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Methodology of Teaching Economic Disciplines in Non-Economics Higher Educational Establishments

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Key words and phrases: actualization of economic knowledge; experimental methods of teaching economic disciplines; theory and methods of teaching in higher education.

Abstract. In order to create conditions for a deeper, conscious and effective acquisition of the course in "Economics" and development of new teaching methods at the University of Physical Culture, Sports and Tourism, we assessed the motivation and the level of students' preparedness, and determined the appropriate methods for updating the economic knowledge and cognitive interest of students in the discipline. To evaluate the results, we used complex methods of testing: written surveys, interviews, and testing. The article presents the foundations of the experimental methodology of teaching the course in "Economics" in higher educational establishments of physical culture, sports and tourism. Also, the possibility of using the author's pedagogical techniques in the educational practice of non-economic higher educational establishments studying economic disciplines is discussed.

Introduction

In the educational process of non-economics universities, Economics is far from the leading place among other disciplines from the point of view of motivation and interest. Meanwhile, this is the most important element in the formation of the fundamental training of a highly qualified specialist of any professional orientation and is the starting point in the organizing of the process of forming the competencies of future graduates [3]. This determined the purpose of the research - to create conditions for a deeper, more conscious and effective study of economics and the development of new methodological techniques for teaching the discipline.

The main tasks at the initial stage were determined as follows:

– assessment of motivation and level of preparedness of higher educational establishments students;

– determination of the necessary teaching methods for the actualization of economic knowledge and the cognitive interest of students in the course in "Economics".

Methodology

The entrance testing of the third-year-students of the Smolensk State Academy of Physical Culture, Sports and Tourism (only 110 people) [2] included a written survey, conversation and testing (to assess the level of economic knowledge of the third-year- students before the start of the studying the discipline). As a result, the presence and features of problems that complicate the successful assimilation of the educational material were revealed:

– students are poorly informed about the economic events taking place in our country and the world, and are almost not interested in what is happening in the economy;

– there is the difficulty of the distinguishing between political and economic events;

– students cannot find causal links between their own financial situation and economic events taking place in the country and the world;

– students have a low need for economic knowledge, because they do not believe that they will be useful in life.

The average score for entrance testing was 3.3; the quality indicator was 37 %.

Thanks to the entrance testing and the analysis of the received information, the goals, objectives and methodological techniques for the further work of the teacher with the students were formulated. In addition, the interviews and surveys of students created such an emotional and psychological atmosphere, in which the further work of students and the teacher at lectures and seminars became more productive.

Further, the main stages in the formation of students' competencies within the studied discipline were determined: entrance testing, goal setting (actualization of economic knowledge with the possibility of their practical application), activity-based practice (emphasis on independent practical, creative, problem-search work), assessment (final test, assessment of the learning outcomes and skills) and self-correction (verification and self-examination).

In the learning process, the emphasis was put on the ability of students to analyze information, critically comprehend it; compare and summarize the data obtained; consciously set and achieve goals; independently present educational material; draw conclusions; present own projects, presentations, etc.

The intensification of lessons was achieved by:

– using module-based teaching technology. Each of the three training modules ("Introduction to Economics", "Microeconomics" and "Macroeconomics") includes the learning objectives, assignments (individual practical, creative tasks, tests, research projects, training sessions, etc.) and assessment;

– conducting short oral and written surveys, using the problematic and interactive teaching method;

– using technical teaching tools, diagrams and other means of visualization and expressiveness;

– developing and using training materials in the form of problem-oriented lecture courses provided with notes and explanations, literature resources on the suggested topics, formative and summative assessment, self-testing of the level of mastering the material by completing practical tasks and drills; individual explanatory teacher's work, constant communication of students with the teacher through modern means of communication (telephone, social networks, instant messengers, videoconferences), as well as traditional educational seminars.

Students of two experimental groups (**EGs**) studied economics within the framework of the proposed methodology, students of two control groups (**CGs**) – in the traditional format.

Table 1. Assessment criteria for the level of competency formation and their compliance with the traditional 4-level scale

Assessment score	Qualitative characteristics of the level	Assessed results	Compliance of the competency with the traditional scoring system
Unacceptably low	The level of competencies development is below average, does not meet most of the requirements of the state educational standard (**SES**) and the curriculum. The theoretical content of the course is partially mastered, some practical skills have not been formed, many of the educational tasks provided for by the curriculum have not been completed, or the quality of performance of some of them is assessed as “unsatisfactory” or “satisfactory”	Recognition of the studied objects and processes re-perceiving previously acquired information about them or actions with them, for example, the selection of the studied object from a number of presented various objects	“2” – unsatisfactory
Reproductive (perception, comprehension, memorization)	The average level of the development of competencies corresponds most of the basic requirements of the SES and the curriculum, the theoretical content of the course is partially mastered, but the gaps are not significant. The necessary practical skills of working with the acquired material are basically formed, most of the educational tasks provided for by the training program have been completed, a significant part of the tasks have been completed, but with serious errors	Memory reproduction of the information; reproduction of previously acquired knowledge from a literal copy to application in typical situations	“3” – satisfactory
Productive (application of knowledge by the model, solution of typical problems, explanation)	The level of competencies development is above average, corresponds to all the basic requirements. The content of the course is fully mastered, without large gaps, some practical skills of working with the mastered material are not sufficiently formed, all the studying assignments provided for by the training program have been completed, the quality of most of them is rated "good", some of the completed tasks may contain minor mistakes	The strength and effectiveness of knowledge; understanding the essential aspects of educational information; the ability to independently reproduce and transform the assimilated information to discuss the problem objects; solving non-typical problems, choosing a suitable algorithm from the set of previously studied ones for solving the specific problem	“4” – good
Creative (application of knowledge in a new situation)	A very high level of competencies development, corresponds to all the requirements of the Federal State Educational Standard and the curriculum, the theoretical content of the course has been mastered completely, without gaps, the necessary practical skills for working with the mastered material are formed, all the educational tasks provided for by the training program have been completed, the quality of their implementation is assessed as “excellent”	Independence and efficiency in applying the acquired knowledge, abilities and skills; availability of self-critical assessment of educational information; ability to solve non-standard tasks; possession of research methods; creation, processing and presentation of objectively new information	“5” – excellent, outstanding results

