last growth during decades may be the result of investments in scientific0technical knowledge. In those countries where only rhetorical speeches were made about progress, backwardness was growing (many countries of Africa) among them. Because of high rate of development 21<sup>st</sup> century will be comparatively stricter to retarded countries than in the 20<sup>th</sup> century. Everyone will have less time to correct mistakes.

Complex analysis of elaborating and realization mechanisms of state innovation politics shows that among the elements of this mechanism on state level main attention is paid to three elements- management, financial support and innovative law, organizational element is considered to be comparatively minor.

Nowadays when Georgian economics is in such difficult situation, it's very important to advance and develop innovation sphere. This potential really exists in Georgia and developed countries already use it well and quite active "minds transfer" to foreign countries are taking place.

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## MAIN TENDENCIES OF THE FURTHER DEVELOPMENT OF FINANCIAL MARKETS CRISIS

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### ABSTRACT

In the article we tried to study new innovative tendencies in the process of financial markets research. In this way we somehow continued our scientific research in the sphere of financial and investments markets. The article highlights reforms in financial system and foreconditions of financial economics creation. In addition, we couldn't neglect financial crisis of 2008 and its further research of the reasons and analysis of sharp increase in currency market importance of funding markets dynamic. The article analysis main forces of financial markets, i. e. liquidity, financial risks, fund indicators and others, together with tendencies of financial markets development.

The article explains defining factors of goods market dynamics in a different way, namely, it has studied increasing role of banks and financial mediators in currency market, the influence of changes of their structure on activation of financial investors' activity, on increase of their influential spheres, on increase of correlation between the dynamics of raw materials on the world financial markets and the dollar dynamic.

As American dollar, Japanese Yen and Swiss frank mainly played the role of „Protective” activities during the financial crisis, the work uses the facts of American reserve fund, European central bank and financial mediators' (non – bank organizations) factual materials.

**Keywords:** Financial Market, Financial Crisis, Liquidity, Funding Market, Gold currency Reserves, Private Investors, State Bonds, International Currency Fund, Capital Exportation, Corelation.

### 1. INTRODUCTION

During the last decades financial markets undertook a lot of changes. Scientific – technological innovative processes, banking and globalization of trading spheres conditioned reduction of state organs influence on economic processes. Activation of competitiveness financial markets with the world links.

Alternation of financial markets architecture made a market more difficult; despite a range of important positive changes leading financial institutes came across new difficulties in many countries. At one of conferences Alan Greenspan, a former manager of the USA federal reserve system, stated that „modern financial markets hit national economics from a new and unexpected side very quickly, even immediately.” In his opinion central banks of all countries should elaborate new ways and methods of manoeuvre of financial risks and liquidity valuation of the world financial system.

The necessity of financial markets existence, modern tendencies of their development, quality of global financial crisis influence on financial markets, also financial institutes and instruments, price – creating mechanism and kinds of operations on investments market and in general, research problems of fulfilling mechanisms of investments in marketing economics, securities market, its fundamental, technical and graphical analysis is my long scientific research object.

At present, in this article I tried to present new innovative processes in financial markets. Namely we paid attention to creation of financial economics and changes of financial mediators' role; In this way we have created basis for financial system reformation.

### 2. Review of the Literature.

As we mentioned in the introduction, scientific study of financial and investing markets is a long – period research subject and actual problem.

1. In the research of modern tendencies of financial markets development we based on scientist – economists **I. Brigham and M. Erhardt's** well – known work „Financial Management” (2005). (tenth edition); we mainly used materials of financial sphere – markets, organizations and parentage ranges. (p. 226 – 276).

2. In general, a classical work of financial and securities markets functioning is **U. Sharp., G. Alexnader and J. V. Baileys's** investments (2000). It gives periodically created and constantly developing markets. Together with markets classification and development it completely gives the USA's main fund markets. (p. 45 – 94).

3. **Qoqiauri L. Financial Market. Fundamental and Technical Analysis of Security Market (2013).** The article present the influence of global financial crisis on financial markets along with statement of necessity of financial markets existence; It highlights investments market, as a creator of financial market – its main point, functioning, study of structure, its

functioning mechanisms, characteristics of main financial instruments. It shows broader problems of securities market creation, functioning, analysis, management and development.

The work highlights discussing points of market's fundamental, technical, graphical analysis and main regulations of technical analysis of securities accepted in the world market practice.

**4. Qoqiauri L., Qoqiauri N. (2018). Financial Markets.** The article is a kind of concluded work of existing theoretical and practical topics about modern financial markets where it completely presents: **Financial Surroundings: Markets, Institutions and Percentage Rates; Financial Institutions, Their Kinds and Functions; Financial Instruments; Essence of the Investment Market and a Mechanism of its Functioning; A Mechanism of Price Formation and Kinds of Operations at an Investment Market; A Mechanism of Realizing Investment Activities in the Market Economy; Security Market and its Participants; Securities and Their Kinds; Pricing at the Security Market; Stock Portfolio; Portfolio Theory; Classical and New Fundamental Analyzing.**

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### 3. Main Part

#### 3.1. Main Tendencies of the Further Development of Financial Markets Crisis.

During recent years following the Crisis of financial market in 2008, sufficient materials appeared for the analysis of the processes, which gave rise to the crisis and opinion on how the architecture of global financial market was changed. Moreover, financial market, different from the real economy was significantly recovered and they feel themselves quite well. Exchange indexes of many countries mostly played the deduction, which they suffered in summer and autumn of 2008. Of course, this situation differs for different countries and indexes, however, in general, financial market is characterised with optimistic expectations. However, strong increase of the market was mostly based on the real figures, certifying sustainable rise of global economy, and by expecting new wave of quantitative mitigation from the side of Federal Reserve System (FRS), allowing global exchange markets to receive "drug" in the form of following portion of liquidity. Decision of FRS in November 2009 on procurement of long-term treasury bonds for 600 billion, appeared to a signal of the rally for global exchange and commodity markets.

What motivates financial markets during last years? As multiple researchers state – it is liquidity and only liquidity. It prevents the markets to crash upon issuance of negative macroeconomic data – the markets are redeemed. And on the contrary, in case of occurrence of additional positive news with the "field of economic fights", it is liquidity that motivates markets for new heights.

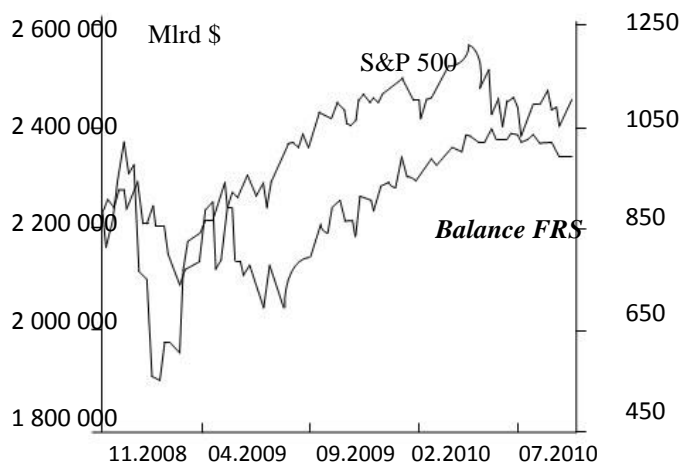
It is interesting that some researchers reject influence of liquidity of the financial markets. In the recent researches R. Darius and S. Radde [Darius, Radde, 2010] try to evaluate how really the liquidity manages financial and commodity markets. Hence, they give rise to unexpected result regarding the fact that during last decade, global liquidity influenced not only the commodity and financial risks (according to the authors, this influence is insignificant), but, in the first place, on the US Real Estate market. The authors relate significant growth of prices on US market of real estate with the increase of global liquidity. It shall be noted that the authors consider global liquidity. They allocate offering money in the countries of G7 and growth of the volumes of gold and foreign currency reserves to the latter.

How can we determine dynamics of the factors affecting liquidity? One of such factors includes increasing FRS tariffs. Between the dynamics of FRS assets and that of S&P index reflecting 90% of capitalization of US exchange market, dependence is clearly observed. These ties are clearly observed on the Figure 1, taken from the website of investment company FINAM.

This is characteristic that, during relatively reduction of assets FRS at the US exchange market, lop-sidedness was created. The Bulls are unable to raise markets and the Bears have no grounds for depression of markets down – existence of liquidity is supports purchasers.

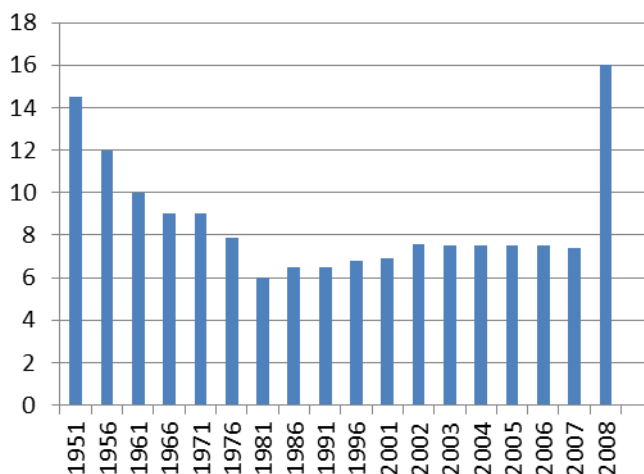
Current growth of assets of FRS is of unprecedented nature, as in absolute, so – relative scales. This rise has several peculiarities. In the first place, it is related with the absolute size of assets. On maximum, these assets reached almost 2.6 billion US Dollars. On the other hand, relative share of assets of FRS in relation with GDP of USA reached maximum values with recession of 1930-s in US economy. In the third place, structure of the assets is strongly changed. If before the Crisis assets basically were represented with the treasury bonds, today, larger share in the assets today is represented by the bonds of federal agencies, even commercial bills, which speaks of the absolute deterioration of the quality of FRS assets.





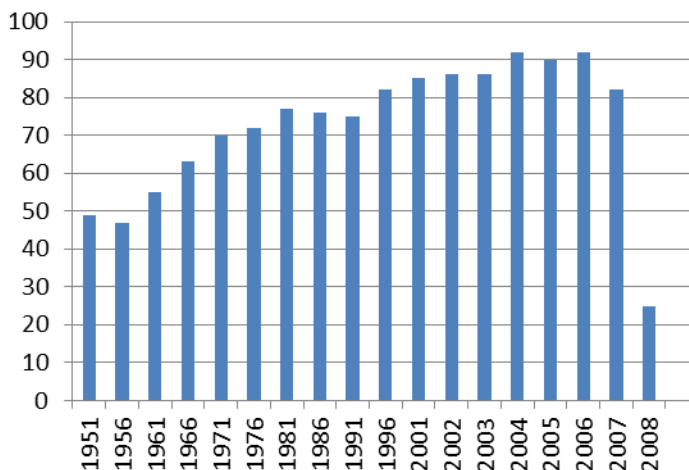
**Figure 1. Index S&P and Balance of FRS Billion Dollars – S&P 500 – Balance FRS**

The second tour of quantitative mitigation commenced in autumn of 2010 foresaw procurement of long-term treasury bonds, in other words, raising quality of portfolio of Federal Reserve System. In the first tour of qualitative mitigation, orientation of FRS on procurement of securities of federal agencies was directed towards balancing of profitableness per each sectors of the market of credit liabilities of USA and activation of mortgage market. These activities were focused on decreasing of profitableness on bills, related with hypothecation, in order to mitigate funding opportunities for banks, issuing mortgage credits. This, in its turn, gave rise to the decreasing of rates on mortgage credits for households.



**Figure 2. Correlation of total assets of FRS against GDP. %. (Source: Stella, 2009).**

Currently, activities of US regulator oriented towards changing the yield of return downward, on “dumping” additional amount of liquidity and “pushing out” investors in into the risky assets.



**Figure 3. Share of treasury bonds and the bonds of federal agencies in total assets of FRS, %.(Source: Stella, 2009).**

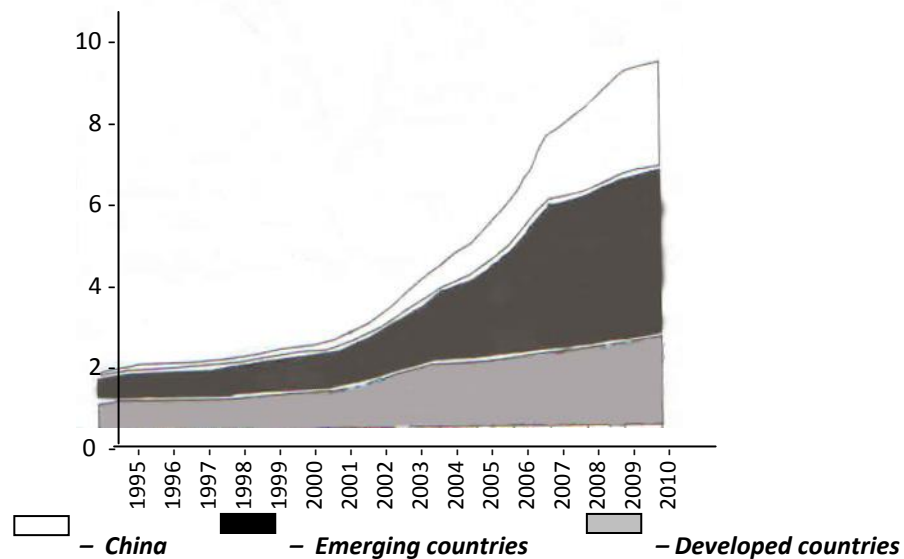
Moreover, it is evident that orientation exclusively on the liquidity of the sources from curing financial crisis is characterized with negative outcomes. Example of Japanese mystery, which turned into the lost decade, speak of the danger of long-term recession, getting of US economy into the “liquidity trap”, which will give rise to the period of recession at the financial markets. Another threat is related with the increasing of the sizes of state debt, increasing face value of the market of state bonds, which will give rise to the fluctuations at the markets. This is spoken by the situation at the market of state debt of peripheral European states. Of course, the situation at US market is strongly different from Japanese one, by the fact that US market is more flexible, and market structures occupy larger share on it. This allows it rely on more rapid curing of the economy, though dangers are clear. Moreover, sooner or later, increasing liquidity shall give rise to the inflation growth. And though this does not take place in US economy (where, on the contrary, deflation moods prevail), in different countries (for example, in China), threat of growth of inflation proves to be theoretical. This makes Central Bank of China to take real steps on restraining credit activities of the banks.

### 3.2. Ostrich Effect: Dollar and Crisis.

During the period after the Crisis of 2008, the value of currency market has strongly been increased for the dynamics of exchange markets. This is the dynamics of currency rates, that became determinant for the dynamics of increasing exchange indicators. Under the conditions of the crisis, the role of “protecting” assets was played by three currencies – US Dollar, Japanese Yen and CHF Franc. Each of them have own background.

Investors' interest in US Dollar was caused by several factors. In the first place, US Dollar remains to be reserve currency. Notwithstanding entire critics of FRS policy from the side of multiple market participants, monetary regulators of multiple countries, in case of occurrence of crisis phenomenon at the market, the investors acquire US Dollars. As earlier, US Dollar remains to be main reserve currency (about 60%) and basic currency at FOREX market (according to the Bank of International Settlements, 84.9% of entire turnover of the market fall within US Dollar with the volume of 4 billion US Dollars on daily basis, and 39.1% - on Euro). For example, at the end of 1980s, share of gold in Forex reserves fell to the marking below 50%, and the role of US Dollar was claimed by other currencies (namely Japanese Yen). What is the share of Yen today? It is insignificant. During last period, recovery of US Dollar, as reserve currency, took place at the global market. And though during passed years share of US Dollar was decreased in total volume of Forex reserves, it still remains to be the currency No. 1 in the total structure of Forex reserves of the world.

Herewith, it shall be understood that the volumes of these reserves significantly increasing during last years (according to the first half of 2010, they reached the marking of 8 billion US Dollars) (Figure 4.), make it impossible to perform their rapid restructuring in favour of another currency, moreover when there is no currency being able to claim the role of global reserve currency in the world.



**Figure 4. Volume of FOREX reserves, Billion US Dollars**  
 China – Emerging countries – Developed countries  
 (Source: The Economist. 2010. November 4).

Herewith, relation of the dynamics of exchange rate of US Dollar against inflow of sources at the market of US treasury bonds has been strengthened. R McCauley and P. McGuire [McCauley, McGuire, 2009] counted that maximum volume of acquisition of US treasury bonds from the side of non-residents, fell within the 3<sup>rd</sup> and the 4<sup>th</sup> quarters of 2008 (Table 1). Out of 363 billion US Dollars, falling within US equity market, 323 billion fell within the market of treasury bonds. Herewith, discounted bonds were subject to maximum demand. Demand on coupon bonds was much lower. It is no coincidence that during crisis period at the market of state bonds of USA anomaly occurred, which was related with the negative yield at the market of discount treasury bonds of USA. Negative balance on the acquisition was maintained at the market of the agencies' bonds, corporate bonds and shares. At the same time, during this period significant deduction of official shares of USA took place abroad. This gave rise to the additional demands for US Dollars from the side of investors, seeking "safe" haven.

**Table 1**

**Net Sale and Purchase of Treasury Bonds, Billion US Dollars**

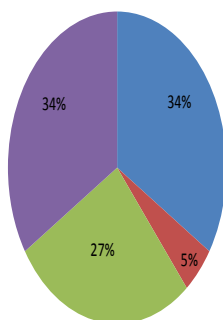
Type of securities	Before crisis			
	2005 – 2 <sup>nd</sup> quarter of 2007	3 <sup>rd</sup> quarter of 2007 – 2 <sup>nd</sup> quarter of 2008	3 <sup>rd</sup> quarter of 2008 – 4 <sup>th</sup> quarter of 2008	1 <sup>st</sup> quarter of 2009 – 2 <sup>nd</sup> quarter of 2009
Private investors	368.8	-36.0	358.4	-244.6
Acquisition by foreigners	765.0	189.9	60.0	12.7
Treasury securities	-19.7	73.2	323.1	62.0
Coupon	-22.9	-10.3	49.9	73.5
Discount	2.1	83.5	273.0	-11.8

<b>Securities agencies</b>	<b>of</b>	<b>20.9</b>	<b>-107.4</b>	<b>-183.0</b>	<b>-98.8</b>
<b>Corporate bonds</b>		<b>572.8</b>	<b>82.5</b>	<b>-78.5</b>	<b>-34.3</b>
<b>Shares</b>		<b>191.0</b>	<b>141.6</b>	<b>-1.6</b>	<b>83.6</b>
<b>Acquisition by US investors</b>		<b>-396.1</b>	<b>-225.9</b>	<b>298.4</b>	<b>-257.2</b>
<b>of foreign bonds</b>		<b>-247.7</b>	<b>-113.3</b>	<b>200.7</b>	<b>-179.1</b>
<b>of foreign shares</b>		<b>-148.5</b>	<b>-112.6</b>	<b>97.7</b>	<b>-78.1</b>
<b>Official foreign assets in USA</b>		<b>494.7</b>	<b>614.3</b>	<b>199.1</b>	<b>391.8</b>
<b>Treasury bonds</b>		<b>194.2</b>	<b>172.1</b>	<b>103.9</b>	<b>275.9</b>
<b>Treasury bills</b>		<b>-27.2</b>	<b>66.4</b>	<b>486.9</b>	<b>207.7</b>
<b>Official US shares abroad</b>		<b>5.0</b>	<b>-62.1</b>	<b>-1046.7</b>	<b>875.9</b>

(Source: Qoqiauri L. (2013).

