

## ГЕОДЕЗІЯ

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### **DEVELOPMENT OF EDUCATIONAL DIRECTION TO ENSURE THE ENVIRONMENTAL USE OF LAND IN THE FORMATION SYSTEM OF MODELS AND INSTRUMENTS IMPLEMENTED IN THE EDUCATIONAL SYSTEM OF UKRAINE<sup>1</sup>**

*It is proved that in the conditions of transformation processes, permanent changes in external and internal environment, negative influence of factors on functioning of economic systems training of experts who can adequately react to the presented problems has special value. It is determined that the formation and application of models and tools implemented in the educational system of Ukraine, their characteristics are important and relevant.*

*The purpose of the study is to characterize the methods and models implemented in the educational system of Ukraine in the context of the development of the educational direction of environmental use of land. To achieve this goal the following tasks are solved: definition of models used in the educational system; description of methods for the implementation of educational services; highlighting the features of the implementation of methods and models used in the educational system; determine the ways of forming and developing the educational direction of environmental use of land.*

*The study identified tools for educational activities, which consists of methods and models that have a personality-oriented nature, taking into account the interests of different groups of stakeholders. It allows to increase the effectiveness of educational activities, but the problematic aspects that arise in educational activities reduce the effectiveness of its operation. Therefore, there is a need to address them through the use of modern methods and models of educational activities. The necessity of development of the educational direction of the environmental use of land as a modern way of training skilled specialists for the economy of the state and ensuring the efficiency of land use in compliance with environmental safety is determined.*

**Key words:** *ecological use of land, educational system, models, methods, tools, personality-oriented approach.*

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**Introduction.** In the conditions of transformation processes, permanent changes in the external and internal environment, the negative impact of factors on the functioning of economic systems, the training of specialists who can adequately respond to the presented problems is of special importance. To do this, there is a need to use modern models and tools implemented in the educational system. In addition, in the context of slowing demographic processes in Ukraine, reducing the level of innovation in the education system, slowing down the integration and interaction of educational institutions with international partners, reducing the effectiveness of relations between different groups of stakeholders, there are problematic aspects affecting the development of education systems. In modern conditions, special importance is to ensure the environmental use of lands, the use of which affects the development of territories and the life of the population. In this context, one of the ways of modern development of the educational system is the development and implementation of training of specialists on the educational direction of environmental use of land. Thus, the formation and application of models and tools implemented in the educational system of Ukraine, development and implementation of educational direction for the environmental use of land, their characteristics are important and relevant.

**The purpose and objectives of the study.** The purpose of the study is to characterize the methods and models implemented in the educational system of Ukraine in the context of forming and implementing the educational direction of the environmental use of land. To achieve this goal the following tasks are solved:

- definition of models used in the educational system;
- description of methods for the implementation of educational services;
- highlighting the features of the implementation of methods and models used in the educational system;
- determination of directions and peculiarities of formation and implementation of educational direction of environmental use of land.

**Analysis of existing publications.** Directions of formation and use of methods and models in educational processes are presented in developments [1–17].

Along with this, the issues of distinguishing the peculiarities of the application of methods and models, tools implemented in the educational system of Ukraine remain unresolved.

**Main part.** When defining models for the implementation of educational services, modeling processes are characterized. In particular, according to V. Maslov, modeling in pedagogy has always existed in the form of standards of personality, the content of its education and training, but began to develop actively in the middle of the last century [10].

As part of the provision of educational activities, the following models have been formed:

- prognostic: for optimal allocation of resources and specification of goals;
- conceptual: formed on the basis of information database and action program;
- instrumental: with which you can prepare the means of execution;
- monitoring models: to create feedback mechanisms and ways to correct possible deviations from the planned results;
- reflexive: which are created to make decisions in case of unexpected and unforeseen situations [18].

The educational system uses models focused on sustainable development with a change in the consciousness of teachers through the use of value-semantic approach.

It should be noted that recently systems of system analysis have been used, which consider the educational process as a holistic system, consisting of a set of interconnected elements, taking into account the personality-oriented approach.

The educational system uses mathematical models based on correlation-regression analysis to establish cause-and-effect relationships. For their construction and implementation the following directions are used:

1. Formation of information and analytical support for modeling.
2. Construction of a correlation matrix that determines the relationships of indicators.
3. Development of models that characterize the causal relationships between indicators.
4. Verification of the developed models for adequacy based on the application of appropriate criteria.
5. Interpretation of the established causal relationships between indicators [19].