Table 2. Comparative characteristics of indicators of the level of competencies formation of students of the experimental groups (**EG**) and control groups (**CG**) in the course "Economics"

Criteria	Research stages	EG	CG
Unacceptably low	before	2.16	2.13
	after	4.15	2.4
Reproductive	before	3.8	3.15
	before	4.2	3.6
Productive	before	2.4	2.0
	before	4.8	4.1
Creative	before	1.8	2.0
	before	4.5	3.3

Results and discussion

The level of the competencies formation was assessed at 4 levels: unacceptably low, reproductive, productive and creative. Qualitative characteristics of the level of the development of competencies formed as the result of the course studying, the assessed results and the correspondence of the level of mastering competencies to the traditional assessment system are presented in Table 1.

As the result of the application of the new methodology for studying the discipline "Economics", a significant increase in indicators was obtained in terms of the levels of competencies formation among students of the experimental groups in comparison with the control groups.

At the final stage of the experiment, at the end of the course in Economics, the students were offered assignments and questions of the final test, which almost completely repeated the input one. The average score was 3.9 in the CG, the qualitative indicator was 38 %, while in the EG the average score was 4.6, and the qualitative indicator was 64 %, which proved the effectiveness of applying the new methods of teaching economics.

The final survey and conversation, conducted at the end of the study of the discipline, gave the following student assessment of the application of the new methodology (% of options chosen by students):

– broadened off-line discussion of various problems that contribute to a more complete perception and understanding of theacquired knowledge and skills – 73 %;

– helped to gain experience in performing corporate researches and projects, presenting their results with the use of modern computer equipment and presentation means – 61 %;

– made it possible to develop communication skills, including experience in using of audiovisual methods, communication means and the Internet – 48 %;

– contributed to the development of closer contacts of students with each other and with the teacher – 39 %.

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Методика преподавания экономических дисциплин в вузах неэкономического профиля

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Ключевые слова и фразы: актуализация экономических знаний; методика преподавания экономических дисциплин; теория и методика преподавания в высшей школе.

Аннотация. С целью создания условий для более глубокого, сознательного и эффективного изучения дисциплины «Экономика» и разработки новых методических приемов ее преподавания в вузе физической культуры, спорта и туризма была проведена оценка мотивации и уровня подготовленности студентов вуза; определены необходимые методические приемы для актуализации экономических знаний и познавательного интереса студентов к дисциплине. Для оценки результатов использовались комплексные методы входной и выходной диагностики: письменный опрос, беседа и тестирование. Полученные результаты доказывают возможность и эффективность использования авторских педагогических приемов в образовательной практике неэкономического вуза при изучении экономических дисциплин.

UDK 339.372

Trends in Changing Consumer Behavior in the Local Goods Market

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Key words and phrases: consumers; consumption; “green” products; lifestyle; organic.

Abstract. The purpose of the article is to study trends in changing consumer behavior and the growing popularity of “green” and local products. This goal is achieved by solving the following tasks: analyzing the essence of the trend, as well as analyzing the tools for working with consumers. The hypothesis of the study: the formation of trends in changing consumer behavior and the growing popularity of “green” and local products in the country is influenced, first of all, by new consumer behavior patterns that have appeared in the United States and Europe, which are spreading to the less developed markets of Eastern Europe. The main research methods in the article are the comparative research method and the analysis of scientific literature. The result of this study is the conclusion that it is necessary to focus on the utility, recycling and environmental and social consequences of the product in the Russian Federation.

Today, environmental pollution is a serious problem all over the world. Environmental and health advocates point to problems related to certain foods and the current food system that have caused a large ecological footprint on the planet. The issue of food has gone beyond focusing solely on food security to include the context of human well-being and the sustainability of our planet [1].

The transition to global consumption has led to an increase in the content of refined fats and sugar, oils and meat in the diet, which leads to an increase in the incidence of type II diabetes, coronary heart disease and other chronic non-communicable diseases that reduce life expectancy and pose serious health risks.

At the moment, many consumers support the idea of protecting the environment, but not all of them are ready to radically change their consumer behavior or lifestyle. As a result, consumers can be divided into several groups according to their actions [2].

1. Consumers who are not ready to change anything in their lives, for them it is enough only to maintain cleanliness at home, on the street and in public places.

2. Consumers whose concern for the environment is limited only to the purchase of more healthy “green” products marked “eco”.

3. Consumers who use conscious consumption try to choose “green” products without additives, with recyclable packaging or without packaging at all, sort the waste and hand it over for recycling. As a rule, they prefer stores in the “Zero Waste” format.

4. Consumers who belong to a vegetarian and vegan lifestyle. These are those consumers who also consciously consume, hand over waste for recycling, but they also do not use animal products.