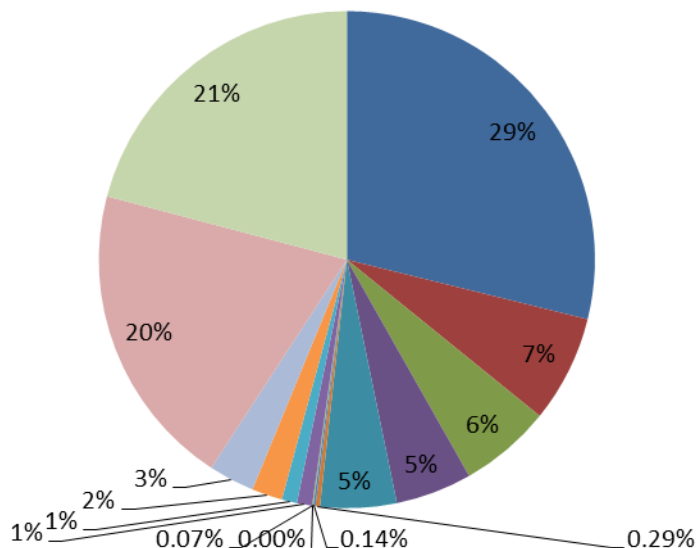
Still, other markets of state bonds are unable to play the alternative role. However, markets of state bonds in Europe and Japan are comparable to US market per book value. Moreover, from pure quantitative point of view, Japanese and European markets stand before US market of state bonds (Figure 5).

Herewith, these markets are not comparable per liquidity. For example, at the main bond market of Europe – the market of German state bonds – monthly volume of trades amounted 500 billion Euros, while the volume in the USA in the amount of 500 billion US Dollars represent the average annual value. Before crisis, the markets of Europe and Japan gave way to the US state bonds. Moreover, this is characteristic for Japanese market, where rate of return per 30-year bonds did not overcome 2% (compared with 5% on US treasury bonds). This gave rise to the fact that there almost were no foreign investors at the Japanese market of state bonds. If at the developed markets share of foreign investors are within 30-70%, at the Japanese market, this share during last year did not exceed 5%. Due to this, we do not need to speak about Japanese alternative. Besides this, taking into account high relations of the sized of state debt in relation with GDP, the Japanese regulator is not interested in rising volatility at the internal market. Inflow of foreign investors may give rise to the increasing rate of return at this market, which is related with the serious problems of debt service.



**Figure 5. Markets of state bonds (% in book value against total price of four largest equity market) Japan 34% EU zone 34% - The United Kingdom 5% - USA 27%. (Source: data of central European bank).**

As for the European bond market, though it is comparative to US market per its book value, though events of 2010-2011 showed that this market is extremely segmented. Great amount of state bonds of European zone are treated on it, however these are the bonds with different credit history, different investment rating and different liquidity (Figure 6).



**Figure 6. Market of state bonds of European zone per book value (in %, against total value) per the issuer-states. Germany 21% - Italy 29% - France 20% - Spain 7% - Austria 3% - Belgium 6% - Portugal 2% - Finland 1% - the Netherlands 5% - Ireland 1% - Greece 5% - Malta 0.07% - Luxemburg 0.002% - Slovenia 0.14% - Cyprus 0.29% (Source: Data of European Central Bank).**

Events of 2011, showed the thread of segmentation of bond market. Herewith, domains on the bonds of separate states in regards with the German state bonds (representing orienteer for the yield in European zone) reached critical values. In 2010 and 2011, the market of state bonds of “peripheral” Europe is fluctuating. The problems are occurred in Greece, Portugal, Ireland, and in autumn of 2011, Spain, Italy and France fell under suspicion. Herewith, the issue of probability of bankruptcy per such bonds and the entity to be responsible (the state itself, European Union (though extremely abstractly) or Germany, as the strongest country – the locomotive of European integration) is arisen. Notwithstanding the fact that special anti-crisis fund has been established and that European states actively perform negotiations about the mechanism of overcoming such situations, all these do not rise attractiveness of European bond market for long-term investors at all.

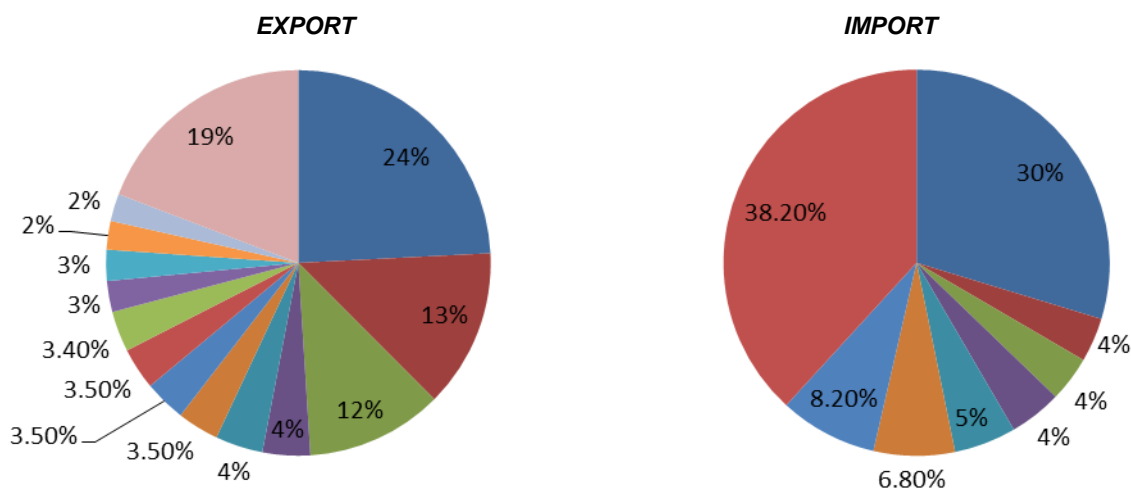
Until today, European financial market remains segmented. Still European zone does not issue European state bonds, thus restricting the opportunity for using this market as “reliability anchor” during financial fluctuations.

Moreover, at the same time, under the conditions of low interest rates and high level of liquidity at the European market, great volume of short-term portfolio investments are made from the side of foreign investors. This is proved by the statistics of European Central Bank as well. At the beginning of autumn of 2010, European equity market fell within 1 billion US Dollars. This is speculated capital. Until Europe in general and European zone (particularly) fails to create adopted rules of issuance, turnover and possible (or impossible) default at the bond market of the states of European zone, European market can compete to the market of US state bonds.

The bond markets of international financial institutes are unable to compete with the US market of treasury bonds as well. It does not exist. Separate small issues of securities do not change general image. Markets of securities of international financial institutes (IMF, and World Bank) have not been created. Attempt for creation of alternative currency in the form of Special Drawing Rights (SDR) did not foresee borrowings of issuance of securities, nominated in this currency. Besides this, issuance of the bonds by the international financial institutes, legislative moments occur. As in case of issuance of “unified” European bonds gives rise to the emerging questions, who will be the issuer, who will be responsible for the liabilities per these securities and how (which assets) they are guaranteed.

It shall be noted that direction of the flows per equity accounts, as before, so after the crisis, is not changed. This is proven by the statistics of International Monetary Fund. The countries with the net surplus of trade balance and emerging countries remain to be the largest exporters of equity. Particularly, Russia is at the 5<sup>th</sup> place of the listing. Conversely, the largest importer of capital worldwide is USA (Figure 7). The main inflow of foreign capital falls within this country. Of course, it shall be noted that these data often depend on the largest transactions at the market of merger and acquisition, which may essentially change the situation with the cross-border overflow of capital. However, in general balance between the exporters and importers are still maintained.

Besides this, significantly increased correlation of the dynamics of monetary and exchange markets during the Crisis period, may be explained with the fact that before autumn of 2008, significant part of the sources for procurement of foreign assets fell within US market of institutional investors. According to FRS, US investors invested about 5 billion US Dollars (according to the accumulated result) into the market of foreign shares as of September 2008. Closing positions by US investors at the global market gave rise to the sharp fall of quotation at the exchange and commodity market and gave rise to the quotation of US Dollar, as it foresaw repatriation of profit, which automatically gave rise to the escape to US Dollar.



**Figure 7. Capital share in countries export and import**  
(Source: Data of European Central Bank).

Dependence of market and the operations *carry trade*, anticipating borrowing in low-return currencies and investments in high-return currencies (for example, in Japanese Yen) has been significantly increased and they were placed in the high-profitable currencies (US Dollar, Pound Sterling, New Zealand Dollar). Herewith, during recent period, Japanese industries started active participation in the operations *carry trade* at the Japanese market. They invested their savings (these are the most (these are the highest savings of industries in the world – 14 billion US Dollars) into foreign currencies, guaranteeing them at the market of derivatives from sharp increase of Yen, against other currencies. Under the conditions of the crisis, closing of positions of *carry trade* took place. This inevitably strengthened the demand from the side of the participants of global market on US Dollar and gave rise to its rise.

It is interesting fact that before falling of global financial markets, repatriation of return had commenced at the Japanese market, which was related with the commenced process of decreasing interest rates, making operations *carry trade* ineffective. In its turn, this gave rise to the strengthening Yen against other currencies and initiated fall of Japanese exchange market. By the way, correlation between dynamics of the correlation between US Dollar/Yen and the dynamics of exchange market are identified clearer at the Japanese exchange market, then at other exchange markets. This is greatly related with the fact that significant part of issuers are presented by the exporters, and their financial position is significantly depends on the competitive ability of national currency. In the event of significant deterioration of strengthening of their financial position, giving rise to the sharp deduction of Japanese exchange market. However, Japanese exchange market started deduction much earlier. Commenced repatriation of the return made investments in Japanese shares uninterested.

Herewith, under the conditions of sharp deduction of interest rates turn of cash flows took place – many foreign financial investors, attracted by low interest rates in USA, actively started operations at US market and investing at the developed and emerging markets. Many experts even speak about new phenomenon at the market *carry trade*, when US Dollar became main source of funding. One of the reasons for rapid recovery of global exchange markets became “Escaping from US Dollar”, which replaced “Escape from Risk”, characterising crisis times.

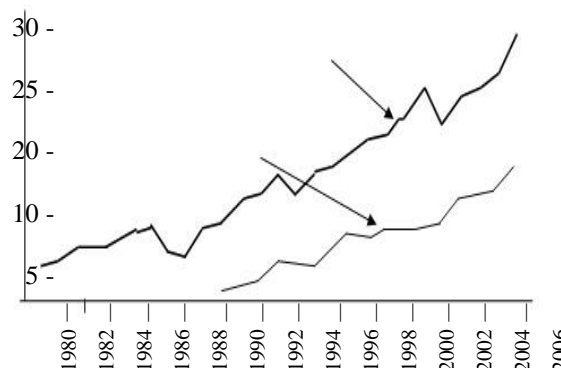
Sharply increased demand on US Dollar during crisis may be related with the closing of credit positions. Significant part of non-American banks before crisis, made borrowings in US Dollar. Started fall of national currency, and decreasing leverage, gave rise to the reverse reaction of the markets – the banks were to close actively their currency positions.

Presented analysis show that, due to several reasons, currently US Dollar keeps playing the role of the most reliable asset, the investors are hiding behind in case of danger. Surprisingly, this take place even in the case, when danger comes from US economy. In this case, actions of the investors look like ostrich, hiding head under the sand when frightened. Such conduct may hardly be named rational, though it has one logic explanation. Until finding alternative to US market of treasury bonds per liquidity, reliability and availability at the global equity market, the situation *déjà-vu* will take place every time, as soon as the global financial system faces following crisis.

### 3.3. Commodity Market: What Determines the Dynamics – Fundamental Factors or Demand from the Side of Financial Investors?

Another peculiarity includes strongly increased role of non-banking organization at the currency market, which may include pension, investment, hedge-funds, sovereign funds and other institutional investors. Demand from the side of these institutes is often of conjunctive nature and is related with the general situation at the market.

Calculations, performed by T. Adrian and Kh. Shin [Adrian, Shin, 2008] (Figure 8), evidence the fact that the share of financial (nonbanking) intermediaries in relation with the banking assets, have been significantly increased during last 30 years.



**Figure 8. Share of financial assets of financial intermediaries (nonbanking organizations) in regards with the bank assets, %. Brokers and dealers at the security market – Hedge-funds**

However, authors of the article did not take into account the assets of the largest institutional investors at US market. Before crisis, in 2008, the assets of pension funds amounted 16 billion US Dollars, assets of investment funds - 12 billion US Dollars, while bank assets in the USA amounted "totally" 11 billion US Dollars.

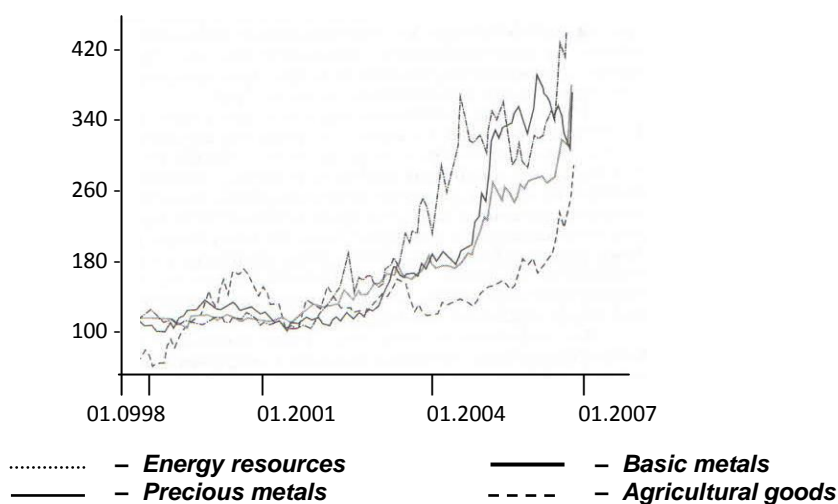
Changing the structure of financial intermediaries gave rise to the increase of demand from the side of financial investors at the market during last decade, which was expressed in increasing the share of speculators and reducing the share of hedgers at the emerging market. It is noteworthy that even in USA opinions appear regarding the necessity for reducing influence of financial investors on the dynamics of commodity futures, restricting opportunities for carrying out operations by them. Leaving evaluation of purposefulness of such restrictions aside (and we consider them senseless and harmful, affecting comparativeness of pricing at the market), occurrence of such opinions itself speaks of the changing of the structure of investors. However, in any case, we may conclude that influence of financial factors on the determination of the price of commodity assets became essentially higher.

Several recent surveys reject significant influence of financial investors on the pricing of commodity assets. For example, survey of H. Scott and D. Sanders [Scott, Sanders, 2010], dedicated to the evaluation of the influence of the role of index funds in pricing of futures at the agricultural goods, did not confirm existence of ties between the dynamics of agricultural futures and inflows (outflows) of resources from the side of indexed funds in these dividends.

Moreover, it shall be recognised that only the action of fundamental factors, it is difficult to explain growth of commodity assets. At the global financial market, correlation between the dynamics of commodity assets and the dynamics of the exchange rate of US Dollar is strengthened.

Moreover, it has to recognize that only action of fundamental factors, it is very difficult to explain growth of commodity assets. At the global financial market, correlation between the dynamics of commodity assets and the dynamics of exchange rate of US Dollar is being increased. In many ways, the dynamics of commodity market depends on the dynamics of currency before the Crisis in 2004-2008. A balloon started blowing at the commodity market. Specialists from International Settlement Bank [Moanski, Health, 2007], they speak about increasing correlation at the market of commodity assets. Therewith, it can be seen in the Figure 9, presented in their work, that commodity assets increased by minimum 2 times from 1998 till 2007.

Growth of commodity assets had fundamental reasons. For example, growth of prices at four metals and energy carriers was explained with the high rates of growth of global economy and especially growth of demand from the side of emerging markets. It was emphasized that this growth was related with the fact that capital intensity and energy intensity of the emerging economies (especially of Chinese one) is a bit higher, than in developed countries.

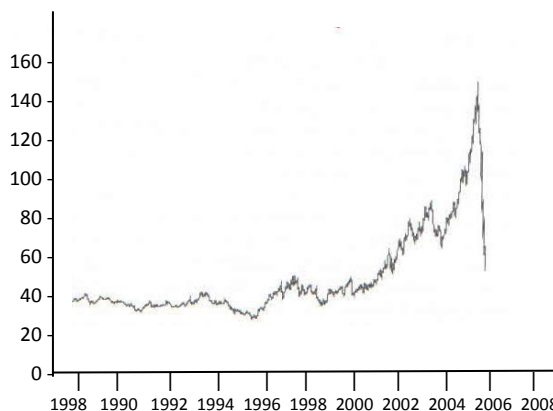


**Figure 9. Growth of commodity assets from 1998 through 2007.**



Demand on agricultural products is related with the fact that in the emerging countries share of middle class has significantly been increased, which represents demand on more qualitative and calorized meal. During recent years, growth of this demand was not accompanied with the increase of respective offer. Moreover, in many developed countries, absolute reduction of areas for agricultural cultures took place. In case of increasing demand on agricultural products should give rise to the sharp rise of demand on products, which took place immediately before the crisis.

However, besides fundamental preconditions in the growth of demand at the commodity assets, significant share falls within the financial constituent. In this regard, the oil market is the most remarkable. No fundamental factor can explain rise of futures on oil from 80 to 147 and further fall to 30 (Figure 10).



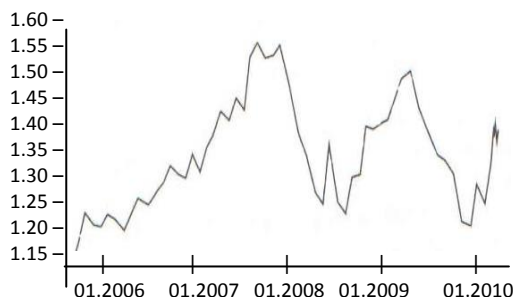
**Figure 10. Dynamics of oil prices. (Source: Bloomberg agency data).**

It is evident that speculative balloon was formed at the market at the background of decoupling expectation, at the background of forecasted deviation in the industrial dynamics of developed and emerging markets. This made investors search for secure assets, which is considered to be commodity market. Herewith, market of oil futures in view of liquidity attracted investors more than other commodity assets. In the beginning of 2008, many hedge-funds used arbitrage schemes, using short trades for the shares of financial sector and purchasing securities of oil companies. This strategy was based on the assumption on potential growth of prices on energy carriers and decreasing financial market under the conditions of mortgage crisis.

Under the conditions of the crisis and sharp fall of all markets, oil appeared similar to other assets. Schedule of oil proves this (see the Figure 10).

Herewith, commodity assets were being increased and fell in the opposing direction compared with the dynamics of US Dollar. Impairment of US Dollar pushed commodity assets forward. Under the conditions of the crisis, falling interest of investors in risky assets and escaping in the quality gave rise to the growth of US Dollar exchange rate. Strengthening exchange rate of US Dollar and “Escaping to Quality” gave rise to sharp fall of price on all commodities and exchange assets. Herewith, restoration of financial markets in the beginning of 2009, in particular way is explained with the recovery of the investors’ interests in commodity market at the background of impairment of US Dollar (Figure 11). Further expectation of mitigation of quantitative figure foresaw strengthening of information moods and growth of demand among investors in assets, being capable to protect from inflation. These traditionally include commodity assets.

S.G. Cecchetti and R. Moessner carry out researches on the subject of how the acceleration of the price growth at the commodity assets (energy carriers, metals and food products) influenced on the growth of prices in the most of the countries [Cecchetti, Moessner, 2008]. As a result, the authors make conclusions that no sustainable dependence (at least, for 10-year period) is being observed. In other words, significant increasing in prices on commodity assets during last 10 years did not bring rise to the significant acceleration of inflation in the developed and emerging countries (including insignificant exceptions). The indicators of the inflation was mostly influenced by the “product” inflation; however, this influence was not insignificant. Moreover for the most investors the commodity assets under the conditions of expected growth of inflation and low interest rates (this latter is much more important) are considered as asset, with the capacity of making much higher profit than traditional instruments (mostly at the bond market). This determines the interest of financial investors in investment into the commodity markets. As we have already mentioned, this interest is cycled and is related with the dynamics of the exchange rate of US Dollar. Changing the trend at the market USD-EUR is considered to be the signal for acquisition or resetting commodity assets.



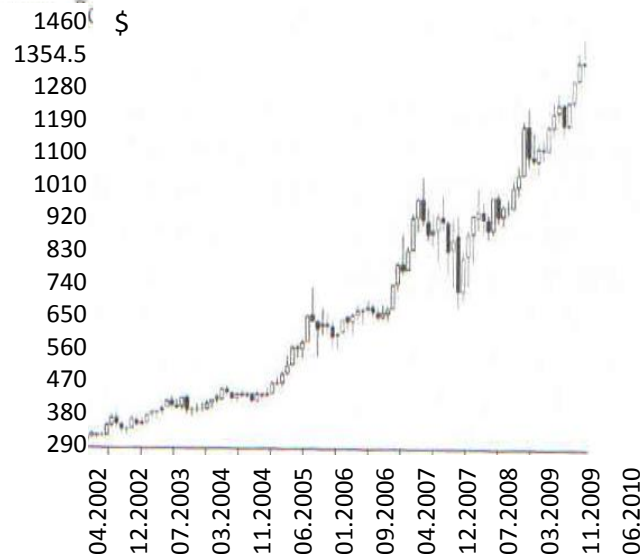
**Figure 11. USD against EUR. (Source: Data from the website [www.yahoo.com](http://www.yahoo.com)).**

Additional factor of strengthening influence over the exchange market of other segments of financial market, was change in the profitability base of banking sector. During Great Modernization, the structure of banking returns has significantly been changed. If in the 1980-s, for the most of the banks, basis for the item of incomes was commercial crediting, today significant share falls within the different crediting and noninterest incomes (including the operations at the exchange market). For the banks, mostly in the countries with the market model, the share of incomes from the operations at the exchange market, not related with the crediting of corporate sector, has been significantly increased. This strengthened the threat for stability of financial markets in general and the banking market gave rise to the strengthening of correlation of all segments of financial market.

In the recent report of the Bank of International Settlements regarding conditions at the exchange market [Triennial Central Bank..., 2010], published in September, 2010, they speak about the sharp increase in the amount of operations at the exchange market from the side of financial organizations, not representing bank-dealer. According to the classification of the Bank of International Settlements, they include small and middle commercial banks, central banks and other financial intermediaries (investment and pension fund, hedge-funds etc.). This trend is prevailing at the global exchange market during last decade. New players are appearing on it – i.e. hedge-funds, actively participating in the extension of the scales of financial globalization, or sovereign funds, representing emerging markets, though, there are the funds from the developed markets (for example, Norwegian Pension Fund) and seeking instruments for investment of sources under the conditions of non-development of local financial risks.

### **3.4. People Die for the Metal, or Why the Cost of Gold Is Being Increased.**

Reasons for increasing demand on gold may be explained absolutely differently. For long period of time, gold lag behind other assets in dynamics (mostly financial). Decreasing the share of gold in FOREX/gold holdings from 60 to 9%, from 1980 through 2005 was decreasing demand on gold as investment resource. This gave rise to the fact that during 20 years at the gold market lop-sidedness was observed. However, since 2002, strong Bull trend was being observed at the market. At the same time, increase in gold may be explained with several factors.



**Figure 12. Price chart on gold, US Dollar. (Source: Website of the Company FINAM).**

First one is related with the impairment of US Dollar during the period from 2002 through 2008 (US Dollar against Euro fell from 0.8 to 1.6). In this regards, gold played the role of any commodity asset, protecting from inflation. Under such conditions, growth of price on gold was insignificantly different from the growth of other commodity assets. This is the reason for essential fell of price on gold from the beginning of the crisis. It fell in price by more than 30% during half a year.

However, further the growth was recovered at the gold market. Interest of the investors in gold is related with the fact that the investors lost faith in paper money. Growth of state debt, increasing budgetary deficit, possible strengthening of inflation expectations give rise to the demand for alternative instruments. Under the conditions of uncertainty of conjuncture at the global exchange spaces, gold is one of the most principle candidates for such asset. This is another reason for increasing trend.

In the third place, characteristic for all commodity spaces, increasing demand on gold was initiated by low interests rates and high liquidity. Sharp falls in prices on gold in 2004 and 2006, were related with the increasing of interest rates, which speaks of the fact that the price of gold, as no other commodity, strong dependence on the conduct of financial investors at the market is seen. In 2008-2010, share of such financial investors in forming price on gold was increased.

Herewith, as it can be seen in the survey of Sh. Roache and M. Rossi [Roache, Rossi, 2009], gold is much different of other commodities by its dynamics, which does not only has sustainable negative correlation with the dynamic of US Dollar, but also is many ways, trend on the gold market is determined with the data of American microeconomic statistics. In case of worsening the situation in US economy, the market interprets these data as the signal for decreasing the exchange rate of US Dollar against other currencies and provoking searching of reliable investments.

At the same time, returning to the golden standard or other versions of building global financial systems around the gold. This is related with the low reserves of this metal, which may not be able to provide continuous functioning of financial and commodity markets, low level in FOREX gold reserves, with the changed structure of financial market.

#### 4. Conclusions

Based on the previously mentioned, we may have general conclusions. During crisis, strengthening of correlation between different financial and commodity markets was increased. James Montier (GMO) noted in his survey that correlation between returns of hedge-funds of different styles investing into the different financial and commodity instruments in 2003-2009, was strengthened from 0.3 to 0.9. Still, the dynamics of the segments of financial market is significantly determined by the situation on the exchange market; herewith, main issue for the dynamics of risky and reliably assets still is the appreciation of US Dollar or depreciation of US Dollar, synonym to which is "Escape from risk" or by increasing "risk appetite". This may be explained by the maintenance of mono-central architecture of global financial system, where there

is the shortage in reliable high-liquid instruments. This latest allows maintenance of the function King of the Mountain to the function of treasury bonds of US market, under the conditions of origination tensions at the global financial market and the asset of last investment. During last period, architecture of global financial system has not been significantly changed: misbalances remained, which gave rise to the crisis of 2008 and which may become the source of new fluctuations at the financial markets.

We may paraphrase Hegel regarding the fact that financial markets do not make any challenges from the previous crisis. Moreover, increase in correlation between different segments of financial and commodity markets create potential threat for more global crisis, national and international regulators shall be ready for. Architecture of global financial market still suffers of misbalance. Notwithstanding large sizes of financial markets, there still is the shortage in investment instruments. Strengthening of correlation between different markets, gives rise to the question on reasonableness of diversification. The question on what will take pace earlier – will the architecture of financial market be changed or will new global financial crisis be commenced.

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## METHOD OF DETERMINING THE WELL THAT NEEDS REPAIR WORK

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### ABSTRACT

The article proposes a technique with which you can quickly identify a well in need of maintenance (current repair) from a variety of wells. As an example, a well cluster is considered; a magnetized water system is pumped into the injection well and the operation wells are analyzed.

As a result, wells were obtained that need to be serviced at the time in question.

Injection of a magnetized aqueous solution improves the uniform displacement of oil from the porous medium.

**Keywords:** wells, well cluster, injection well, operation wells, maintenance (current repair), magnetized aqueous.

### РЕЗЮМЕ

В статье предлагается методика, с помощью которой можно из множества скважин быстро определить скважину, нуждающуюся в текущем ремонте. В качестве примера рассматривается куст скважин, в нагнетательную скважину закачивается намагниченная водная система и анализируется работа эксплуатационных скважин.

В результате получены скважины, нуждающиеся в текущем ремонте для рассматриваемого момента времени.

Закачка намагниченного водного раствора улучшает равномерное вытеснение нефти из пористой среды.

**Ключевые слова:** скважина, куст скважин, нагнетательная скважина эксплуатационные скважины, текущий ремонт, намагниченная вода.

Modern computer and software can with high degree of accuracy find place of the oil – water contact and different parameters of the formation, oil, gas and water. All of this needed same times and special knowledge, equipment. Often, it is necessary to detect the primary direction of the formation fluid in a short time in order to regulate this process and increase the oil recovery factor. Besides, method proposed allow to test effect from influence on bottom hole zone or formation. Making software on bases this method can help field engineer decide this problem in short time. Analyses formation data do the next order:

1. Select a time interval. This interval should be the same for different periods of production (before and after the event holding) and equal on average to 1 year.
2. Calculate summary month oil rate and formation liquid for every production wells around injection well in choose time interval.
3. Summary month oil rate of the well divide on thickness opening part of the formation, we has relative value oil flow rate for every wells. This parameter allowed compare result of the different wells.
4. The result obtained from 3 points is the basis for testing the wells work.
5. In this case, it is assumed that the average total oil velocity corresponds to uniform filtration in all directions.
6. Deflection from average relative oil rate show best or bad well job.
7. On the map, the center of the injection well and production well is connected by a straight line, the average relative oil production of this well in scale is deposited from the injection well toward the production well. This procedure was carried out for each well in a cluster of wells. The points obtained are connected by a smooth line, an oval is obtained. On scheme we have same oval and show circumference with average relative summary oil rate radius.
8. Compare oval with circle line. If the point of the oval is inside the circle, in this case, the permeability of the well is low; in this well it is necessary to plan work to increase the permeability of oil - bottomhole treatment, and so on. If the point of the oval is outside the circle, in this case, the permeability of the well is good, and this well does not require repair and there is no need to change the technological regime at this well.

According to this scheme, analysis of the work of wells is carried out every month.

This method is used to analyze the performance of wells located in the Bobrik bed of the Nurlat field of Tatarstan (Russia). Collector of this layer is terrigenous porous media, saturated oil with viscosity  $\mu = 100$  centipoise and gas factor  $G = 7 \text{ m}^3/\text{m}^3$ .

Test injection of water showed that the reservoir does not accept water, resulting in 4,5 years of reservoir development without water flooding, a decrease in reservoir pressure from 9 MPa to 6 MPa and a decrease in oil flow rate from an average of 10 tons / day to 2 tons / day.

To activate the effects on the reservoir, field engineers decided to inject a magnetized SPS aqueous solution (three sodium phosphates - they are alkaline) into the reservoir. They contacted us and together we installed magnetizing equipment at well # 1811 and beginning injection:

- 1) 140 m<sup>3</sup> solution SPS treatment with magnetic field;
- 2) after that the magnetized water, pushing this SPS solution into a porous medium, to long distance from the injection well.

We research dynamic oil rate from time production wells # 1733,1734,1746,1747. For example, on fig.1 showed dynamic oil rate from time for production well #1734.

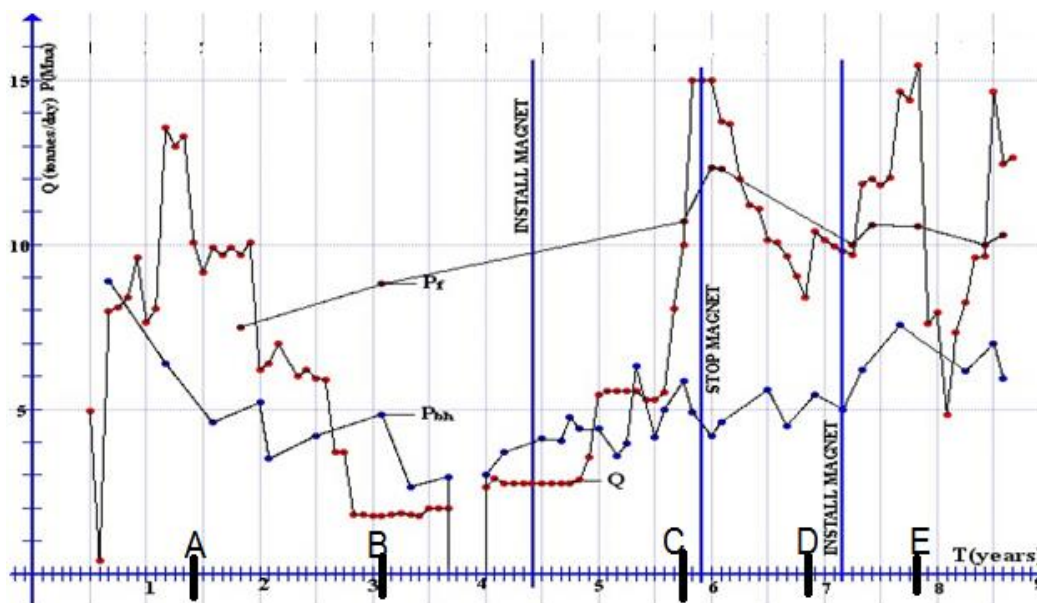


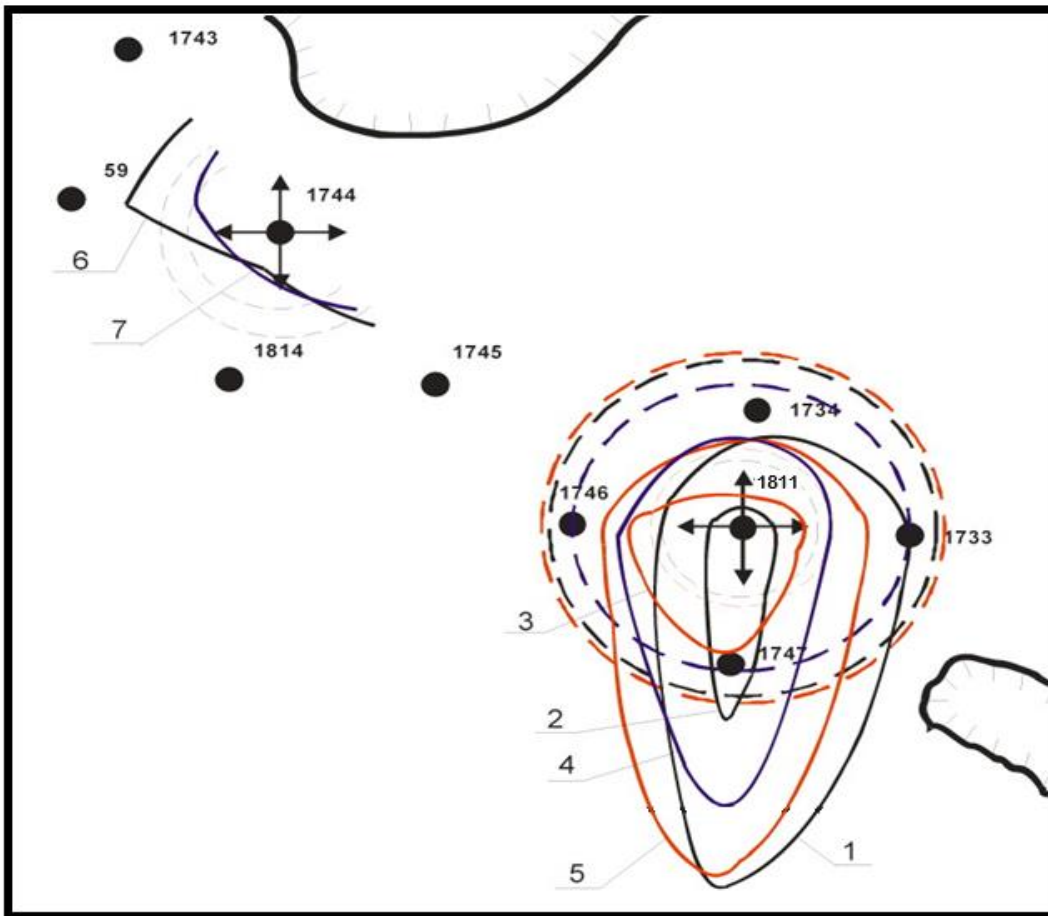
Fig.1. Dynamic change productivity and formation, borehole pressure well 1734.

From this curve we can see, that after 4,5 years from beginning development formation pressure increase from the 7 MPa till the 10 MPa and oil rate decrease from the 13,5 t/day till the 2,5 t/day. Last 14 months (before beginning injection magnetize water) oil rate well is constant, equal 2,5 t/day. After magnetic water injection in well #1811 all production wells around this well increase oil rate. Well # 1734 beginning oil rate increase till the 5,5 t/day after 7 months (from beginning injection magnetic water) and continue increase till the 15 t/day (it is more than initial oil rate 13,5 t/day) after 1,5 years from beginning injection magnetic water.

To convince that the increase in oil production was due to magnetic water treatment, it was decided to turn off the magnetic device on the water injection line. In the absence of a magnetic effect, if the flow rate of oil in producing wells

continues to grow - this indicates the absence of a magnetic field effect on production; if the oil flow rate decreases, this indicates the effect of the magnetic field on production.

We stop injection magnetize water and after 1 year, oil rate decies till the 8,5 t/day. We made sure, that magnetic field influence on increase oil rate and again build magnetic equipment on well head # 1811; continued inject magnetic water and research production well around this well. On well # 1734 oil rate is increase from the 8,5 t/day till the 15 t/day after 1 year after beginning injection magnetic water in the second time. Beginning formation pressure in well # 1734 is 7 MPa and all time increase, after beginning injection magnetic water, as a result this formation pressure increase till the 13,5 MPa this is more than the initial pressure.



1 –production beginning; 2 – before injection; 3 – magnetize water injection; 4 – water injection; 5 – magnetize water injection; 6 – production without injection; 7 – water injection.

Fig.2.Distribution of oil flows at different stages of oil reservoir development.

In this well we have very interesting fact – formation pressure all time increase, but oil rate decrease. (look 2 – 4 years fig.1) It is known, that, usually, increase formation pressure is stimulated increase oil rate. In this case, we cannot know exactly what happened, because many factors influence this process. In our opinion, in porous media bore hole zone pressure smaller than bubble point pressure and formation pressure little influence on oil rate of the well. In our opinion, the pressure inside a porous medium in the wellbore zone is less, than the bubble point pressure and the increase in reservoir pressure has little effect on the flow rate of the well.