Currently, there is a shift in demand towards goods produced by local producers. The main players in the local food movement are farmers ‘ markets and manufacturing facilities that are located nearby. This movement is now an important part of the food system, especially because it intersects with people’s desire to consume healthier, plant-based, organic foods [3].

Local products are considered natural and fresher. This is due to the fact that such products are known to consumers, they know where the product is produced and under what conditions. Also, the transportation of goods from local producers to retail trade enterprises is much cheaper than goods from other regions and countries, which allows you to set a lower price for these goods. However, the local agriculture is a seasonal activity in the cultivation of limited types of products. This is the main problem.

Today’s consumers are used to the variety and availability of a large variety of products from around the world. Over the past 50 years, food has become widely available throughout the year. Therefore, the ability to survive only at the expense of local production is unlikely. The implication is that local products are more likely to complement, rather than replace, traditional food production and consumption. But for such accessibility, goods produced in a distant factory can travel thousands of kilometers before reaching the plate. Large amounts of non-renewable resources are used for processing, packaging and transporting these goods, which makes the production and marketing of non-native products the most environmentally unfavorable.

So far, the movement in favor of environmental protection is only beginning to develop in our country, and therefore consumers are willing to pay more for “green” and local products, considering this a manifestation of social responsibility. As the popularity of environmental care increases, consumers of the latter two groups are becoming more and more popular.

New social movements related to food systems, especially food production and consumption, have grown dramatically over the past few decades. Some of them are now an integral part of healthy habits around the world, and an increasing number of people find themselves adhering to one or more of these “alternative” lifestyles. This indicates a growing trend away from products that are becoming increasingly industrialized, standardized, and impersonal.

There is a growing trend of switching to a plant-based diet. People who adhere to a plant-based diet can formulate their choice in different ways. Some focus mainly on consumption, thinking about their own health; others focus on production, wanting to avoid harming the environment and suffering animals.

In the past few years, vegetarians and vegans have managed to raise public awareness that cutting or avoiding meat in favor of plants has beneficial effects on human health, the environment, and animals. Vegan food is considered better for the planet than that which includes animal products, but not all plant-based products have a small ecological footprint.

Without careful consideration of where our food comes from and how it is grown, our nutrition can have unintended consequences. While plant-based products and meat substitutes can be much better for the environment than animal husbandry in general, in order to really change the environment, care must be taken about what to replace meat with.

To begin with, you need to stick to using local fruits and vegetables in the season itself –

this is the best approach. More and more retail chains and businesses are paying attention to consumers who monitor their health, the health of others and the protection of the environment.

The first step is the growth of the organic goods market. These are primarily more natural food products marked “eco” and “organic”, non-GMO, palm oils and E-additives, as well as products for face and body care, consisting of plant components.

In many structural positions, we are becoming similar to Europe. For example, in Europe, most producers produce fruits, vegetables and cereals, the same situation is in Russia (Fig. 1) [4].

Accordingly, the growing popularity of farm products and products produced by local small businesses, such as fruits, vegetables and dairy products, is noticeably increasing. Its advantages over mass products are obvious: farm products are not only more saturated, but also completely safe for the body. Large producers do not spare chemical fertilizers to increase the amount of harvest, and conscientious farmers unite in cooperatives, refusing to use pesticides and stimulants. They focus on product quality, not quantity.

Farm and local products have been introduced to our country not so long ago. Farmers and their supporters are confident that by choosing organic products, our country will provide healthy food not only to its residents. There are great chances to become a world leader in this industry, which will contribute to the development of the Russian economy [5].

As a result, there is a development of “green” networks, including farm stores. Examples of such networks are the networks of Vkusville, Green, Laboratorium, and Fermag. These chains position themselves as “healthy food stores”, which indicates that the share of responsible customers is already growing in Russia.

Companies with a clear environmental policy and plans for its implementation win against their competitors, as evidenced by various indices – both Russian and international – which determine the level of environmental friendliness of a particular corporation, depending on its industry. In order to fully implement the environmental protection program, both manufacturers and consumers must focus on the utility, recycling, and environmental and social consequences of the product, and not just on its aesthetic and stylistic aspects.

Thus on the basis of the conducted research it is possible to draw the following conclusions:

– currently, there is an increase in the consumption of “green” and local goods;
– the share of organic products among non-organic products is growing;
– the popularity of farm products and local small businesses that produce food is increasing;
– new networks of “green” stores, including farm stores, are being created and developed;
– global companies have begun to take into account local characteristics and consumer tastes.

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Тенденции в изменении потребительского поведения на рынке местных товаров

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Ключевые слова и фразы: «зеленые» товары; органика; потребители; потребление; стиль жизни.

Аннотация. Целью статьи является изучение тенденций в изменении потребительского поведения и роста популярности «зеленых» и местных товаров. Поставленная цель достигается решением задач: проведение анализа сути тренда, а также анализа инструментов работы с потребителями. Гипотеза исследования: на формирование тенденций в изменении потребительского поведения и роста популярности «зеленых» и местных товаров в стране оказывают влияние в первую очередь новые модели поведения потребителей, появившиеся в США и Европе, которые распространяются на менее развитые рынки стран Восточной Европы. Основные методы исследования в статье – сравнительный метод исследования и анализ научной литературы. Результатом данного исследования является вывод о необходимости сосредоточиться на полезности, вторичной переработке и экологических и социальных последствиях использования продукта в Российской Федерации.

UDK 519.715

General Patterns for Developing Socio-Economic Systems Governed by Infinite Number of Actors in a Simple Interchange Model

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Key words and phrases: actors; development; evolution; general pattern; socio-economic system.