In fig. 1, points a, b, c, d, e show the time by which the average total oil production was calculated for all wells surrounding the well 1811. In fig. 2 - lines 1, 2, 3, 4, 5 connect the points of production wells No. 1733, 1734, 1746, 1747 located around the injection well No. 1811. Each curve shows one stage in the history of the development of this area of deposits. Analyzing this curve, we can tell what happened to the area of the drainage zone. This will allow us, if necessary, to draw up a schedule for processing the wellbore zone of a specific well and explore the effectiveness of the event in a simpler and faster way.

As an example, examine Figure 2. Analysis of Fig. 2 shows that at the initial stage of production (curve 1 and 2), we have a high oil production rate in all wells, but uneven filtration in all directions. The predominant direction of filtration flow oil - to the well 1747. This is very bad for production in this part of the reservoir, because when the water breaks into the well # 1747, all the energy of the reservoir is spent on filtering water into the well # 1747, and the production wells # 1733, 1734, 1746 around # 1811 consume little energy. This part of the reservoir energy is not enough to displace oil in wells No. 1733, 1734, 1746, this will lead to a decrease in oil production in these wells. In the oil field practice, regulation of the operation mode of the wells achieve a uniform filtration rate. Curve 2 differs from curve 1 only a smaller scale. It is period before injection magnetized water.

After injection magnetized water solution SAS and pushing this solution SAS in porous media, to long distance from injection well, magnetized water, result we have curve 3. Wells 1733, 1746 improve characteristics. On fig.2 you can see, the curve 3 approach to circle. In this step, part of formation good work – with high efficiency as a result oil rate increase.

When stopped injection magnetize water, wells 1733, 1746 keep good characteristics and high oil rate, but again in direction well 1747 increase flow liquid (see curve 4).

Injection magnetized water in well 1811 second time, improve well operation 1733, 1746, but high flow liquid is observed in direction well 1747 (see curve 5).

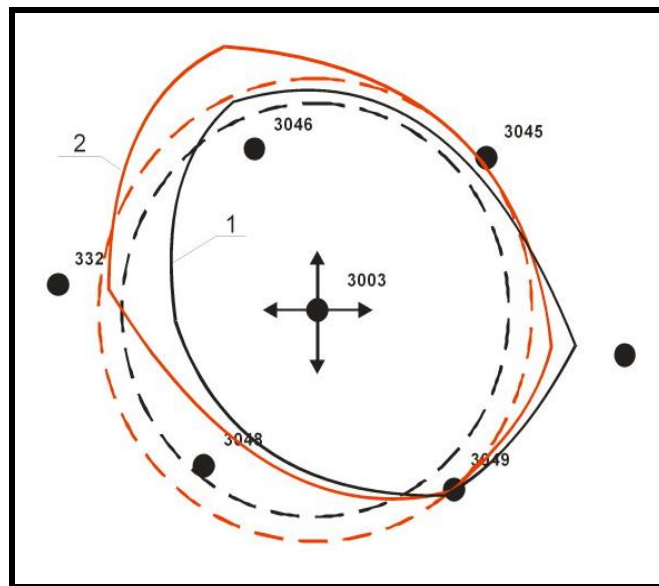
So, applying the proposed method, we can determine the prevailing direction of filtration of the flow and make recommendations for optimal oil production.

We will check this method in the following examples. On formation we have well cluster: a) injection water in well 1744 and produce oil from wells 59, 1743, 1745, 1814; (look fig.2);

b) injection magnetize water in well 3003 and produce oil from wells 332, 3004, 3045, 3046, 3048, 3049 (look fig.3). Production data for these wells are given in the book [10] Fig.52 – 58.

Field data on the processing of these wells by the above method and the results are shown in Figure 2 (6 curve – without injection and 7 curve – injection water) and picture 3 (1 curve –injection water and 2 curve - injection magnetized water).

From Figure 2 it can be seen that the production well 1814 has a low permeability before and after water injection; production well 59 - reduces oil production after water injection. So, we can see, that, in this case, injection water decrease average summary oil rate for well cluster.



1 – before injection; 2 – after injection.

Fig.3. Distribution of oil flows at different stages of development formation.



From figure 3 we can see, that after injection magnetized water in well 3003 production wells 332, 3004, 3045 improve production; however, production well 3048 don't improve production. Average summary oil rate for well cluster increase production this is say, that injection magnetize water improve displacement oil from porous media.

## CONCLUSIONS

1. Using the proposed method, it is possible to determine the prevailing direction of flow filtration.
2. Pumping magnetized water improves oil displacement from porous media.

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## ESTIMATION OF EFFICIENCY OF MANAGEMENT OF FINANCIAL RESOURCES OF AGRICULTURAL ENTERPRISES IN UKRAINE

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### РЕЗЮМЕ

Метою статті є дослідження ефективності управління грошовими коштами сільськогосподарських підприємств для визначення пріоритетів державної підтримки. Вибрано оптимальні методи оцінки ефективності управління фінансовими ресурсами аграрних суб'єктів господарювання. Визначено основні види сільськогосподарської продукції, виробництво якої потребує фінансової підтримки. Встановлено категорії аграрних суб'єктів господарювання, що потребують бюджетної підтримки виробництва конкретної продукції. Охарактеризовано особливості надання фінансової підтримки сільськогосподарським підприємствам за організаційно-правовими формами господарювання.

**Ключові слова:** фінансові ресурси, ефективність, управління, державна підтримка, сільськогосподарське підприємство, продукція рослинництва, продукція тваринництва, сільське господарство.

### РЕЗЮМЕ

Целью статьи является исследование эффективности управления денежными средствами сельскохозяйственных предприятий для определения приоритетов государственной поддержки. Выбраны оптимальные методы оценки эффективности управления финансовыми ресурсами аграрных субъектов хозяйствования. Определены основные виды сельскохозяйственной продукции, производство которой нуждается в финансовой поддержке. Установлены категории аграрных субъектов хозяйствования, которые потребуют бюджетной поддержки производства конкретной продукции. Охарактеризованы особенности предоставления финансовой поддержки сельскохозяйственным предприятиям по организационно-правовым формам хозяйствования.

**Ключевые слова:** финансовые ресурсы, эффективность, управление, государственная поддержка, сельскохозяйственное предприятие, продукция растениеводства, продукция животноводства, сельское хозяйство.

### ABSTRACT

This article focuses on an investigation of efficiency of management of cash funds for determining priorities of a state support. Optimal methods of assessing of the efficiency of management of the financial resources of the agrarian economic entities were selected. Main types of agricultural products which are requiring of the financial support of their manufacture were determined. Categories of the agrarian economic entities which are requiring of the budget support for a manufacture of specific products were established. Peculiarities of provision of the government support to the agricultural enterprises by organizational and legal forms of management were characterized.

**Key words:** financial resources, efficiency, management, state support, agricultural enterprise, crop production, livestock products, agriculture.

### FORMULATION OF PROBLEM

Efficiency of management of the financial resources of the agrarian enterprises is displayed in their main indicators of activity and it is basis of development of agriculture. Information turns out by means of assessments of efficiency of management of the funds of the agrarian economic entities about those segments of the agriculture which have need of the budget support with purpose forming of stable of agricultural manufacture and avoidance its fall. At the same time arises possibility of avoidance of support those segments of the agriculture which work without problems. The government support of problematic the agricultural enterprises will cause effective development of the agriculture.

Significant contribution in solving problems of assessments of the efficiency of management of the financial resources of the agricultural enterprises have made scientists Dorokhova L. M., Nediliska L. V., Khudolii M. L., Hryniuk N. A., Blank I. O., Riepina I. M., L., Kolotukha S. M., Besko V. P., Kravtsova L., Rudenko M. I., Kustrich L. O.

## PRESENTATION OF MAIN MATERIAL OF RESEARCH

Main ones results of activity of the agricultural enterprises give possibility reveal of certain regularity. When enterprises invest in the manufacture more size of capital they get bigger revenues and better pay work of workers. In turn, the agrarian enterprises expand of their manufacture and this way they develop of the agriculture [1, p. 242].

Khudolii M. L. believes that criterion of efficiency of using of the cash funds of the economic entity is maximum magnification income from bringing to manufacture of resources with condition most complete using and optimal ratio. Author understands profit as volume complete depreciation deductions, salary and balance income. Hryniuk N. A. believes that such criterion is maximization of a financial profitability of enterprises with condition saving their financial stability which most complete reflects influence of formed structure of sources of financing on increase of efficiency of invested the cash funds. Blank I. O. and Riepina I. M. stand out main directions of evaluation of effectiveness of formation and use of the cash funds of economic entity. It is evaluation of opportunities of formation of the cash funds and their using for buying in compliance into strategy and tactics of economic development of enterprises and an estimation of economic efficiency of functioning of the cash funds [2, p.31].

Authors offer calculate two groups indicators for an assessment of opportunities of formation of the cash funds and their using in process of buying of assets. It are indicators that characterize opportunities of creation of the cash funds and indicators of assessments of efficiency of using of the cash funds that characterize change of volume financing of assets of the economic entity [2, p.31].

Rudenko M. I. indicates that on start of work economic entities function only at the expense of their own cash funds. In future the enterprise on basis selected landmark of development begins accumulate borrowed the cash funds with purpose providing it development. At the same time, engagement of the finance will be conducting until profitability of activity of the enterprise will give possibility to pay percentages for a use loans.

At presence of increase of volume borrowed the financial resources, payment for their using will be growing which it will cause increase of a cost own capital and risk of bankruptcy will be growing. It will cause approximation of weighted average price of capital to the profitability of the enterprise which substantially reduces attractiveness of next growing of volume of the borrowed financial resources. In case of achievement of certain minimum difference of engagement of the borrowed cash funds will stop. On the one hand, it will be unprofitable for an enterprise use additional the borrowed funds because their cost will increase and on the other hand, owners of the borrowed funds can themselves refuse from providing funds to the company. If investor will believe that provision of certain amount of the borrowed resources fundamentally will worsen state of the enterprise and as result it will lower its revenues then he will refuse from further financing [3, p. 216 – 217].

Growth of the own capital causes decrease particle of the borrowed financial resources and raises solvency of enterprise that increases its thus financial independence. Creditworthiness is such financial and economic state of the enterprise which gives to investor confidence in effective use by enterprise of borrowed funds and also in its ability and readiness return these funds in accordance to conditioned requirements. Growth of the creditworthiness provides receipts of the additional borrowed funds and cycle repeats.

Main steps of similar cycle have such appearance [3, p. 216 – 217]:

1. Enterprise attracts the additional borrowed funds while it is profitable (with consideration of interest rates) and while in it exists such the possibility. If profit of enterprise exceeds percentage payments then present benefit develops at the expenses of the borrowed financial resources. If profit is smaller from percentage payments then the economic entity will suffer damages and engagement of the additional borrowed funds will decrease cost of the enterprise.
2. After achievement of that status when the enterprise cannot find the borrowed funds by acceptable price (that evidence about overload of the enterprise with debts compared with volume of the own capital) enterprise need increase amount of the own capital. Amount of growth of the own capital has be such in order to raise level of the creditworthiness of the enterprise and thus return cost of offered to it the borrowed funds on tentative level.
3. In further the enterprise again can develop at the expense of the borrowed funds until it will achieve to that status when it will have not possibility pay by cost of the borrowed resources. Such cycle repeats.

Shown scheme of formation of sources of the financial resources of the enterprise provides transition of the enterprise to next step only then when there are exhausted all opportunities of previous. That is the enterprise does not increase its debt obligations. Firstly, growth of cost of the borrowed funds that causes to magnification payments for a use the borrowed resources will influence on cost of all the enterprise negatively. When the enterprise will use all of available amount of the borrowed resources it risks be in situation of lack of the funds if it will be requiring the additional funds for a realization of investment opportunities [3, p. 216 – 217].

For the assessments of the efficiency of management of the financial resources of the agricultural enterprises it will use methods of Rudenko M. I.. By these methods, it will conduct assessment of efficiency by means of calculation and

comparison of the profitability and volume of the manufacture of agricultural product. Necessity of the budget financing for the specific agrarian products it will determine with next way. It will take into account general volume of the manufacture certain of products and profitability these products of enterprises of specific categories. If general amount of the volume of manufacture of the specific products will be falling and the economic entity of specific category will be having an unprofitability of the manufacture these products during two successive periods of activity then it will need the government support. When will be declining of the manufacture of the specific of kind of the agrarian products and the enterprises of the specific category will be having the profitability realization these products then they will not need the state support. For an expansion of the manufacture this economic entity can buy the borrowed financial resources at the expense of received the profitability. In case of the profitability of the specific kind of the agricultural products and rising trend of it manufacture by the economic entity of the specific category the budget financing does not grant because these enterprises have all opportunities for their development.

Coefficients of the profitability are indicators of the assessments of efficiency of management of the financial resources and show the profitability of the economic entity. These magnitudes calculate by means of ratio of received profit to the spent financial resources or how ratio received profit to volume of the realized products [4, p. 23].

For an analysis of the profitability and the volume of manufacture products of a plant growing it will select certain main kinds of agricultural plants which grow up by the enterprises in Ukraine. They include grain and leguminous crops, sunflower seeds, sugar beets (factory), vegetables of open ground, vegetables of closed ground, wheat, rye, oats, barley, corn for grain, soy, rape, potatoes, fruits, grapes. The profitability of these products will analyze in the agricultural enterprises generally and in private farms separately. This analysis will give the possibility of determine list of main of kinds of products of the plant growing which require of the budget financing. The state financial support of producing of problematic of products of the plant growing will cause development of the plant growing branch in general. Analysis of the profitability, unprofitability and dynamics of the manufacture of main kinds of products of the plant growing in the agricultural enterprises is presented in table 1.

The table 1

The analysis of the profitability, unprofitability and the dynamics of manufacture of main kinds of products of the plant growing in the agricultural enterprises including private farms [5; 6; 7, p. 311]

Products of the plant growing	Types of agricultural holdings	The profitability of products (%)		The volume of producing (thsd.t)	
		2015 year	2016 year	2015 year	2016 year
Grain and leguminous crops	agricultural enterprises	42,6	37,8	46506,6	52022,2
	including private farms	38,6	38,0	7650,2	8880,9
Sunflower seeds	agricultural enterprises	78,4	61,9	9549,2	11730,1
	including private farms	71,5	64,4	2167,0	2644,3
Sugar beets (factory)	agricultural enterprises	27,7	24,6	9553,8	13348,9
	including private farms	16,1	32,7	618,9	973,4
Vegetables	agricultural enterprises	32,0	15,3	1281,7	1322,9
	including private farms	43,8	21,2	282,5	298,4
Vegetables of open ground	agricultural enterprises	47,5	19,7	-	-
Vegetables of closed ground	agricultural enterprises	14,1	7,7	-	-

Wheat	all types of agricultural holdings	36,4	31,7	26532	26099
Rye	all types of agricultural holdings	21,9	24,6	387	390
Oat	all types of agricultural holdings	21,5	34,4	489	500
Barley	all types of agricultural holdings	28,3	25,4	8288	9436
Corn for grain	all types of agricultural holdings	50,3	45,7	23328	28075
Soy	agricultural enterprises	38,6	52,0	3675,0	3999,5
Rape	agricultural enterprises	44,3	45,0	1709,3	1123,1
Potatoes	agricultural enterprises	24,2	-3,2	456,0	468,2
Fruits	agricultural enterprises	52,6	12,0	411,7	370,5
Grape	agricultural enterprises	102,4	74,6	206,2	221,0

The profitability of the grain and leguminous crops, vegetables of open ground, vegetables of closed ground, sunflower seeds and vegetables of the agricultural enterprises including the private farms has been decreasing since 2016. The profitability of the sugar beets (factory) of the agricultural economic entities has been decreasing since 2016. The profitability of the sugar beets (factory) of the private farms has been increasing since 2016. The agricultural enterprises and the private farms that grow up the grain and leguminous crops, sunflower seeds, sugar beet (factory), vegetables slower have been increasing their own capital since 2016 [5]. The economic entities have grown size of their own capital in further can invest the additional financial resources in the next an agricultural producing and they so can expand it. The manufacture of the grain and leguminous crops, sugar beet (factory) and vegetables has been growing since 2016. The producing of the sunflower seeds have been increasing since 2015 [6]. Therefore, the agricultural enterprises including the private farms that produce these products are not requiring the state support.

The profitability of growing of the rye, oats and the soy has been increasing since 2016. The profitability of growing of the wheat, barley, corn for grain and the grape has been decreasing since 2016. The agricultural enterprises have been having the unprofitability of the potato since 2016. The profitability of the rape has been increasing since 2014. The profitability of the fruits has been decreasing since 2013. The producing of the wheat has been decreasing since 2016 [5]. The manufacture of the rye, oat, barley, corn for grain, grape has been increasing since 2016. The producing of the rape has been decreasing since 2013. The manufacture of the fruits has been increasing since 2016. The producing of the soy has been increasing since 2013 [7, p. 311]. Producers of the wheat and the rape can borrow the financial resources from received by them profitability. Therefore, these agricultural enterprises are not requiring the budget support.

It will analyse the profitability and dynamic of the manufacture of livestock products by such main types as cattle, pigs for meat, poultry for meat, milk, sheep and goats for meat, chicken eggs, wool, and fish products. It will calculate these indicators of efficiency of management of the financial resources of the enterprises collectively by enterprises and by private farms separately. Also it will calculate these indicators of the efficiency of management of the financial resources of the enterprises collectively by the enterprises and by the private farms separately. Analysis of the profitability (unprofitability) and dynamic of the producing of main kinds of livestock products in the agricultural enterprises including the private farms is presented in table 2.

The table 2

The analysis of the profitability (unprofitability) and the dynamic of manufacture of main kinds of the livestock products in the agricultural enterprises including the private farms [8, p. 30; 5; 9; 10]

The livestock products	The enterprises	The profitability (%)		The volume of producing	
		2015 year	2016 year	2015 year	2016 year
Milk (thsd.t)	agricultural enterprises	12,7	18,6	2669,2	2705,6
	including private farms	20,5	23,3	177,4	183,6
Pigs for meat (thsd.t)	agricultural enterprises	12,6	-4,1	583,8	580,3
	including private farms	2,4	-1,2	30,0	30,9
Poultry for meat (thsd.t)	agricultural enterprises	-5,4	3,4	1294,5	1311,1
	including private farms	10,2	2,3	36,2	34,5
Cattle for meat (thsd.t)	agricultural enterprises	-16,9	-23,2	155,6	155,1
	including private farms	3,3	-0,1	12,1	15,0
Sheep and goats for meat (thsd.t)	agricultural enterprises	-29,6	-35,2	2,3	2,0
Sheep for meat	agricultural enterprises	-29,4	-35,1	-	-
Chicken eggs (mln. pieces)	agricultural enterprises	60,9	0,5	9762,2	8067,6
Wool (t)	agricultural enterprises	-61,9	-31,8	314	266
Products of fish-farming (thsd.t)	agricultural enterprises	-4,6	-4,4	88,6	78,4

The producers of the cattle for meat have been receiving the unprofitability since 2016. Breeding the cattle for meat by the enterprises has been decreasing since 2016 [5]. Therefore, the enterprises which manufacture these products are having necessity the state support. The budgetary support will give the possibility compensate part of costs of the agricultural enterprises for a breeding of the cattle for meat that will increase their profitability and the volumes of their manufacture. The private farms that breed the cattle for meat are not requiring the budget financing because their producing has been increasing since 2016.

The agricultural enterprises have been receiving the unprofitability from realization the pigs for meat since 2016 [5]. The general volumes of breeding of the pigs for meat by the enterprises have been decreasing since 2016 [9]. They can draw borrowed the cash funds for the further manufacture at the expense of the profitability that received by them in 2015. Therefore, they are not having necessity the state support. Also the private farms which breed the pigs for meat are not requiring the budget support because producing these products has been increasing since 2016 [9].

The enterprises that breed the poultry for meat have been having the profitability since 2016. The profitability of the poultry for meat of the private farms has been decreasing since 2016 [5]. Breeding of the poultry for meat by the enterprises has been increasing since 2016. Producing of the poultry for meat by the private farms has been decreasing since 2016 [9]. The private farms can borrow the cash funds at the expense of the profitability. Therefore, the enterprises including the private farms that breed the poultry for meat are not requiring the financial support.

The profitability of the enterprises including the private farms has been increasing since 2014 [5]. Producing of the milk by the enterprises in the agriculture has been increasing since 2014. Manufacture of the milk by the private farms has been

increasing since 2008 [9]. Therefore, producers of the milk are not requiring the government support.

The unprofitability of the sheep and goats has been increasing since 2016 [5]. The general volumes of breeding of the sheep and goats in the agriculture have been decreasing since 2012 [9]. Therefore, the enterprises that breed of the sheep and goats are requiring state support.

The profitability of the chicken eggs has decreasing since 2016 [5]. Producing of the chicken eggs has decreasing since 2015 [9]. Producers of the chicken eggs can borrow the cash funds at the expense of the profitability which received by them in 2016. Therefore, they are not requiring the financial support.

The unprofitability of the wool has been decreasing since 2015. The unprofitability of the products of fish-farming has been decreasing since 2016 [5]. Manufacture of the wool has been decreasing since 2010 [9]. Producing of the products of fish-farming has been decreasing since 2014 [8]. Therefore, producers of the wool and products of the fish-farming are requiring the budget support.

For the analysis of the profitability and the volumes of producing of main kinds of the agricultural products by organizational and legal forms of the agricultural enterprises it will take into account such products as the grain and leguminous crops, sunflower seeds, rape, sugar beet (factory), potatoes, open-ground vegetables, fruits, grape, cattle for meat, pigs for meat, sheep and goats for meat, poultry for meat, milk, chicken eggs, wool. It will calculate the profitability of above given products for such categories of the agricultural enterprises as business partnerships, private enterprises, cooperatives, other non-state economic entities and state enterprises. Appropriate analysis of the profitability will give the possibility of give the state support for concrete categories of the economic entities that produce unprofitable products and not to all producers of one or other products. The analysis of the profitability and dynamic of producing of main kinds of the agricultural products by organizational and legal forms of the enterprises is presented in table 3.

The table 3

The analysis of the profitability (unprofitability) of main kinds of the agricultural products by the categories of the enterprises [5]

Categories of agricultural enterprises and years  Main kinds of the agricultural products	Business partnerships		Private enterprises		Cooperatives		Other non-state economic entities		State enterprises	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Grain and leguminous crops	43,3	37,9	44,2	37,8	43,9	44,1	31,5	34,4	21,4	20,8
Sunflower seeds	81,8	59,9	81,7	70,0	86,7	82,5	44,7	56,1	34,6	26,0
Rape	38,7	40,4	57,6	53,4	68,8	83,5	52,7	59,0	30,3	40,0
Sugar beet (factory)	24,4	15,2	38,2	44,3	-13,1	15,7	16,6	16,2	-15,1	9,7
Potatoes	27,1	-7,1	16,2	6,4	12,8	-0,5	143,7	51,3	-10,9	-13,9
Vegetables of open ground	53,7	11,3	43,3	25,0	36,3	8,2	15,3	64,0	3,6	-29,9
Fruits	50,7	11,0	85,1	22,3	-18,5	6,6	42,4	10,4	-6,2	-11,7
Grapes	64,9	58,8	89,7	73,1	8,6	1,9	300,5	199,2	-4,0	19,7
Cattle for meat	-19,0	-24,8	-11,9	-17,2	-21,2	-33,4	-17,2	-49,5	-29,3	-34,0
Pigs for meat	13,7	-3,9	13,6	-6,5	-10,9	-18,1	5,2	13,8	-16,8	-33,9

(%)

Sheep and goats for meat	-26,0	-37,0	-16,4	-30,7	-44,2	-33,5	-20,1	-47,0	-52,9	-40,5
Poultry for meat	-6,7	3,0	-0,8	10,8	-39,9	-56,4	-12,8	-21,7	-18,5	-16,3
Milk	9,6	17,5	19,9	22,6	32,9	28,1	-2,2	1,0	0,5	3,6
Chicken eggs	60,1	1,0	45,4	-9,6	6,6	-22,3	163,0	16,9	-33,3	-59,7
Wool	-65,6	-36,9	3,2	-3,6	-50,6	-40,6	–	–	-81,1	-39,3

The profitability of the grain and leguminous crops, sunflower seeds, sugar beet (factory), vegetables of open ground, chicken eggs which grow up by business partnerships has been decreasing since 2016. The profitability of the milk of the business partnerships has been increasing since 2016. The profitability of the fruits of the business partnerships has been decreasing since 2014. The profitability of the rape of the business partnerships has been increasing since 2014. The business partnerships have been having the profitability of the poultry for meat since 2016. The business partnerships have been having the unprofitability of the potatoes and the unprofitability of the pigs for meat since 2016 [5]. Therefore, above given categories of the economic entities are not requiring of the budget financing. The unprofitability of the cattle for meat and the sheep and goats for meat which breed by the business partnerships has been increasing since 2016. The unprofitability of the wool of the business partnerships has been decreasing since 2014 [5]. Therefore, the business partnerships which breed the cattle for meat, sheep and goats for meat and produce of the wool are craving the budget support.

The profitability of the grain and leguminous crops, sunflower seeds, rape, vegetables of open ground, fruits and grapes which grow up by the private enterprises has been decreasing since 2016. The profitability of the sugar beet (factory) of private economic entities has been increasing since 2014. The profitability of the milk of the private enterprises has been increasing since 2016. The profitability of the potatoes of the private economic entities has been decreasing since 2015. The private economic entities which produce of the chicken eggs, wool and breed pigs for meat have been having the unprofitability of these products since 2016. The private enterprises which breed the poultry for meat have been having the profitability of these products since 2016 [5]. Therefore, these categories of the economic entities are not requiring the financial support. The unprofitability of the cattle for meat, sheep and goats for meat which breed by the private enterprises has been increasing since 2016 [5]. Therefore, the private enterprises which breed the cattle for meat, poultry for meat are requiring the state support.

The profitability of the grain and leguminous crops, rapes which grow up by the cooperatives has been increasing since 2014. The profitability of the sunflower seeds, vegetables of open ground, grape and milk which produce by the cooperatives has been decreasing since 2016. The cooperatives that grow up the sugar beet (factory) and the fruits have been having the profitability these products since 2016. The cooperatives that grow up the potatoes and the chicken eggs have been having the unprofitability these products since 2016 [5]. Therefore, these categories of the agricultural enterprises are not requiring the budget support. The unprofitability of the cattle for meat, pigs for meat and the poultry for meat which breed by the cooperatives has been increasing since 2016. The unprofitability of the sheep and goats which breed by the cooperatives has been decreasing since 2015. The unprofitability of the wool which produces by the cooperatives has been decreasing since 2014 [5]. Therefore, the cooperatives that breed the cattle for meat, pigs for meat, poultry for meat, sheep and goats for meat and produce of wool are requiring the government support.

The profitability of the grain and leguminous crops, sunflower seeds and rape which grow up by the other non-state economic entities except the business partnerships, private enterprises and cooperatives has been increasing since 2014. The profitability of the sugar beet (factory) and the vegetables of open ground which grow up by the other non-state economic entities except the business partnerships, private enterprises and cooperatives has been decreasing since 2014. The profitability of the potatoes and the grapes which grow up by the other non-state enterprises except the business partnerships, private enterprises and cooperatives has been decreasing since 2016. The profitability of the fruits and the chicken eggs which grow up by the other non-state enterprises except the business partnerships, private enterprises and cooperatives has been decreasing since 2015. The profitability of the pigs for meat of the other non-state enterprises except the business partnerships, private enterprises and cooperatives has been increasing since 2015. The cooperatives that produce the milk have been having the profitability of this product since 2016 [5]. Therefore, these categories of the enterprises are not requiring of the state support. The unprofitability of the cattle for meat and the poultry for meat which breed by the other non-state enterprises except the business partnerships, private economic entities and cooperatives has been increasing since 2016 [5]. Therefore, these categories of the enterprises are craving the budget support.



The profitability of the grain and leguminous crops and sunflower seeds of the state enterprises has been decreasing since 2016. The profitability of the rape of the state economic entities has been increasing since 2014. The state enterprises have been having the profitability of the potatoes, fruits and grapes since 2016. The profitability of the milk of the state enterprises has been increasing since 2016. The state economic entities have been having the unprofitability of the vegetables of open ground since 2016 [5]. Therefore, these agricultural state enterprises are not requiring the financial support. The unprofitability of the potatoes, fruits, pigs for meat and the cattle for meat which produce by the state economic entities has been increasing since 2016. The unprofitability of the sheep and goats for meat and the wool which produce by the agricultural state enterprises has been decreasing since 2015. The unprofitability of the chicken eggs of the state economic entities has been increasing since 2014 [5]. Therefore, the state enterprises that produce the potatoes, fruits, pigs for meat, cattle for meat, sheep and goats for meat, wool and chicken eggs are requiring the government support.

Breeding of the cattle for meat, sheep and goats for meat is most problematic. The agricultural enterprises of all organizational and legal forms of economic activity have been having the unprofitability from realization this kind of products since 2015. Therefore, these economic entities are having necessity of the budget financing. Among of the all categories of enterprises the state economic entities are requiring the most financial support because they are receiving the most unprofitability.

## CONCLUSIONS

Methods of the author Rudenko M. I. were selected for the evaluation of effectiveness of the management of the financial resources of the agricultural enterprises in Ukraine. Efficiency of the management of the cash funds was evaluated by main types of the agricultural products and by the categories of agricultural enterprises. The assessment was conducted on the basis of analysis and comparison of the profitability and dynamics of the volume of producing of the main types of the agrarian products.

Studies showed that private farms had not been requiring the government support for the agricultural producing. The agricultural enterprises are requiring the budget financing for the breeding of the cattle for meat, sheep and goats for meat, producing of the wool and the products of fish-farming. The analysis of efficiency of the management of the cash funds of the specific categories of the agricultural enterprises showed that state economic entities had been requiring the government support for the growing of the potatoes, fruits, breeding cattle for meat, pigs for meat, poultry for meat, producing the chicken eggs and the wool. The other non-state enterprises except the business partnerships, private economic entities, and the cooperatives are having necessity of the financial support for the breeding of the cattle for meat, sheep and goats for meat, poultry for meat. State should give the financial support to the cooperatives for the breeding of the cattle for meat, sheep and goats for meat, pigs for meat and producing the wool. The private enterprises are requiring the budget financing for the breeding sheep and goats for meat, cattle for meat. The business partnerships are having necessity of the budget support for the breeding of the cattle for meat, sheep and goats for meat and producing the wool.

The state enterprises are requiring the most budget support because they are having the most unprofitability of the agricultural products of among of the all categories of economic entities. The breeding of the cattle for meat, sheep and goats for meat, poultry for meat and producing of the wool are most problematic for the agricultural enterprises among of all kinds of the agricultural products. These products are requiring first-priority the budget financing. The state support of the problematic agricultural economic entities and the producing of the problematic agricultural products will give the possibility of increase of the manufacture in the agriculture.

Prospects for further research are the assessment of efficiency of the management of the financial resources in subsequent periods. It will give the possibility of identify other problematic segments of the agriculture and provide them with the state financial support.

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## DIE PSYCHOLOGISCHEN UND EMOTIONALEN VORBEREITUNGS BESONDERHEITEN FÜR UFER SPINNANGEL SPORTLER ZUR WETTKAMPF STÄTIGKEIT

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### Аннотация

В данной статье рассматриваются значимые стороны серьезного и многогранного вопроса о психологических и эмоциональных особенностях подготовки береговых спортсменов-спиннингистов к соревновательной деятельности. Весомое место занимает вопрос о самооценке спортсмена-спиннингиста для достижения поставленной им результативной цели.

**Ключевые слова:** психология, эмоции, спортивный спиннинг, самооценка, результат.

**Das Aufführungsproblem.** Der Uferspinnangelsport hat eine große und lange Geschichte, die in 50-er, 60-er Jahren des vorigen Jahrhunderts begonnen worden war. Heutzutage hat sich die vorliegende Sportart – Spinnangelsport – in die zielgerichtete und wichtige sportliche Industrie entwickelt, die nicht nur technische, theoretische Neurungen und Errungenschaften sondern auch wichtige Perspektiven und wissenschaftliche Komponente einschließt. Fast alle Neuheiten und wissenschaftliche Informationen werden in solchen wissenschaftlich-populären Zeitschriften wie „Sportfischfang“, „Blinker“, „Anglersport“, „Fisch&Fang“, „Angler der Ukraine“, „Anglerwelt“ und anderen dargestellt. Ukrainischer Uferspinnangelsport hat seine eigene Profis und Meister wie J. Petrasch, D. Korzenkow, A. Lisitsa, J. Tupitsyn, O. Wyrezub, O. Mjasnikow, V. Kobeljuch, P. Mitjurtsch, K. Tschaban und andere. Die Sportuferspinnangel ist sehr interessante und intellektuelle Sportart insbesondere, die die Spinnangelsportler zwingt, die schnellen Beschlüsse zu übernehmen, die Strategie und Taktik zu ändern, die häufigen Ausreisen auf die Wasserbehälter zu machen, die bestimmten Fertigkeiten zu erwerben und die Methodiken der schnellen Raubfischsuche auszuarbeiten; darin ist das Zweck der wertvollen Fähigkeit, die hauptsächlich, die psychologisch-emotionale Sphäre des Sportlers berührt. Doch, es bringt die Müdigkeit auch wegen häufigen Umstellungen und Proben im Fangsektor für die abgeführte Zeit, meistens, zur physischen Müdigkeit an, dann geht es, hauptsächlich, um eine psychische und emotionale Müdigkeit, die sowohl in der Trainingsperiode als auch in der Wettkampfperiode entsteht. Die tief berührte emotionale Sphäre des Spinnangelsportlers darf mit der negativen emotionalen Übersättigung in nötiger Minute nicht zurechtkommen, dass es letzten Endes zum langfristigen Regress anführen kann.

**Die Analyse der letzten Forschungen und Publikationen.** Die Forschungen, die von sportlichen Psychologen geleitet sind (Siehe.: V. N. Smolentsewa [9], A. V. Rodionow [8], V. R. Malkin [4], G. D. Babuschkin [5], A. Z. Puni [7], E. N. Gogunow [1] etc.) geben zu verstehen, dass eine Besonderheitenreihe der psychologischen Zustände des Sportlers und seine sportlichen Emotionen ihren Einfluss auf die Qualität der sportlichen Handlungen im allgemeinen, auf den Lauf und Erfolg der sportlichen Wettbewerbe öffnen, ihre Abhängigkeit von den objektiven oder äußeren Bedingungen der Wettkampfatmosfera aufklären, was auch die Abhängigkeit der psychologisch-emotionalen Erlebnisse von den individuellen Persönlichkeitsbesonderheiten der weitestehenden Sportler, für unseren Fall, der Spinnangelsportler, zu zeigen hilft. Vor allem müsste der Spinnangelsportler die inneren individuellen Forderungen kennen, die das Ergebnis oder das Ergebnis der vorliegenden Tätigkeit (das Auffangen des Testfisches!) befriedigen soll; d. h. die Stufen der Begreiflichkeit der inneren Forderungen. Hierher muss man auch die Selbsteinschätzung des Sportlers beitragen. Das innere „Abwiegen“ der psychologischen und emotionalen Zustände des Spinnangelsportlers wird die Grundlage für die Besonderheitenreiheentstehung der inneren Unterstützung und die Vorbereitung auf die Wettkampfstätigkeit schaffen.

**Das Ziel des Artikels** schließt sich darin, auf einigen bedeutenden Seiten der ernsten und vielseitigen Frage über die psychologischen und emotionalen Besonderheiten der Uferspinnangelsportler zur Wettkampfstätigkeit ausführlich stehenzubleiben.

**Die Hauptmaterialsdarlegung.** Nach den Worten des anerkannten Koryphäen der Sportpsychologie E. N. Iljin: „...die Tätigkeit der Sportler trägt den Wettbewerbscharakter und ist, nach ihrem Wesen, auf die Errungenschaft des maximalen Ergebnisses unabhängig gerichtet“ [3]. Solch eine überzeugte Meinung des ernsthaften Gelehrten gibt den Anlass, daran zu denken, dass die psychischen Erlebnisse des Spinnangelsportlers außerordentlich kompliziert, eigenartig, vielfältig sind, denn die extremen Uferspinnangelwettbewerbe fordern von ihnen die maximale Anstrengung

in den, am meisten, ungünstigen Bedingungen. Auf den Wettbewerben im Uferspinnangelsport entsteht das Verletzungsrisiko (z. B. das Fallen ins Wasser von einem steilen oder glitschigen Ufer, die Körperverletzungen an den scharfen Köderhaken u. a. m.). Und wir sind geneigt zu glauben, dass gerade deshalb „gilt die Hauptaufgabe der speziellen psychologischen und emotionalen Sportlervorbereitung zum konkreten Wettbewerb als die Zustandesschaffung seiner psychischen Bereitschaft zum Wettbewerbsauftreten“ [2].

Wenn man sich von der Systembereitschaft des Sportlers zu den Wettbewerben (nach A. Z. Puni) abstoßen lässt, so hebt man für den Spinnangelsportler nur einige Schlüsselpunkte heraus:

1. Die nüchterne Überzeugung in seiner Kräfte (ist auf der Bestimmung des Verhältnisses seiner Möglichkeiten und der Gegnerkräfte unter Berücksichtigung der Bedingungen der bevorstehenden Wettbewerbe gegründet).
2. Das Streben bis zum Ende fürs Wettbewerbsziel bis zum Ende zu kämpfen (wird in der Zielstrebigkeit des Sportlers geäußert, in seiner Bereitschaft bis zum letzten Wettbewerbskampfaugenblick für die Zielerreichung zu müssen).

Die sportlichen Postulate, die vom autoritativen Wissenschaftler A. Z. Puni ausgesprochen wurden, verdienen nicht nur die unverwandte Aufmerksamkeit und Einschätzung sondern auch leisten die Hilfe, um eine Besonderheitsreihe für die Spinnanglersportler konkret zeigen zu können, und zwar: die Datenerfassung über die angebotenen Bedingungen der bevorstehenden Wettbewerbe auf den Wasserbehältern; die Selbstregelung der ungünstigen inneren Zustände (z. B. die Angst vor dem unpräzisen Einwurf in den nötigen Punkt der Fangzone); die Erhaltung und die Wiederherstellung des neuro-psychischen Potentials; die Erhaltung und Aktualisierung der geformten Motive für den Wettbewerb.