Abstract. This paper applies general mathematical model developed for open stochastic system to describe a special case of evolution for socio-economic system (**SES**). The general model is based on randomized continuity equation (**RCE**) in approximation of an infinite number of links (sources and sinks) of different nature between SES and its environment where each link is executed by a continuity equation. Research leads to forming of infinite system for differential equations having the same mathematical appearance but different meaning of involved quantities. This study uses methods of mathematical and functional analysis to find solution of RCE and give it suitable interpretation. For interpretation a methodology of an evolutionary geometry is employed. General solution obtained this way is characterized by a regular change of ratio dealing with the volume of the required and non-required SES microstates. In this sense, found solution is a form of general conservation law for SES which deals with a dynamic transformation of structure for social-economic activity.

Introduction

A concept of a socio-economic system (**SES**) at the regional level refers to the way how social and economic factors influence one another in local communities. Social economics typically deals with the consequences of links between social activity and economics. It uses microeconomic rules to areas of human behavior which is not usually thought as component of economics. It can be drug abuse, marriage, family decisions, punishment, crime, and the like. Contemporary social sciences consider behavioral interactions of individuals and groups through formation of social capital, social markets, social norms and other social-related terms [1].

Traditionally, for study of SES researchers use multi-disciplinary methods [2; 3]. Actor-system dynamics is an innovative multidisciplinary methodology for analysis of the social interplay between economic and socio-political institutions [4].

The development of an open actor-oriented system theory should address complex socio-

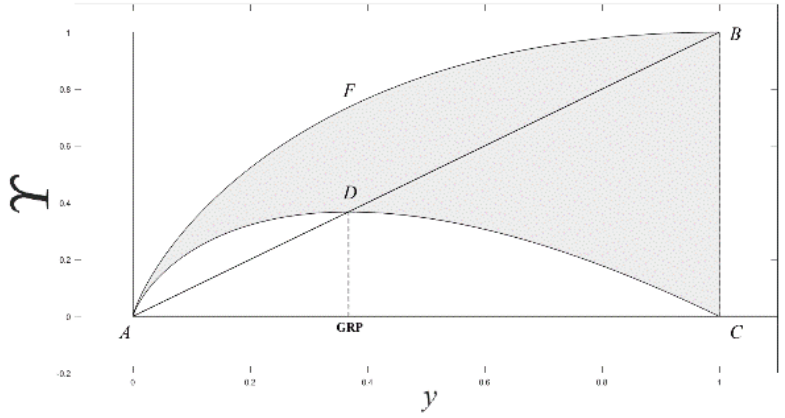

Fig. 1. Curvilinear geometry of exchange between FMD and UMD at $y < 1$. In the plot, by an abscissa axis a SEP rate is indicated, by the ordinate axis an integral efficiency of SEP is indicated. Plot demonstrates mechanism for appearance of triangle form in the space y – Υ

economic phenomena in the ways which diverge substantially from conventional economics. On the one hand, above theory should deal with the flow of social-economic power (**SEP**) concerning economic resources, on the other hand, with the structural economic innovation and transformation as a result of changing social conditions [5].

From the formal standpoint, functioning of socio-economic institutions ultimately can be thought as a result of interaction of SES with various socio-economic actors in unlikely economic conditions. In other words, we can assert that above interactions, formally manifesting in establishing of links between SES and external environment is what we can call as functioning (evolution) of SES.

Obviously that phenomenon of stable functioning for autonomous SES requires permanent exchange of SEP through interaction between internal and external actors.

Based on [5], we will study a dynamic of SES in assumption that specifics of each link is ignored but the contribution of this link to general SEP exchange is accounted for sure. While doing that, an environment of SES can be simulated as a reservoir of unlimited capacity providing lasting SEP exchange during lengthy period.

General form of SEP conservation

Below, we formalize the process of coining geometry forms in the y – Υ space, where y is SEP flow power, Υ is average efficiency of SEP exchange.

From [6] it follows that the instant full volume of phase state for microstates at fixed y is $|2\ln y|$. So, an average value of SEP circulating through SES interface at exchange with the full microstate domain (**FMD**) in arbitrary point $y = y_n$ numerically equals to an area under curve Υ(y) (grey and white area in Fig. 1). Then SEP is

$$S_{2\ln y} = 2\int_0^{y_n} \Upsilon(z)dz = \frac{1}{2} y_n{}^2 (2\ln y_n - 3). \quad (1)$$

In its turn, the volume of phase space for microstates for unrequired microstates domain

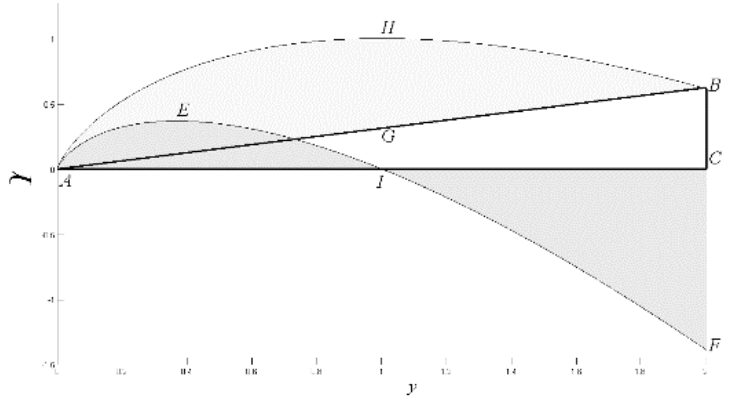

Fig. 2. Curvilinear geometry of SEP exchange between FMD and UMD at $y > 1$. Designation of axes are the same as in Fig. 1