Der Prozess der psychologischen Versorgung der sportlichen Tätigkeit kann wie die Steuerung der Vorbereitungs- und Wettkampftätigkeit vorgestellt werden. Eine Hauptbesonderheit der psychologischen und emotionalen Vorbereitung zur Wettkampftätigkeit vom Spinnangelfischer sind die spezialisierten Trainings mit vielschichtigem Zubehör (z. B. mit Angelrutentypen aller Spannungsformen –

„Slow“, „Moderate“, „Fast“, „Extra Fast“), während die Belastung auf den Schultergürtel beim Einwurfprobieren auf die Weite stufenweise-systematisch sein wird. Bei den Durcheinwürfen in die Fangzone auf den Wasserbehältersektoren kommt „das psychologische Spinnangelwurfeinschießen“ für die Köderpunktgabe und die Leitung des Köders durch die Wasserdicke vor. Man darf aber über psychische und psychologische Überlastungen nicht vergessen lassen, die, eigentlich, sowohl den Willen des Spinnangelsportlers trainieren als auch wichtige Bedeutung für das Ergebnis haben! Nach der Meinung des bekannten Wissenschaftlers auf dem Gebiet der Sportpsychologie I. P. Wolkow: „...die Fähigkeit des Sportlers, die willensstarken Bedingungen im Zustand des zunehmenden Ermüdungsgefühls unter den Wettbewerbsauftreten zu zeigen und zu entwickeln ist eine Kennziffer seiner willensstarken Charakterqualitäten“ [6]. Diese Behauptung des Gelehrten- Psychologen sei bedingungslos und unerschütterlich. Der psychologische und emotionale Hintergrund des Spinnangelsportlers soll immer die Emotionen, die den Erfolg begünstigen, solche wie die sportliche Begeisterung, die sportlichen Prinzipien und die sportliche Bosheit, das Gefühl des sportlichen Stolzes, der Ehre, der Überzeugung, die sportliche Konkurrenz, die sportliche Anregung haben.

**Die Schlussfolgerungen.** Wir kommen letztlich zur folgenden Schlussfolgerung, dass die **sportliche Anregung**, in solcher spezifischen Sportart wie die Uferspinnangel, vom Fischer-Sportler wie der Hyperaktivitätszustand, wie das eigentümliche Gefühl des Kampfes für die Errungenschaft des gestellten Zieles erlebt wird; das ist eine hauptpsychologische und emotionale Besonderheit der Uferspinnangelsportlervorbereitung zur Wettkampftätigkeit.

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## TAKING INTO ACCOUNT THE IMPACT OF METEOROLOGICAL FACTORS, THE ANALYSIS OF COMPOSITE INSULATORS INFRARED DIAGNOSTICS OF HIGH-VOLTAGE POWER TRANSMISSION LINES

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### ABSTRACT

In the process of remote control and diagnostics of various industrial equipment, the issue of detecting influential factors for a specific object, the improvement of the system's characteristics by selecting methods and tools, operating modes have been considered. A functional model has been developed for the implementation of the optimal mode of the work carried out for diagnostic measurements of the composite insulators surface. In order to achieve the highest values of the information characteristics of the IC measurements, a target function of optimal dependence of N on RH has been proposed.

**Keywords:** remote control, diagnostics, infra-red measuring, composite measurement, meteorological-factor

### INTRODUCTION

Remote control and diagnostic systems are of particular importance in the process of diagnosing various industrial equipment. Selection of remote control and diagnostic methods and tools, working range or ranges directly affects the accuracy of the obtained results.

This selection will be with different purposes depending on the state of the object being investigated, the characteristic parameter to be controlled, the operating conditions, and so on. Investigating the above-mentioned requirements for making proper decisions and identifying influential factors are of particular importance in evaluating the results of the research. During the measurement, control and diagnostics carried out remotely, along with the specific parameters of the object, the selection of factors that directly affect these processes, and the inclusion of their characteristic parameters into the objective function determining the state of the object are considered as important issues of the investigation.

It is well known that composite insulators are widely used in high-voltage power transmission lines. The hydrophobicity of these insulators surface directly depends on the aging degree of their material during operation. The state of these insulators can be monitored both in the infrared (IF) and ultraviolet (UF) ranges. Recently, in practice, insulators with rubber cover are used. However, the main problem in the use of insulators is their aging. According to (1), there are the following categories of insulators aging:

- Thermal aging
- Electrical aging
- Environmental aging due to environmental impacts
- Mechanical aging

As it is noted in [2], the heating on the surface of the insulators arises due to leakage currents because of the pollution layer that occurs on the surface of the insulator due to the effects of meteorological factors. In this case, the magnitude of leakage currents depends on both the applied voltage and the thickness of the pollution layer and its nature.

As it is noted in [3-5], composite insulators are widely spread thanks to their light weight and ability to resist pollution. It is considered that the increase in the temperature of the composite insulator surface by 0.5-1.0°K indicates the presence of defects in the insulator. However, at higher atmospheric humidity, more temperature increases are also observed (3), which actualizes the issue of studying the impact of meteorological factors on the results of measurement and diagnostics of insulators using the remote sensing method in the infrared range.

The main factors affecting the result of measuring the temperature of the insulator in the infrared range are the followings:

- wind velocity ( $w$ );
- atmospheric moisture capacity (relative humidity) ( $RH$ );
- aging degree of the insulator;
- defect size ( $D$ ).

In general, the above-mentioned dependence is mathematically expressed as follows (fig.1a and fig. 1b) [6]:

$$T_2 = f(M, E(w, RH), D)(T_1 - T_0) \quad (1)$$

where:  $T_1$  is temperature in the defect zone;

$T_2$  — ambient temperature.

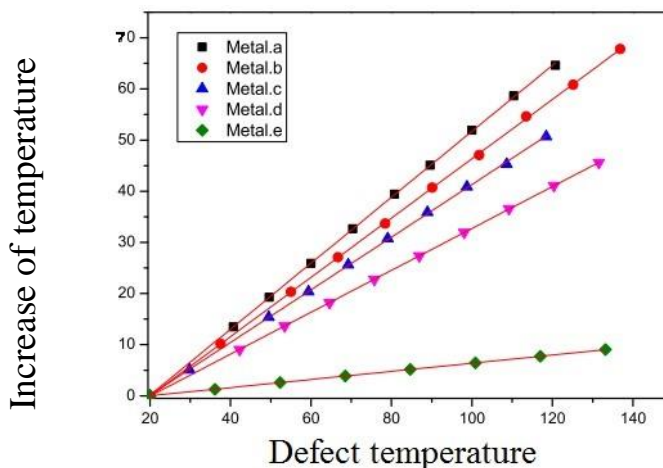


Figure 1a. The dependence of the temperature increase on the insulator surface depending on the defect temperature at various values of relative humidity [6]

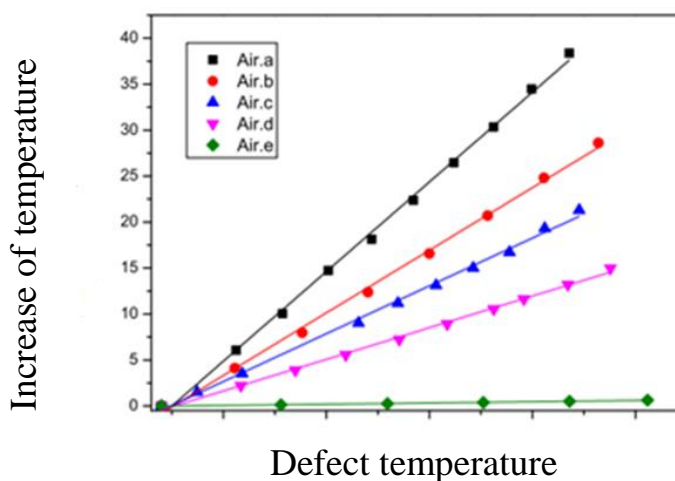


Figure 1b. The dependence of the temperature increase on the insulator surface depending on the defect temperature at various values of wind velocity [6]

#### PURPOSE OF THE WORK

The purpose of this article is to study the impact of the above mentioned meteorological factors on the information characteristics of the infrared diagnostic system.

The objective of the investigation is to optimally evaluate the informational characteristics of an infrared diagnostic installation used for remote measurements of the insulators temperature.

#### THE PROPOSED METHOD

The solution of the above-mentioned problem is considered. In order to evaluate the information value of IR measurements, first of all it should be noted that, according to the results of experimental studies conducted in (6), it can be assumed that the occurrence probability of temperature increases in insulators operating in high humidity conditions within 1-3°C is distributed equally. In cases when the temperature increase exceeds 3°C are connected with anomalous occurrences and are not accepted for consideration when calculating information value. Averaging according the ordered series of measurements, the informational assessment of the obtained results is calculated by the following formula:

$$M_{cp.d.} = \frac{1}{n_{max}} \sum_{i=1}^{n_{max}} M_i \quad (1)$$

where:  $M_i = N_i \cdot \log_2 m(w, RH)$  (2)

where:  $n_{max}$  is the series number of measurements;

$N$  is the number of measurements in  $i$ -th series;

$M$  is the number of various gradations.

In continuous form, expressions (1) and (2) can be summarized as follows:

$$M_{cp.n.} = \frac{1}{N_{max}} \int_0^{N_{max}} N \cdot \log_2 m(w, RH) dN \quad (3)$$

In order to form and solve an optimization problem, first the interrelation of such indicators as  $W$  and  $RH$  is analyzed. According to investigations conducted in (7), there is a mutually inverse relationship between  $W$  and  $RH$ , i.e. there is a linear type dependence:

$$w = A_1 - k_1 \cdot RH \quad (4)$$

Where:  $A_1 = \text{const}$ ;  $K_1 = \text{const}$ .

As it is seen from the graphs presented in Fig. 1a, b, the temperature increase of insulators is a growing function of  $RH$  and a decreasing function of  $W$ . This circumstance makes it possible to determine  $m(W, RH)$  in the first approximation as follows

$$m(w, RH) = \frac{U_{max}}{\Delta U} \cdot [A_2 - (A_1 - k_1 RH)] [1 + k_2 RH] \quad (5)$$

$K_2$  is the matching factor;

$U_{max}$  is the maximum value of the measuring signal;

$\Delta U$  is quantum value.

In order to simplify the mathematical calculations,  $A_1 = A_2$  is taken. In this case, the expression (5) has the following form:

$$m(w, RH) = \frac{U_{max}}{\Delta U} [k_1 RH (1 + k_2 RH)] \quad (6)$$

Next, in order to form an optimization problem, consideration function is introduced:  $N = f(RH)$  (7)

Physically, the function (7) expresses such condition that the number of measurements for specific  $i$ -series should be set depending on the value of relative humidity, since  $RH$  is a major factor contributing to an increase in insulator surface temperature.

In order to find the optimal form of the function ( $RH$ ), it is assumed that the selection of this function can be made among a limited class of functions satisfying the condition.

$$\int_0^{N_{max}} f^{-1}(N) dN = C \quad (8)$$

where:  $C = \text{const}$ .

Taking into account  $RH = f^{-1}(N)$  (9)

Taking into account expressions (3), (6), (8), (9), the objective functional to be optimized is constructed:

$$\begin{aligned}
 M_{cp.n.o.} = & \frac{1}{N_{max}} \cdot \int_0^{N_{max}} N \cdot \log_2 \left\{ \frac{U_{max}}{\Delta U} [k_1 \cdot f^{-1}(N) \cdot (1 + k_2 f^{-1}(N))] \right\} \lambda N + \\
 & + \lambda \cdot \left[ \int_0^{N_{max}} f^{-1}(N) dN - C \right] \quad (10)
 \end{aligned}$$

where:  $\lambda$  is Lagrange multiplier.

According to the condition of the Euler-Lagrange equation, the optimal function  $f^{-1}(N)$  must satisfy the condition:

$$\frac{d \left\{ N \cdot \log_2 \left\{ \frac{U_{\max}}{\Delta U} \left[ k_1 \cdot f^{-1}(N) \cdot (1 + k_2 f^{-1}(N)) \right] \right\} \lambda [f^{-1}(N) - C] \right\}}{df^{-1}(N)} = 0 \quad (11)$$

From expression (11) the following equation is found:

$$\frac{N[1 + 2k_2 f^{-1}(N)]}{(\ln 2) \cdot f^{-1}(N)(1 + k_2 f^{-1}(N))} + \lambda = 0 \quad (12)$$

From (12) it is easy to obtain the following quadratic equation:

$$f^{-1}(N)^2 + f^{-1}(N) \left( \frac{1}{k_2} + \frac{2N}{\lambda \ln 2} \right) + \frac{N}{\lambda \cdot k_2 \cdot \ln 2} = 0 \quad (13)$$

Solution (13) has the following form:

$$f^{-1}(N) = - \left( \frac{N}{\lambda \ln 2} + \frac{1}{2k_2} \right) + \sqrt{\left( \frac{N}{\lambda \ln 2} + \frac{1}{2k_2} \right)^2 - \frac{N}{\lambda \cdot k_2 \cdot \ln 2}} \quad (14)$$

In order to calculate a specific value, expressions (8) and (14) are used. Without getting into the mathematical details of calculating the Lagrange multiplier, the calculated value is denoted as  $(-\lambda_0)$ , i.e.

$$RH = - \left( \frac{N}{\lambda_0 \ln 2} + \frac{1}{2k_2} \right) + \sqrt{\left( \frac{N}{\lambda_0 \ln 2} + \frac{1}{2k_1} \right)^2 + \frac{N}{\lambda_0 k_2 \ln 2}} \quad (15)$$

In order to determine the type of extremum of the functional (10), it is sufficient to calculate the second derivative of the functional integrand (10) with respect to  $f^{-1}(N)$  and make sure that it is negative. Therefore, the objective function (10) at solution (15) reaches its maximum.

## CONCLUSION

Therefore, during the measurement, control and diagnostics carried out remotely, along with the specific parameters of the object, the selection of factors that directly affect these processes, and the inclusion of their characteristic parameters into the objective function determining the state of the object are considered as important issues of the investigation.

It is shown that conducting serial diagnostic measurements of the surface temperature of composite insulators should take into account the possibility of implementing the optimal mode of the work being carried out. The full cycle of the work should be divided into separate series of measurements and in each series the number of insulators to be diagnosed should be proportional to the value of the relative humidity. In this case, the specific form of the optimal dependence  $N$  on  $RH$  is determined on the base of calculating the function (15). The analysis carried out in this article shows that, at condition observance (15), the selection of value  $N$  depending on  $RH$ , taking into account the restriction imposed on the selection of the function  $f^{-1}(N)$  may lead to the achievement of the highest values of the information characteristic of the IR measurements.

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## EVALUATION OF QUALITY OF LIFE AFTER INGUINAL HERNIA REPAIR

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### РЕЗЮМЕ

Сегодня невозможно в полной мере оценить преимущества или недостатки кого-либо метода операции, не изучив их влияния на качество жизни.

**Цель исследования** - изучить качество жизни по опроснику SF-36 в послеоперационном периоде у пациентов, оперированных по поводу паховой грыжи.

**Материалы и методы:** Проведено обследование и анкетирование По опроснику качества жизни sf-36, 258 пациентов, с паховой грыжей, которым проводили герниопластику (Через 6-12 месяцев после операции), в том числе методом Лихтенштейна оперировали 98 пациента, методом Гвенетадзе - 74, лапароскопическим методом - 231. Все пациенты были лицами мужского пола в возрасте от 34 до 77 лет. Исследование проводилось в Национальный Медицинский Центр им. Гудушаури (Тбилиси) и в Клинике Гелиоса (CTRR, Германия).

Средний бал физической функции, при лапароскопическом методе и при методе Гвенетадзе значительно не отличались - 91,1, и 89,5 соответственно, что значительно отличается от результата при методе Лихтенштейна - 82,9. Рольное функционирование оценивали меньшей степени при методе Лихтенштейна - 67,8, на втором месте – метод Гвенетадзе – 75,5, на первой – лапароскопический метод 81,8. Такую же тенденцию видим при оценке выраженности болевого синдрома – соответственно 86,5; 91,1 и 94,2, При оценке Психологического здоровья – соответственно 69,8; 73,3 - 78,0, Шкала жизнеспособности - 64,5, 69,6 и 73,3

оценка здоровья по сравнению с прошлым годом значительно ниже при методе Лихтенштейна - 80,3 и значительно не отличаются при остальных двух методах, соответственно – 87,8 и 88,0. Самую низкую оценку получил Общее состояние здоровья – соответственно -50,3, 55,9, 60,6.

Социальное функционирование, значительно не отличаются при открытых методах, соответственно – 81,6 и 83,5 тогда как при лапароскопии - выше – 88,8.

Такая же картина наблюдается при оценке влияния эмоционального состояния на рольное функционирование - соответственно -74,7, 76,3 и 82,0.

Средний бал по качеству жизни после лапароскопической грыжесечки составляет 81,96±10,39, при методе Гвенетадзе -77,84±11,18, при методе Лихтенштейна - 73,36±11,56 операции.

**Выводы:** при оперативной лечении паховой грыжи по оценке качества жизни, метод Лихтенштейна менее благоприятен по сравнению с методами Гвенетадзе и лапароскопии;

Лапароскопический метод способствует улучшению качества жизни, среди открытых методов герниопластики, рекомендован метод Гвенетадзе;

Среди открытых методов герниопластики, рекомендован метод Гвенетадзе;

**Ключевые слова:** паховая грыжа, sf-36, метод Лихтенштейна метод Гвенетадзе, лапароскопия.

### აბსტრაქტი

დღეისათვის შეუძლებელია სრულად შევაფასოთ ნებისმიერი ოპერაციული მეთოდის უპირატესობები, მათი სიცოცხლის ხარისხზე გავლენის შესწავლის გარეშე.

კვლევის მიზანია სიცოცხლის ხარისხის შესწავლა SF-36 კითხვარების მიხედვით პოსტოპერაციულ პერიოდში იმ პაციენტებში, რომელთაც ჩაუტარდათ საზარდულის თიქრის ოპერაცია ლიხტენშტეინს, გვენეტაძისა და ლაპაროსკოპიული მეთოდებით.

**მასალა და მეთოდები:** ჩატარდა 258 პაციენტის გამოკითხვა სიცოცხლის ხარისხის sf-36 კითხვარის მიხედვით, 98 პაციენტმა ჩაუტარდა ჰერნიოპლასტიკა ლიხტენშტეინის მეთოდი, 74 პაციენტს გვენეტაძის მეთოდის გამოყენებით, 231-ს ლაპაროსკოპიული მეთოდით . ყველა პაციენტი იყო 34-დან 77 წლამდე

ასაკის მამაკაცები. კვლევა ჩატარდა ლუდუშაურის ეროვნულ სამედიცინო ცენტრში (თბილისი) და ჰელიოს კლინიკაში (CTRR, გერმანია).

**შედეგები:** ფიზიკური ფუნქციონირების მიხედვით ლაპაროსკოპურ მეთოდსა და გვენეტაძის მეთოდს შორის საშუალო შეფასება არ იყო სარწმუნოდ განსხვავებული -შესაბამისად - 91.1 და 89.5, მათგან მნიშვნელოვნად განსხვავდება შედეგი ლიხტენშტეინის მეთოდის შემთხვევაში- 82.9.