(**UMD**) at fixed y is $k - |2\ln y|$, where factor k is added for consistence. Then average SEP circulating through SES interface of at exchange with UMD in arbitrary y is equivalent to area under curve $2\Upsilon(y) - ky$ (white area in Fig. 1):

$$S_{k-2\ln y} = \int_0^{y_n} (2\Upsilon(z) - k_n z)\, dz = \frac{1}{2} y_n{}^2 (2\ln y_n - 2k_n - 3). \quad (2)$$

We find the difference:

$$S_t = S_{2\ln y} - S_{k-2\ln y} = \frac{1}{2} k_n y_n{}^2, \quad (3)$$

where $S_{ET} = S^{tr}_n = ½ky_n{}^2$ is area of evolving triangle (**ET**) for $y = y_n$ and $k = k_n$. At the same time, SET numerically equal to the volume for required microstate domain (**RMD**).

Thus, the difference between SEP, coming through SES's interface at the exchange between FMD and UMD equals to SET. However, as it comes from Fig. 1, the resultant triangle can also be obtained at subtraction of area for another elliptic sector AFBDA from area of curvilinear ΔAFBCA.

It means that the area of the sector AFBDA is equal to an area of the sector ADCA and therefore area of sector AFBDA numerically matches average SEP circulating through SES interface at an exchange with UMD. As a result, (3) can be rewritten as:

$$S_t = S_{2\ln y} - S_{AFBDA} = \frac{1}{2} k_n y_n{}^2 = S_{ET}. \quad (4)$$

Forming of ET at $y > 1$ goes in the same way (Fig. 2). The area of ET is found as the difference between an area under curve $\Upsilon(y)$ and area of sector AHBGA.

General Equation of X-balance

The common feature of above drawing is a necessity to find the difference between the

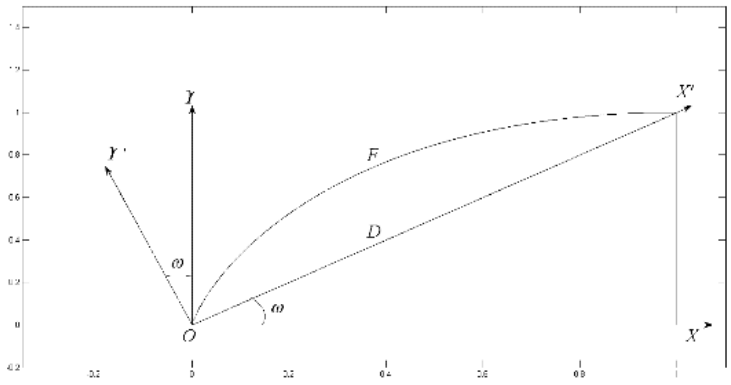

Fig. 3. Interpretation of SEP-exchange in SES at using of the new coordinate system. Designations of axes are identical to used in Fig. 1

common area under curve Υ(*y*) and the area of elliptic sector clipped by the segment between the points [0; 0] and [y_n, Υ(y_n)].

From a geometrical point of view, the emergence of this sector can be described as dependence Υ(*y*) taken in the new coordinate system *ẏỎỸ* which is the result of the turn of coordinate system *yOY* at some angle ω at keeping of origin for the both systems *yOY* and *ẏỎỸ* in the same point.

Transferring matrix from *ẏỎỸ* to *yOY* is

$$T = \begin{Bmatrix} \cos\omega & -\sin\omega \\ \sin\omega & \cos\omega \end{Bmatrix} \tag{5}$$

or

$$\begin{aligned} y' &= y\cos\omega + \Upsilon\sin\omega, \\ \Upsilon' &= -y\sin\omega + \Upsilon\cos\omega, \end{aligned} \tag{6}$$

where

$$\begin{aligned} \sin\omega &= \frac{1}{\sqrt{1+k^2}} = \frac{S^T}{k}, \\ \cos\omega &= \frac{k}{\sqrt{1+k^2}} = S^T \end{aligned} \tag{7}$$

and S^T is defined by

$$S^T{}_n = \frac{B_n C_n{}^2}{2}\sqrt{1-\frac{1}{k^2+1}}. \tag{8}$$

Note that a determinant of square matrix (6) is equal to unit, indicating conservation of the

volume for considering phase space.

Then, in the light of (4)–(7) we can write down:

$$\int_0^y \Upsilon(z)dz - i\int_0^{y'} \Upsilon(z')dz' = \frac{1}{2} y\Upsilon(y), \tag{9}$$

where the second term is an area of elliptic sector in the new coordinates ỳỲ̀. Eq. (9) is a nonlinear integral equation with a complex term and it is the most general relation dealing with SES evolution (Fig. 3).

For the interpretation of (9) we employ the simple physical analogy. Let the first term in the left part be the general SEP circulating during the SES interface. The second term is a useless low-structured SEP irrevocably lost during exchange process.

Finally, the term in the right part is a useful SEP which is taken for an internal reconfiguration of SES with purpose of adaptation to the given level of an flow *y*. Then it is possible to formulate a concept of an efficiency of SEP-exchange θ as:

$$\Theta = \frac{1}{2} \frac{y\Upsilon(y)}{\int_0^y \Upsilon(z)\,dz}. \tag{10}$$

Thus, we see that evolution of SES is a result of permanent competition between a number of available (RMD) and unavailable (UMD) microstates.

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Закономерности развития социально-экономических систем, управляемых неограниченным числом акторов в простой модели взаимообмена

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Ключевые слова и фразы: акторы; общая закономерность; развитие; социально-экономическая система; эволюция.

Аннотация. В статье представлена математическая модель, созданная для открытой стохастической системы с целью описания эволюции социально-экономической системы (**СЭС**). Математическая модель основана на рандомизированном уравнении непрерывности в приближении неограниченного числа различного рода связей (источников и стоков) между СЭС и ее окружением, где каждая связь описывается уравнением непрерывности. Исследование данной модели приводит к формированию бесконечной системы дифференциальных уравнений, имеющих идентичную математическую форму, но разный смысл используемых величин. Для нахождения решения применяются методы математического и функционального анализа. Для интерпретации результатов использованы методы эволюционной геометрии. Полученное решение характеризуется закономерным изменением соотношения между доменами для востребованных и невостребованных микросостояний, которое выступает в роли обобщенного закона сохранения для открытой стохастической системы, подобной СЭС. В этом смысле имеют место динамическая трансформация структуры социально-экономической активности (**СЭА**) и закономерное изменение диапазона флуктуаций СЭА. Продемонстрировано, что данная модель может быть применима к наиболее общим сценариям развития СЭС.

UDK 337

Factors Determining the Effectiveness of the Nature Management Enterprise

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Key words and phrases: efficiency factors; enterprise of nature management; natural environment; human needs.

Abstract. In order to study the factors that affect the efficiency of the enterprise of environmental management, the article examines the components of the natural environment and the efficiency of activities. The author used the methods of analysis, generalization, and synthesis. As a result of the conducted research, the main factors that determine the efficiency of the enterprise of environmental management and the components of the efficiency of the enterprise's production activities are identified.

Nature management is understood as a set of measures for the use of natural resources in order to meet the economic, industrial, health and wellness or other needs of a person. The second interpretation provides for the definition of the concept of "nature management" as a scientific discipline. That is, it is, in fact, a theoretical science that studies and evaluates the process of human use of natural resources, as well as developing ways to optimize it.

There is a distinction between rational and irrational use of natural resources. In the rational use of natural resources, the involvement of natural resources and the properties of nature in the sphere of human activity provides the needs for them not only for the present, but also for future generations. This can only be achieved through the integrated, cost-effective use of natural resources in compliance with the requirements of nature protection. Irrational use of natural resources leads to the depletion of natural resources, pollution and degradation of natural systems, and disruption of their ecological balance. At the same time, there is a complete or partial loss of the quality of the natural environment, a decrease in its health and aesthetic functions.

The set of objects and conditions of nature that affect humans and natural resource economic indicators of economic activity is called the natural environment. The quality of the natural environment is understood as its ability to perform functions in interaction with society for an unlimited period of time:

1) the spatial basis for the settlement, distribution and development of productive forces;
2) sources of natural resources;
3) natural absorber and assimilator of anthropogenic pollution;
4) "storage" of the gene pool and species diversity of the plant and animal world.

All these important functions are components of one main function of the natural environment – the function of human life support.

Natural resources are those objects (or phenomena) that are not created by man, which

are used by him to meet a number of his needs. These include minerals, soils, flora and fauna, surface waters, etc. All natural resources by the nature of their human use can be divided into the following classes:

- industrial;
- agricultural; scientific;
- recreational facilities;
- medical, etc.

They are also divided into two large groups: inexhaustible (solar energy, water); and exhaustible (oil, natural gas, etc.). The latter, in turn, are divided into renewable and non-renewable natural resources. It is worth noting that you can only refer a particular resource to a certain group conditionally. After all, even our Sun is not eternal and can "run out" at any time.

Thus, nature management is the theory and practice of rational use and reproduction of natural resources and natural conditions by humans, including the analysis of anthropogenic impacts on ecosystems and their consequences for humans.

Nature management or environmental management is the use of natural resources in the production process to meet the needs of society. In other words, activities aimed at protecting the environment and preserving natural resources are nature management. In a more formal form, environmental management refers to decisions and actions related to the allocation and development of resources, as well as the use, restoration, monitoring and assessment of changes in the environment. Its main goal is to ensure the rational use of society's resources. This concept was developed due to the emergence of the principles of sustainable development. Environmental management is currently considered as a science that develops general principles for the rational use of natural resources and their impact, which helps to prevent an environmental disaster and preserve the environment.

Nature management activities related to the rational use of the environment can be carried out by individuals, households, industries, or government agencies. The main purpose of any industrial enterprise is to produce certain products of a certain volume and quality, within a certain time frame. When determining the scale of production, it is necessary to proceed not only from the individual and national economic needs for this product, but also from the need to take into account the achievement of the maximum level of its efficiency. Therefore, it is necessary to evaluate the quality of the work of an industrial enterprise, first of all, by determining the economic efficiency of the products produced, since high production efficiency is a necessary prerequisite for the systematic expansion of production.

The economic theory defines the category of efficiency as the effectiveness of a production process, production system, or a particular form of management. In general, the economic efficiency of production is a quantitative ratio of two values: the results of economic activity and the costs incurred (in any proportion).

The essence of the efficiency of production and economic activity is interpreted by most economists as the achievement of maximum results in the interests of society at the lowest possible cost. Therefore, the definition of this indicator should be based on a comparison of the result of production with the total costs of living and past labor that caused this result.