როლიური ფუნქციონირება ნაკლებად შეფასდა ლიხტენშტეინის მეთოდის შემთხვევაში - 67.8, მეორე ადგილზე - გვენეტაძის მეთოდი - 75.5, ხოლო პირველზე - ლაპაროსკოპიული მეთოდი - 81.8. იგივე ტენდენცია აღინიშნება ტკივილის ინტენსივობის შეფასებისას - შესაბამისად - 86.5; 91.1 და 94.2, ფსიქიკური ჯანმრთელობის შეფასებისას - 69.8; 73.3, 78.0, სიცოცხლისუნარიანობის შეფასებისას - 64.5, 69.6 და 73.3.

ჯანმრთელობის მდგომარეობის შეფასება წინა წელთან შედარებით, მნიშვნელოვნად დაბალია ლიხტენშტეინის მეთოდის შემთხვევაში - 80.3 და არ განსხვავდება სხვა ორი მეთოდის დროს, შესაბამისად - 87.8 და 88.0. ყველაზე დაბალი ქულა აღინიშნებოდა ზოგად ჯანმრთელობის შეფასებისას - შესაბამისად - 50,3, 55.9, 60.6.

სოციალური ფუნქციონირების შეფასება მნიშვნელოვნად არ განსხვავდება ღია მეთოდებს შორის, შესაბამისად 81.6 და 83.5, ხოლო ლაპაროსკოპიის ოპერაციის შემდეგ სარწმუნოდ მაღალია - 88.8. იგივე სურათი აღინიშნება, ემოციური პრობლემებით გამოწვეული როლიური ფუნქციონირების შეფასებისას, შესაბამისად-74.7, 76.3 და 82.0.

ლაპაროსკოპიული თიაქარკვეთის შემდეგ ცხოვრების ხარისხის საშუალო მაჩვენებელია  $81.96 + 10.39$ , გვენეტაძის მეთოდის შემდეგ -  $77.84 + 11.18$  და ლიხტენშტეინის მეთოდის შემდეგ -  $73.36 + 11.56$ .

**დასკვნა:** სიცოცხლის ხარისხის შეფასების ხარისხის მიხედვით, საზარდულის თიაქრის ქირურგიული მკურნალობისას ლიხტენშტეინის მეთოდი ნაკლებად ხელსაყრელია გვენეტაძისა და ლაპაროსკოპიული მეთოდით ოპერაციასთან შედარებით.

## INTRODUCTION

In recent years, the introduction of new advanced technologies into clinical practice has made it possible to achieve some success in the treatment of inguinal hernia. However, despite the progress achieved and the large number of existing methods, the results obtained are not always satisfactory.

The Lichtenstein method became the “gold standard”, which in a number of clinics has practically no alternatives. This was facilitated by its simplicity, reliability, repeatability, and easy training of surgeons for this technique. A certain negative experience is also known. Chronic pain syndrome after implantation of the endoprosthesis, stiff - man syndrome, testicular atrophy, impaired spermatogenesis and ejaculation, caused by chronic paraprothestic inflammation, circulatory disorders, neuropathy are described in detail. The use of the mesh in the Lichtenstein method helps to reduce relapses, but studies have shown that the mesh has contact with the spermatic cord, which leads to a fibrous reaction with subsequent secondary azoospermia[2,3,4]. T. Gvenetadze developed a method that allows using the mesh to isolate it from the spermatic cord, which contributes to the prevention of male infertility[5].

Laparoscopic hernioplasty is an effective alternative to open surgical treatment of inguinal hernias. Laparoscopic hernia repair accounts for 10% of all hernia surgery. Potential benefits include reduction in postoperative pain, rapid recovery, lower recurrence rate, and fewer complications. [6]

Today, it is not possible to fully appreciate the advantages or disadvantages of any one operation method without studying their influence on the quality of life[7].

The purpose of the study is to study the quality of life according to the SF-36 questionnaire in the postoperative period in patients operated for inguinal hernia.

## MATERIALS AND METHODS

Survey and questionnaires were carried out According to the questionnaire of the quality of life of sf-36, 258 patients, 98 patients underwent hernioplasty (6–12 months after the operation), including Liechtenstein, operated on the patient, 74 patients using the Gvenetadze method, 231. All patients were males aged 34 to 77 years. Research methods - Anamnesis, Clinical, Ultrasound, Clinical Laboratories. The study was conducted in the National Medical Center of Gudushauri (Tbilisi) and Helios Clinic (CTRR, Germany). According to the questionnaire of quality of life sf-36. Statistical analysis was performed using the SPSS 22 software package.

**RESULTS**

The distribution by type of hernia and by operation methods are presented in diagram 1.

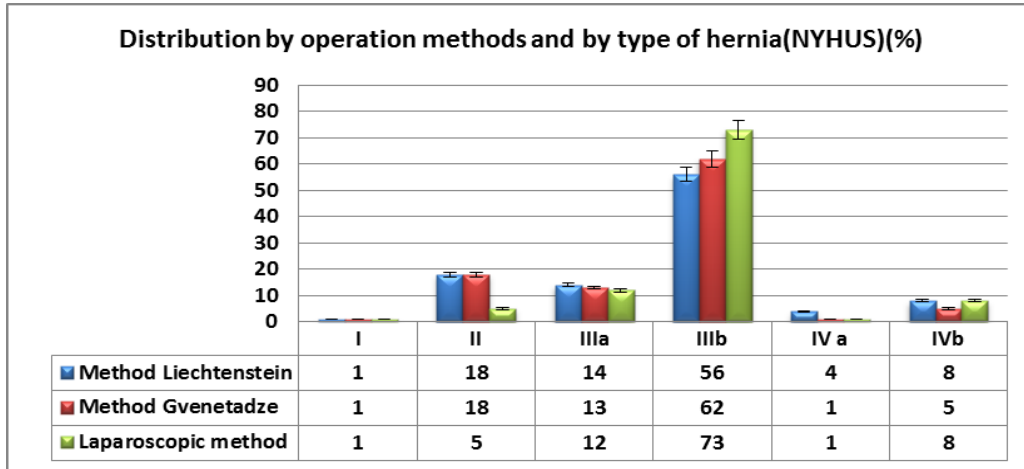


Diagram 1.

Among the operated patients, the type of inguinal hernia IIIb prevailed, the second type of hernia was smaller in the laparoscopy group, in other cases there was no significant difference between the types of hernia in Nyhus. The results of the survey on the questionnaire SF-36 are shown in Figure 2.

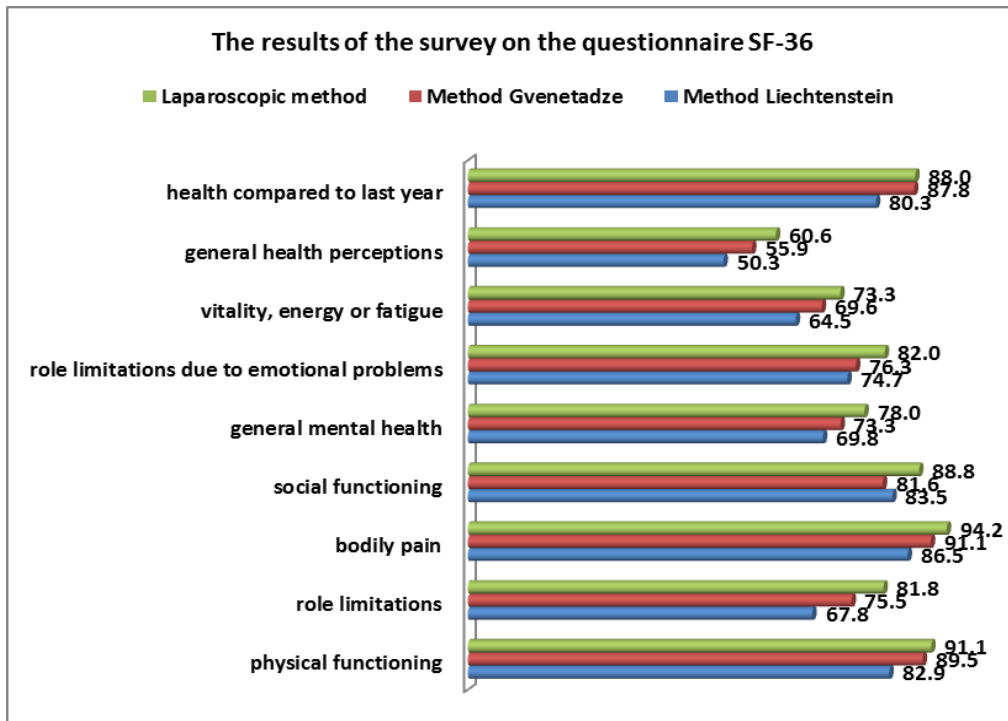


Diagram 2.

The average physical function score that assesses physical activity, including self-care, walking, climbing stairs, carrying weights, and performing significant physical exertion, with the laparoscopic method and with the Gvenetadze method did not significantly differ - 91.1, and 89.5, respectively, which is significant differs from the result with the method of Liechtenstein - 82.9.

Role limitations, which shows the role of physical problems in limiting vital activity, reflects the extent to which health limits the performance of ordinary activities, i.e. characterizes the degree of restriction of performance of work or daily duties to those problems related to health: a lesser degree was assessed with the Liechtenstein method - 67.8, in the second place - the Gvenetadze method - 75.5, in the first - the laparoscopic method 81.8. We see the same tendency when assessing the severity of pain syndrome - 86.5; 91.1 and 94.2, - The pain scale assesses the intensity of the pain syndrome and its effect on the ability to engage in normal activities, including domestic and non-domestic work.

Mental Health characterizes mood, the presence of depression, anxiety, assesses the overall indicator of positive emotions. When evaluating mental health, the lowest score was given for the case of the Liechtenstein method 69.8; in second place is the method Gvenetadze 73.3 and the highest mental health score in patients operated on using the laparoscopic method is 78.0.

The vitality scale - vitality of energy or fatigue - implies an assessment of the feeling by the respondent or patient full of strength and energy of 64.5, 69.6 and 73.3

compared to the previous year, the health rating is significantly lower with the Liechtenstein method - 80.3 and not significantly different with the other two methods, respectively - 87.8 and 88.0.

Social functioning, which assesses satisfaction with the level of social activity, does not differ significantly with open methods, respectively - 81.6 and 83.5, whereas with laparoscopy - above - 88.8.

The same picture is observed when assessing the influence of the emotional state on role functioning, respectively -74.7, 76.3 and 82.0. Role emotional functioning implies an assessment of the extent to which the emotional state interferes with the performance of work or other normal daily activities. The lowest score received was General Health - respectively - 50.3, 55.9, 60.6.

The average score for quality of life after laparoscopic hernia repair is 81.96 + 10.39, with the Gvenetadze method, 77.84 + 11.18, and operations with the Liechtenstein method, 73.36 + 11.56.

The advantages of the laparoscopic method are in reducing the morbidity of the operation, which contributes to the early return of patients to vigorous activity, as well as in a good cosmetic effect. The efficiency of endoscopic plasty is high with bilateral or recurrent inguinal hernias, especially after open plastics [8].

Thus, the analysis of the study allows us to state that laparoscopic hernioplasty of inguinal hernias has a greater clinical efficacy compared with laparotomic operations. When analyzing the quality of life using the SF-36 questionnaire, significantly higher total indicators of the physical and mental components of health are observed in patients after laparoscopic hernioplasty, and the quality of life of patients undergoing laparoscopic hernioplasty suffers to a lesser extent and normalizes earlier. method of surgical treatment. As for the difference between the quality of life assessments, with the open methods, almost all the points show the advantage of the Gvenetadze method, including significant differences were found in assessing factors such as role functioning, scale of vitality, severity of pain, psychological health.

## CONCLUSIONS

In the surgical treatment of an inguinal hernia, according to the quality of life assessment, the Liechtenstein method is less favorable compared to the Gvenetadze and laparoscopy methods;

The laparoscopic method helps to improve the quality of life;

Among the open hernioplasty, methods, the Gvenetadze method is recommended;

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## ECONOMIC PROSPECTS OF USING LOSSLESS TECHNOLOGIES IN GRAPE PROCESSING ENTERPRISES

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### ABSTRACT

The creation and expansion of the use of lossless technologies based on scientific innovation is one of the key conditions for enterprises that are empowered to produce more productive results. Scientific and technical innovations plays a major role in reducing costs, improve the quality and competitiveness of processing products and finally improve the financial capabilities of enterprises. These advantages are widely used to increase the cost-effectiveness of production and processing related to loss-free technology-based processes that incorporate scientific innovations.

**Keywords:** price, cost, competition, innovation, quality, benefit, income.

### INTRODUCTION

Innovative activity of the agrarian sector enterprises is one of the most important factors of increasing the competitiveness of innovative products produced and the economically efficient operation of enterprises. Main directions of innovation activity are characterized by the creation and implementation of innovations. Innovative activity aimed at creating new technologies, products and services is one of the main factors of economic development. [4, p.54]. At present there are the following disadvantages in the innovative development of processing industry enterprises:

- lack of sustainable development programs to stimulate innovation;
- difficulties in conducting and application of researches to the production based on scientific and technical and innovative;
- failure to form a mechanism for ordering production of innovative products based on innovation-oriented research;
- inefficiency of science and innovation activities coordination;
- shortcomings in the formulation of international interconnection mechanisms in the field of innovation.

Evaluating the current and prospective innovation potential in the country for the development of innovation activities is one of the important issues. [1, s.18]. Innovation as a potential raw material resources, development of technical and technological tools, conduction level of scientific and technical research and their outcome, status of the material-technical base, the capacities of production areas that will provide new types of production, financial provision, status of organizational-management system, intellectual property and its registration and so on is manifested by consideration. These factors can have a positive impact on the nationwide research of innovation activities and the development strategy and direction of the relevant field.

Innovative development of the national economy and economic entities must be practically coordinated with the innovative potential and its substantiated information base. [2, p.19]. Such an approach can provide a broad range of opportunities for determining what kind of new product and service are needed, make market assessment of the relevant product, and linking the results of scientific and technical and innovation research to market requirements in this area.

### Current problems with the use of lossless technologies in grape processing enterprises

Modern development level of the economy is characterized by the modernization of the processing industry as in other areas it is extremely important for the development of this industry. In this process, it is particular importance the application of innovations in the processing industry, especially the use of innovative technologies based on lossless technologies. Such an approach would be useful both cost-effective funding in this area and also by creating its targeted use routes new scientific and competition-oriented product production, and chain of sales will be completed. [3, p.46].

Innovative processes in the agro-industrial sphere are differ significantly from other areas according to its characteristics. These characteristics refer to agrarian-industrial production in particular agriculture: there are numerous producers and processors of agricultural products, different and mostly mobile technologies are required for the production of agricultural products; since agricultural production depends on the natural climatic features this factor is also taken into account when choosing the feasibility parameters of production technologies; there are differences in production and processing of

agricultural products; specialization of agricultural production is characterized by the peculiarity of each area and the level of resource availability; different regions are distinguished by production factors; agricultural producers differ in different social situations and so on.

The prospects of taking into account the development of viticulture which have a large prevalence in the country's economy give impetus to the positive aspects. In addition, problems with the recycling of additional products in the grape processing industry and their elimination are currently considered to be one of the most important issues in the agrarian sector. Strategies for speeding up the development of the grape processing industry reflects use of lossless technologies based on innovations.

Experience shows that the strategy for innovation needs to be prioritized in coordination to ensure the economic development of the grape processing industry. Thus, the adopted development strategies, concepts, state programs are coordinated interconnected. Innovation strategy should also constitute an important part of the socio-economic development policy and strategy. This tendency also highlights the necessity of improving the legislative and regulatory framework for the relevant field in terms of modern requirements.

As mentioned above, the main factor in the development of the grape processing industry is directly related to innovative technological and technological innovations. Technological developments in the economies of developed countries confirm that periodic processes are interrelated with scientific-technical progress and innovation activities. Detection of such durable and legitimate links between technical, technological innovations creates the necessary basis for the development of effective mechanisms for the prevention or mitigation of adverse factors in the development of the grape industry. Generally, the innovation process stimulates the production of new, commercially-driven products improves production and management systems, reduces costs, improves product quality, productivity and competitiveness. [5, p.67]. The innovation process is also directly linked to the emergence of new inventions and ideas, enhancement of scientific knowledge and stimulates their unity, and ultimately ensures the application of scientific and technical progress for the development of socio-economic fields.

All of this indicates that it is important to develop innovative strategies that allow you to compete not only in grape processing facilities, but also in the entire processing industry. The organization of competitive handling is the key condition for the successful operation of the enterprise, as well as the search for and development of new products and technologies. Also, adaptation of innovations to existing economic conditions is one of the main conditions. Thus, the development of innovation policy aimed at competitive production involves the identification of the purpose and strategy of its development, deriving from the assessment of the potential of the enterprise and the provision of relevant resources. Research shows that in addition to the issues mentioned in the grape processing industry technical re-equipment of enterprises should not be overlooked.

### **Economic justification for the use of lossless technologies in grape processing**

The greatest innovation in modern society and all sectors of the economy is related to scientific and technical progress. This process is realized through the creation of new products and modernization of the old by using new technologies. Scientific and technical innovations are a crucial factor for the economic development of all spheres as it serves the development of the country's economy as a whole. In most cases, large expenses are required to create a new product, technology or any other innovation. From this point of view, the quality of the products and the economic efficiency of the products obtained as a result of recycling are basically guiding.

As mentioned, the innovation process is based on technological innovation and the final result of the new or upgraded product innovation is to be co-ordinated as an improved technological process [6, p.71]. Thus, technological innovations play a key role in reducing costs, improving product quality and creating new equipment. As new technologies are used to increase productivity, they are used significantly in reducing losses and improving the economic efficiency of production. Efficient results in agrarian spheres using lossless technologies should now be considered as one of the most important issues [8, p.18].

Since the development of viticulture is considered to be one of the priorities of our country's economic policy, significant steps have been taken in recent years to expand the vineyards, improve the productivity and quality of grapes, as well as to increase the volume of grape processing. However, research shows that losses due to the use of additional products obtained as a result of grape processing are allowed. But it is possible to produce oil for medical purposes, to produce fertilizers and feed for agriculture from recycling of these additional products. At present 75-80% of wine production is produced from grape processing, grape shell is 10%, the comb is about 5% and seed is about 5%. [7, p.42].

The processing capacity of Ganja Wine-2 OJSC is 10,000 tons, processed grapes were 4303.7 tonnes in 2015, 3113,8 tons in 2017, grape kernel 807.8 tons and 558.7 tons, comb 174,8 tons and 82.1 tons, costs per tonne of processing are 38.4 man and 149.1 manats, profitability is 25%.