Naturally, the production of products is impossible without the cost of materialized and living labor, so in any field of management, both one-time and current costs are necessary for the production of products. At the same time, the cost value is not a constant value, but depends on many factors. Each type of product can be produced from various types of raw materials and materials, with the help of various technical means, at enterprises that differ in size, profile, structure, with various forms of labor and production organization.

It is obvious that when choosing ways to meet the needs for the necessary products –

national and individual – it is necessary to proceed from the lowest costs of social labor for its production, that is, to ensure that these costs are produced with the greatest economic efficiency.

Of particular interest in any economic situation is the relationship between the costs and the results of the organization's activities. The objective necessity of all-round economy of social labor is determined by the fact that the social needs in each given period of time exceed the resources available to society – material, labor, financial. Hence the essence of economic efficiency, which consists in the need for these resources, by saving them, to provide to the greatest extent the increasing social needs.

The solution to this problem is hindered by the fact that the methodology of economic analysis, which would allow the most complete and correct study of the impact of STP on production efficiency, has not been widely used.

The special significance of the problem of production efficiency determines the need to correctly take into account and analyze the level and scale of efficiency of all means and elements of production. The essence of the problem of improving the efficiency of production and economic activity is to achieve the maximum possible increase in the volume of production (income, profit) for each unit of resources (expenses) – labor, material and financial. Consequently, an important macroeconomic criterion for the effectiveness of activity becomes the growth of the productivity of public (living and materialized) labor.

Ultimately, the economic efficiency is expressed in an increase in labor productivity. Consequently, the level of labor productivity is a criterion for the economic efficiency of production. The higher the labor productivity and, consequently, the lower the production costs, the higher the economic efficiency of labor costs.

In foreign practice, the term "efficiency of the production and service system" is usually used as a synonym for the term "efficiency of management", when productivity is understood as the effective use of resources (labor, capital, land, materials, energy, information) for the production of a variety of goods and services.

The overall performance of the system is a concept much broader than labor productivity and profitability of production. A hereditary sign of efficiency (productivity) may be the need to achieve the goal of production and economic activity of the enterprise (organization) with the least expenditure of social labor or time.

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Факторы, определяющие эффективность предприятия природопользования

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Ключевые слова и фразы: потребности человека; предприятие природопользова-

ния; природная среда; факторы эффективности.

Аннотация. С целью изучения факторов, влияющих на эффективность работы предприятия природопользования, изучены составляющие природной среды и эффективности деятельности. Использованы методы анализа, обобщения, синтеза. В результате проведенного исследования выделены основные факторы, определяющие эффективность предприятия природопользования, и составляющие эффективности производственной деятельности предприятия.

UDK 33

Monitoring of the Arctic Zone Pollution in the Russian Federation

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Key words and phrases: development of the marine economy; international significance; key bioresource reservoir; northern basin; pollution monitoring.

Abstract. Despite the destructive development of the marine economy, the northern basin retains the role of one of the key bio-resource reservoirs of international importance. Along with fish, there are significant reserves of algae and invertebrates: kapshak, northern krill, mussels, scallops, sea urchins; the population of the king crab is growing rapidly. The northern seas are also home to about 20 species of marine mammals.

The development of industry and the creation of industrial zones in areas gravitating to the Northern Sea Route (**NSR**) in the past 40 years have led to the sustainable development of shipping in the Arctic seas. This is primarily due to the development of the extraction of mineral resources, the creation of industrial complexes in the northern regions for the extraction and processing of non-ferrous, rare and precious metal ores.

The territory of the Arctic is characterized by vast, untouched habitats of flora and fauna. Given the absence of a large number of man-made structures, these lands are among the most pristine in the world. Treeless tundra, frozen ground with primitive plants such as lichens and mosses are the most characteristic features of the Russian Arctic. Due to low temperatures, permafrost and low microbiological activity, organic components decompose very slowly in the tundra.

The impact of oil pollution is especially significant during plankton blooms. Fish roe is most susceptible to oil pollution.

The need for effective environmental policies remains critical for the Arctic. Experts believe that the development of energy resources on the continental shelf will aggravate the ecological situation in the southern part of the Barents, western parts of the Kara and Chukchi seas. But the sustainable development of all of Russia largely depends on the sustainable development of the Arctic, many areas of which are now on the brink of survival.

For traditionally maritime industries, environmental protection is supported by activities on board ships and onshore facilities.

Shipping and oil production on the Arctic shelf are the main sources of its pollution and the increased threat of oil spills, which can cause irreparable harm to the easily vulnerable nature of the North. Sustainable development of the Arctic is impossible without the development of measures to ensure the environmental and safety of oil production. They can be conditionally

divided into two parts:

1) measures to reduce and prevent operational pollution arising from normal operation;
2) measures to reduce damage in emergency situations associated with oil spills.

Of the currently established technologies for the delivery of goods to the Arctic, the most complex and hazardous for the environment is the delivery of fuels and oils. On average, 50 tanker voyages are carried out on the NSR annually, transporting about 400 thousand tons of oil, the main amount (80 %) of which is diesel fuel. Oil delivery to domestic consumers in the Arctic, as a rule, is carried out according to the established scheme: oil is supplied to the western part of the Arctic (from Novaya Zemlya to the port of Tiksi) from Murmansk and Arkhangelsk, and to the eastern part (from the port of Tiksi to the Bering Strait) from Nakhodka and Providence.

According to the data, there are five main routes for pollutants to enter the Arctic:

– falling out of the atmosphere;
– brought by ocean currents;
– removal by rivers flowing to the north;
– direct discharge from the shore;
– direct burial at sea.

A distinctive characteristic of the Arctic is a low temperature, due to which evaporation decreases and therefore semi-volatile compounds can be transferred to the Arctic due to the processes of “global distillation”, that is, in the same way in which heat is transferred from the equatorial regions to the Arctic. The primary medium for semi-volatile and insoluble substances is mainly the atmosphere, not the sea. At the same time, the transport of soluble and less volatile compounds occurs mostly due to ocean currents.

Airborne releases of pollutants to the Arctic include both local pollutants and pollutants from significantly distant sources.

According to **AMAP** (Arctic Monitoring and Assessment Program) of the Arctic Council, persistent organic compounds and oil are the main threats to the Arctic environment today. Incidents on offshore drilling platforms can be especially dangerous [7].

The main sources of pollution in the Arctic are industrial enterprises of the Kola Peninsula, Arkhangelsk and Taimyr Peninsula, runoffs of the Severnaya Dvina, Pechora, Ob and Yenisei rivers, as well as discharges of partially purified industrial or industrial untreated wastewater from settlements and cities.

Due to the specificity of the rivers flowing into the Arctic seas, pollution mainly remains in the coastal zone. The Arctic seas are currently the cleanest in the world.

There are two types of environmental hazards – industrial contaminants and accidental pollution. Industrial contaminants are generated and discharged continuously, albeit in relatively small quantities. At the same time, accidental pollution has a salvo nature, but is limited to the accident area and adjacent territories. In the event of an emergency discharge, there is a massive death of the inhabitants of the sea, and with constant operational discharges of pollutants, chronic pollution of the entire NSR occurs.

Sources of air pollution on board ships are emissions from power plants of sulfur and nitrogen oxides, carbon, ozone-depleting substances, as well as noise. These emissions are currently not standardized, but they should be taken into account when assessing the impact of shipping on the environment.

Emergency oil spills occur, as a rule, during loading and unloading operations, during bunkering of ships at sea and when oil is delivered to an unequipped shore through temporary pipelines.

The International Maritime Organization (**IMO**), when developing measures to ensure

preparedness for oil spill response (hereinafter OSR), recommends, based on an assessment of the risk of spills, conditionally dividing oil spills into three categories.

Level 1 is an oil spill, the response of which can be carried out by the forces and means available to the perpetrator of the spill, for example, on a drilling platform, or one specialized service. Usually this is an oil spill not exceeding 500 tons.

Level 2 is a spill, the elimination of which will require the involvement of forces and resources available in the surrounding areas and the region. The volume of such spills does not exceed 5000 tons.

Level 3 is a spill, for the elimination of which it is required to attract forces and means from other regions, including from neighboring states.

With the current volume of oil transportation in the Arctic, oil spills of the 2nd level can occur. However, in the near future, when organizing oil production on the shelf, Level 3 spills are possible. Based on this, a system of readiness for their elimination should be built. The main causes of spills, both small and large, are pipeline damage during loading and unloading operations and accidents (collisions, grounding) of tankers carrying oil. In the near future, they will be supplemented by accidents on drilling platforms and pipelines supplying oil to oil terminals (ice and wave loads, accidents and falls on helicopter platforms, gushing, accidents during tanker loading, and ruptures of subsea oil pipelines).

The behavior of oil in cold Arctic seas, especially in ice conditions, is significantly different from the behavior of oil in the event of an oil spill in other regions of the Earth.

The behavior of oil in open water obeys well-known equations and lends itself well to mathematical modeling. At the same time, the behavior of oil under the ice, in the openings of ice, on its surface is currently practically unpredictable and very difficult to model. Oil under the ice, without sticking to it, accumulates in its underwater irregularities, while mixing under the action of the current. Under ice and snow, oil, without significant changes, can remain for a long time (up to several months). Various oil spill scenarios proposed for arctic conditions show that any spill always ends up onshore in any spill. In the Arctic conditions, this means that oil, if it hits the shore, is almost impossible to remove, therefore it is extremely important that the OSR preparedness strategy relies primarily on ensuring the collection, destruction of oil by burning and dispersing in the open sea.

The existing system of preparedness to respond to all kinds of oil spills in the sea is not able to ensure environmental safety with the planned volumes of oil and oil products transportation in the Arctic.

It is necessary to develop regulatory documents regulating the procedure and procedure for ensuring environmental safety on the NSR routes.

The well-being of some Arctic regions is explained not by the fact that negative northern factors act in them to a lesser extent, but by the presence of opposing strong competitive advantages, the main of which are highly efficient and unique natural resources and a favorable geographical position. If these competitive advantages do not outweigh the negative factors, then the corresponding regions fall into the group of problematic ones, which are not able to support self-development based on their own resources only. But in general, the Arctic zone retains its macroeconomic competitiveness, primarily due to the development of the oil and gas, mining and chemical, diamond mining, metallurgical and fishing industries.

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Мониторинг загрязнения Арктической зоны России

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ФГБОУ ВО «Российский государственный гидрометеорологический университет», г. Санкт-Петербург (Россия)

Ключевые слова и фразы: ключевой биоресурсный водоем; международное значение; мониторинг загрязнения; развитие морской экономики; северный бассейн.

Аннотация. Несмотря на деструктивное развитие морской экономики, северный бассейн сохраняет роль одного из ключевых биоресурсных водоемов международного значения. Наряду с рыбами, здесь имеются значимые запасы водорослей и беспозвоночных: капшак, северный криль, мидии, гребешок, морские ежи, быстро растет популяция камчатского краба. Северные моря являются также областью обитания около 20 видов морских млекопитающих.

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