If we consider that every kilogram of grape cernel is sold for 0.32 manat, seeds are almost not used, and it is not difficult to determine the usefulness of the seed that goes to waste. Let's get a quick calculation. As we have already noted 3113,8 tons of grapes were processed in Ganja Wine-2 OJSC in 2017. So 3-4% of seeds are taken, about 110-120 tons. 120-130 liters of grape oil is extracted from each ton of seeds. So, approximately 13,000-15,000 liters of oil is obtained from 110-

120 tons of grape seed. If we consider that world market price of each liter of oil is 16-17 US dollars and spent 13-14 US dollar per liter of oil we can tell about profitability is 23-24%. If we summarize the above mentioned, it is obtained 208-220 thousand manats income from the grape oil in Ganja Wine-2 OJSC and profitability is 30-40 thousand manats.

If we take into account this, Ganja Wine-2 OJSC does not work with full processing capacity, it's clear that prospects for more revenue and how much money is lost every year.

In general, in many developed countries where processing technology has been developed in vinegar, appropriate measures have been started to support waste recycling. The main purpose of this process is primarily to reduce losses in grape processing, to gain additional revenue from waste products, and to increase the profits of grape processing plants as a whole.

## RESULT

As a result of the research, it is possible to use additional products from grape processing as a silage additive in animal feeding base, grated grape seed supplements as feed, as a natural dyestuff, ethyl alcohol, and in the form of vegetable oils such as wastes and juice production from seeds. They reaffirm the rich potential of grape-processing products and the benefits of non-waste technology and the economic viability of such technologies and technological equipment.

Thus, it is known that the use of new technologies related to the processing of additional products obtained as a result of grape processing is one of the important issues in the grape processing industry. Of course, the process of applying lossless technology is particularly remarkable in terms of efficiency and serves the following goals: raising the level of profitability of enterprises; self-repayment of investments; reducing costs for the processing process; maximum and effective utilization of potential resources, etc.

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## SOME WAYS OF IMPROVING THE METHODOLOGY OF TEACHING BIOCHEMISTRY IN THE MEDICAL UNIVERSITIES

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### ABSTRACT

The formation of fundamental knowledge in a medical college is one of the urgent problems of the general training of doctors, for whom biochemical research methods are a significant source of diagnostic information. Understanding the essence and relationship of biochemical processes in the body contributes to the formation of clinical thinking of a modern specialist. Given the urgency of the problem, the authors of the article consider some methods and forms of improving the process of teaching biochemistry at a medical school. Also considered active methods and forms of education, various methods of conducting integrated classes using clinical situational tasks are described.

Based on the accumulated experience of teaching biochemistry, the department makes recommendations for improving the educational process, allowing to improve the quality of education.

**Keywords:** *biochemistry, teaching, clinical tasks, integrated studies.*

### INTRODUCTION

The President of Kazakhstan N.Nazarbayev in his Message “New development opportunities in the conditions of the Fourth Industrial Revolution” stressed the importance of ensuring the quality of training of medical personnel. The country needs not just a trained specialist, but a professional who is able to work in constantly changing socio-economic conditions [3,13]. In this direction, the higher medical school of the country is faced with the task of integrating into the system of a single educational space in accordance with European requirements and achieving recognition of Kazakhstan diplomas by the countries - members of the Bologna process. The mechanism for achieving the goals is the fulfillment of the parameters of the Bologna process, which predetermines an active search for new forms and methods of reforming the education system for its convergence into the world educational space [5,8,11,12]. In this regard, in Kazakhstan's universities, special attention is paid to the formation of professional competence and competitiveness of graduates at the international level. Questions of reforming medical education and science, the formation of an effective personnel policy in the healthcare industry are provided for in the State Program “Densaulyk” for 2016-2019, within the framework of which a project is being implemented to modernize medical education in Kazakhstan, the main goal is to achieve the quality of training of health personnel [4,6 7].

In higher medical schools, the teaching of biochemistry is one of the urgent problems of general training of doctors, for whom biochemical research methods are a significant source of diagnostic information, as the incorrect interpretation of the results of biochemical analyzes by practitioners can be a source of serious diagnostic errors. Understanding the essence and relationship of biochemical processes in the body contributes to the formation of the clinical thinking of a modern specialist [1,2,10,18].

To achieve the task, the department of biochemistry and chemical disciplines of the Semey State Medical University continuously improves the organization of the educational process, introduces modern innovative technologies, taking into account the specifics of students' groups and the subject of study. The traditional form of teaching biochemistry to future doctors is characterized by a gap between theoretical knowledge and the ability to use this knowledge in the practice of the doctor, which leads to the need to improve the educational process [9,21].

The foregoing determines the relevance of the problem and the purpose of the work: the determination of methods and forms for improving the process of teaching biochemistry as a basic discipline in a medical school on the basis of a synthesis of domestic and foreign experience.

### RESULTS

During the period of introduction of new State educational standards, the department has gained some experience in teaching biochemistry, developed curricula in the disciplines based on the final learning outcomes, where the situational tasks, materials for students' independent work and independent work under the guidance of a teacher are revised.

The study of biochemistry goes on for two semesters, in the form of the disciplines "Medical biochemistry" and "Biochemistry of organs and tissues", while "Medical biochemistry" is a prerequisite of the discipline "Biochemistry of organs and tissues". The first lesson monitors the initial level of knowledge in chemistry as a prerequisite, that is, the first lesson draws attention to differences in the basic readiness of students, which is then analyzed in a formative evaluation. Improving the quality of training also provides for the active introduction of innovative learning technologies and the improvement of teachers' skills, in connection with this, all teachers of the department have been trained in advanced training courses and master classes in innovative technologies. Over the past years, the department prepared and published textbooks, teaching aids, monographs, developed teaching aids for teaching subjects, multimedia presentations, case studies and tests, accumulated extensive teaching experience using innovative learning technologies. Considering that the study of biochemistry must preserve the nature of the fundamentality, contribute to the formation of basic knowledge of the basic laws and methods of biochemistry, and at the same time - fulfill the motivational role, contain elements of pathochemistry and focus students on the importance of biochemistry for studying clinical disciplines, as well as for future practical and scientific activities [15, 16], the department provides such innovative teaching methods as small group work, brainstorming, biochemical dictation, TBL method, TBL methods for vertical and horizontal integration with organic chemistry, microbiology, TBL with CBL elements based on the discussion of clinical cases.

For the formation of clinical thinking and the application of theoretical knowledge in practice and improve the absorption of material in such difficult sections as hormonal regulation of metabolism, blood biochemistry, kidney biochemistry, liver biochemistry, connective tissue biochemistry, we use situational tasks as one of the interactive learning methods. A feature of such tasks is a clearer setting of a specific task, both from a qualitative and a quantitative point of view; analysis of real data of a specific situation; multivariance of possible solutions. The introduction of situational tasks, in our opinion, contribute to the development of clinical thinking, adaptation to future professional activities, which forms the basis for the formation of professional competencies. They allow the student to identify interdisciplinary communication using different methods of activity, different methods of working with information, as required by educational standards. Situational tasks applied at the department are practice-oriented. For example, we have developed a method of integrated classes on the topic: "Protein-energy deficiency in children" for residents-pediatricians of the 1st year of study in the cycle "Pathology of young children". The modified form of this technique is used for students of the 2nd course of the specialty "General Medicine" in the study of the discipline "Medical Biochemistry" on the topic: "The exchange of proteins and amino acids." In clinical situational problems, brief excerpts are given from the history of life and the history of the disease, laboratory and biochemical indicators for understanding the biochemical mechanisms of the development of the pathological process. To solve a situational problem, students need knowledge of several disciplines. By these tasks students of 2<sup>nd</sup> year become closer to the real life situations, in contrast to traditional educational resources. The use of situational problems in biochemistry, as a method of training, allows to intensify the process of understanding, mastering and applying theoretical knowledge in solving practical problems. Discussion of situational problems provides a more in-depth study of the course of biochemistry, allows you to check the level of student learning of theoretical material and is a necessary condition for achieving the end results of learning use the knowledge gained in solving situational problems that simulate biochemical processes occurring in a living organism.

When using integrated classes, pediatricians have mastered the clinical, metabolic and genetic aspects of chronic disorders in young children, based on their knowledge of etiology, pathogenesis, biochemical processes, clinical diagnostic criteria, and learned the tactics of treatment of this pathology.

Feedback results showed that pediatrician residents point out the positive aspects of a systematic approach to the study of material, which helps consolidate theoretical knowledge of biological chemistry and assimilate new material with a more detailed study of the biochemical mechanisms of the development of a pathological condition.

In addition, the department developed methods of integrated classes with pathological anatomy on the topic "Cholesterol exchange. Hypercholesterolemia", with propedeutics of internal diseases on the topic "Biochemistry of the kidneys and urine. Physical and chemical properties of urine in health and disease, with infectious diseases on the topic "Biochemistry of the liver. Jaundice." In addition, methods of integrated lessons on the interpretation of clinical and biochemical parameters in pediatrics for students of the 5th year, interns, pediatricians, and residents of pediatricians have been developed, where the features of the metabolism of basic biomolecules (proteins, carbohydrates, lipids, nucleic acids) in children and adolescents, modern methods are considered laboratory diagnosis of sick children and adolescents; general principles and features of laboratory diagnosis of hereditary diseases and congenital anomalies; the main biochemical parameters of biological environments in normal condition in children and adolescents.

Discussion of situational problems provides a more in-depth study of the course of biochemistry, allows to check the level of student learning of theoretical material and is a necessary condition for achieving the end results of learning, use the knowledge gained in solving situational problems that simulate biochemical processes occurring in a living organism.

Not less important problem for many students is insufficient basic knowledge of chemistry. Memorization of complex chemical formulas, multi-stage chains of metabolic pathways - all this requires tremendous efforts from second-year students. At the same time, neither the level of knowledge of beginning medical students, nor the amount of hours allocated for studying the discipline, does not allow teachers to fully convey, and students understand and appreciate the importance of biochemistry for medical science.

Practically beyond the limits of the main course, there remains a huge array of data in the field of clinical biochemistry, and the course of clinical biochemistry at senior courses is an elective and has not been entered into the curriculum.

How do we see a way out of this situation? Taking into account the current trends in the educational process, the student-oriented approach, in the department, within the framework of the project "From student to student", a group called "Biochemistry experts" is organized from among strong students to train poorly performing students. The work of the group is aimed at developing students' deep and sustained interest in the study of the disciplines "Medical Biochemistry", "Biochemistry of organs and tissues", the development of cognitive activity of students, holding round tables, group conferences, etc. The organization of this group at the department allowed to predict the performance of weak students, to optimize the rational distribution by students of their temporary, physical and mental resources; regulate the educational process; increase the motivation to acquire knowledge; put in the first place the personality factor among strong students; identify talented and hardworking students to implement an individual approach; to create favorable conditions for students to choose specialization within the framework of the educational specialty according to their abilities and inclinations already at an early stage of study. Members of the group initiated classes in an unusual format for discussing the issues of biochemistry "Over a cup of tea." Friendly atmosphere, fellow students in the role of teachers are ideal conditions for communicating with each other and studying the fundamental discipline - medical biochemistry. At such classes, students are active in discussing issues that cause them difficulties, analyze clinical situational problems, interpret analyzes of biological body fluids. Classes are held for groups of Kazakh and Russian branches. The work of the group is conducive to focusing on the study of complex issues of medical biochemistry and stimulates the learning activities of not only successful students, but also those who are lagging behind, besides enhancing learning in various sections of the discipline.

Considering that medical biochemistry is a basic discipline that is necessary and important for the future professional activities of future medical professionals, the organization of research work of students at the department is aimed for developing the analytical thinking of future doctors, for the formation of their scientific worldview, which is further needed to study the major disciplines [14,17,20]. For this, a student research group is functioning. Any student has the opportunity to become a member of a scientific circle, choose a topic in accordance with their scientific and practical interests and execute it under the guidance of a department teacher. Teachers encourage students to participate in research, inform about the possibilities of the scientific base of the department, developed scientific topics and projects, provide the work of the circle member with all necessary. All teachers of the department are research leaders of the research conducted by students. The scope of scientific work of the SSW is diverse. The research work of students at the department consists of several types, including experimental work, when a student, under the guidance of a teacher, performs experimental work according to the chosen topic, and then processes the measurement results, draws conclusions. At this stage, students acquire one of the most important research skills - the ability to work with primary sources, independently find and analyze information. In addition, students write abstracts on the proposed topics. Teachers recommend students topics, give advice, help in the selection of literature. With this type of work, students acquire and consolidate certain theoretical research methods, ways of working with literature, and acquire skills in the design of scientific work. In the course of their work, students not only conduct a review of the literature on the selected topic of the abstract, but also independently study new information on biochemical processes and mechanisms, the materials of which they present in the form of computer presentations. In the process of work, students gain experience in searching and working with information resources, with various information sources. An integral and necessary part of the organization of research work is to demonstrate and evaluate the results of work. Students present the results of their work in the form of reports at a scientific-practical conference held at the university and annually take prizes. Students have the opportunity to perform their work in front of a wide audience, which makes them more carefully work out their future performance. In connection with the introduction of credit technology of education, the role of students' independent work (SIW) and 'independent work under the guidance of a teacher (SIWGT) is increasing. The department practices various forms of SIW and SIWGT, for example, writing an essay, preparing an informational message, preparing and holding a training conference, preparing situational tasks, filling in tables, developing a metabolism scheme.

At the SIWGT, the teacher determines the tasks and gives recommendations for its implementation, as well as checks its results. Managed self-study is usually used to study more important course issues. In the process of carrying out any form of independent work, the student may seek advice from the teacher on any issues of interest or difficulty.

The forms of conducting the SIWGT are also different, for example, discussion, methods: "small groups", "round table", "educational conference", video presentations and their discussion, compilation of crossword puzzles, presentation of a given topic in tables and diagrams, etc.

An equally important problem is the correspondence of the student's own assessment of knowledge with the assessment given by the teacher. In this case, the only solution is a clearly defined assessment criteria, which are developed and prescribed in Syllabus for all disciplines of the department. Syllabus posted on the electronic portal of the university and each student has access to them and can be found. All kinds of classes, types and forms of conducting SIW, SIWGT, requirements for the implementation of certain tasks are prescribed in the Syllabus. Evaluation criteria are prescribed for all types of control carried out at the department, including assessment at a practical lesson, tasks SIW, exam, practical skills.

For the formation of students' understanding of the principles, conditions of application and use of methods of quantitative and qualitative analysis in medical biochemistry, development of skills and abilities to work with chemical reagents, devices and equipment, familiarization of students with the principles of measurement technology, modern technology of biochemical analysis, basic methods and qualitative methods and quantitative analysis of biological objects (for example, quantitative determination of proteins and enzymes in the blood, determination of serum levels of carbohydrate metabolism, pigment and water-salt metabolism, metabolites and enzymes of nitrogen metabolism, etc.), the department provides for the implementation of laboratory workshops using such instruments like a refractometer, spectrophotometer, biochemical analyzer, hematology analyzer, etc.

Analysis of the effectiveness of improving the forms and methods of teaching biochemistry as the main basic discipline shows a significant increase in the quantitative and qualitative indicators of 2nd year students progress, for example, students of the specialty 'General Medicine' results of the final control for 2018 amounted to 94.7%, compared to 2017 year (84.9%).

### THE DISCUSSION OF THE RESULTS

Changes occurring in the higher education system in the world dictate the introduction of additional aspects to the problem of teaching biochemistry at medical universities, in solving which the use of innovative approaches proposed by specialists from different countries, including the United States, Turkey, Germany, Russia, Ukraine, and etc. can be useful. The annual congresses of the Federation of European Biochemical Societies (FEBS) also propose the use of innovative approaches in solving a number of problems in the biochemistry and molecular sciences, including the problem of teaching these subjects in medical schools. Many works are devoted to the integration of basic disciplines with the study of clinical disciplines, skills and technologies of laboratory and experimental work, work with the scientific literature on a specific medical problem. For example, in Kocak A. et al. [19], a positive result was noted in the use of specially studied integrated modules in teaching biochemistry, which is also being introduced at the department when studying certain topics in integration with the internal propaedeutics, infectious diseases, pathological anatomy, and pediatrics.

Summarizing the results of the study, we can conclude that:

- the traditional form of teaching biochemistry is characterized by a gap between the receipt of theoretical knowledge and their use in the practice of the doctor;
- the formation of clinical thinking and the application of theoretical knowledge in practical activities and the improvement of learning material will be much more effective when using situational tasks as one of the methods of interactive learning;
- biochemistry training for future doctors should be carried out in close integration with clinical disciplines by conducting integrated classes;
- the formation of students' deep and sustained interest in the study of disciplines the development of cognitive activity of students, holding round tables, group conferences should be held in the framework of educational and scientific circles and the development of various forms of SIW and SIWGT.

### CONCLUSION

Summarizing the above, we can conclude that improving the teaching of biochemistry as a basic discipline, using innovative approaches in the light of modernizing medical education, taking into account domestic and foreign experience, provides an improvement in the quality of theoretical and practical training of students.

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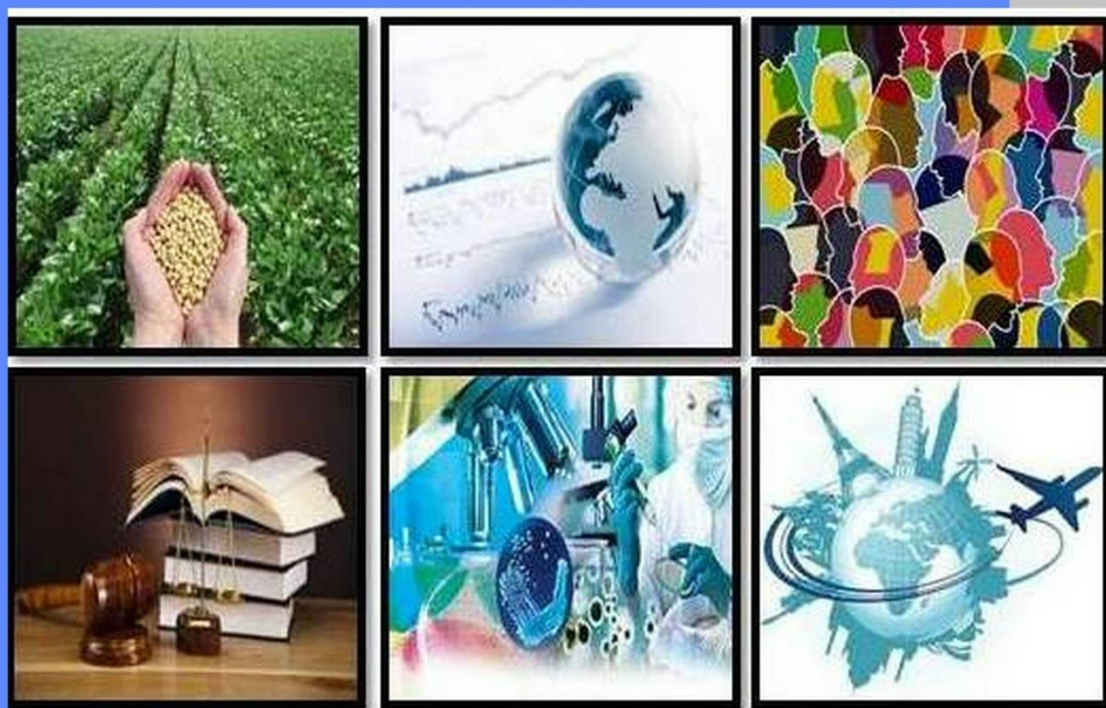
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