To verify the models used in the education system for adequacy, the relevant criteria are applied:

1. Correlation coefficient ( $R$ ), which characterizes the level of influence of the independent indicator ( $x$ ) on the resulting component ( $y$ ). On the basis of values of a correlation coefficient the directions of communication (inverted, direct) are defined. Depending on the values of the correlation coefficient, the level of influence between the indicators is set:

- 0 – no connection;
- 0.01 – 0.25 – low level of influence;
- 0.251 – 0.5 – mediocre level;
- 0.501 – 0.75 – significant level;
- 0.751 – 0.99 – high level;
- 1 – absolute connection.

2. The coefficient of determination is defined as the square of the correlation coefficient and characterizes the relationship between the indicators.

3. Student's criterion ( $t$ ) determines the statistical significance of the indicators of the developed model. It is evaluated by the ratio:

$$t = \frac{V_1 - V_2}{\sqrt{v_1^2 + v_2^2}}, \quad (1)$$

where  $V_1$  – are the average values of the first arithmetic comparison set;

$V_2$  – average values of the second arithmetic comparative set;

$v_1$  – average errors of the first arithmetic comparison set;

$v_2$  – average errors of the second arithmetic comparison set.

Indicators are statistically significant if the actual value of the Student's criterion exceeds its normative value. Otherwise, the indicator is excluded from the model.

4. Fisher's test ( $F$ ) is determined to confirm the significance of the correlation coefficients, which shows the reliability of the established relationships. The reliability of the established relationships between indicators is confirmed if the actual value of the Fisher criterion exceeds its normative value. If on the contrary, the model is considered inadequate. The value of the Fisher criterion is determined by the ratio:

$$F = \frac{1 - \eta^2}{n - p}, \quad (2)$$

where  $\eta$  – is the correlation that characterizes the relationship between the integrated indicator of the formation and use of intellectual capital and the generalized criteria of competitiveness and investment attractiveness of construction companies;

$p$  – parameters of the regression model;

$n$  – is the number of observations used for modeling.

5. Homo or heteroskedasticity test criteria used to determine the homogeneity or branching of residues of a random variable. The Broysch-Pagan, White, Golffeld-Kwandt, Glaser, and Aitken methods are used.

6. The Darbin-Watson test ( $d$ ) is used to determine the autocorrelation of the residues and is determined by the ranges of values, where the respective zones are characterized in relation to its minimum and maximum values ( $d_L$  and  $d_U$ ):

– if  $d < d_L$ , positive autocorrelation – the model is considered inadequate;

– if  $d > d_U$ , the hypothesis is not rejected – negative autocorrelation – the model is adequate;

– if  $d_L < d < d_U$  is an uncertainty zone where it is not possible to clearly determine the level of autocorrelation, there is a need for additional research [19].

Criteria for testing for multicollinearity, which determines the degree of dependence between independent variables. The essence of this phenomenon is that a high level of dependence between independent indicators leads to a shift in the evaluation results and obtaining inaccurate values of the correlation coefficient. Multicollinearity testing is performed on the basis of correlation coefficients.

To implement the educational process, the tools of system analysis, modeling, comparison, dialectical development, legal and information-analytical support, expert and structural-substantive analysis are used.

The presented tools and the proposed models are implemented through a set of interconnected elements:

– formation of a theoretical and methodological platform for the implementation of the educational process;

– creation of information-analytical and normative-legal base of functioning and development of educational process;

– development of models for the implementation of the educational process, taking into account the personality-oriented approach, taking into account the interests of stakeholders;

– research of adequacy and reliability of models;

– application of models in the educational process;

– interpretation of the obtained results.

The education system uses general and special teaching methods. They are structured by:

– the level of information (verbal, visual, practical);

– by submitting educational material (methods of ready knowledge and research methods);

– taking into account the purpose of training (methods of acquiring new knowledge, formation of skills and abilities, application of knowledge in practice, creative activity, consolidation of knowledge, skills and abilities, testing and evaluation of knowledge, skills and abilities);

– by the nature of educational and cognitive activities, heuristic, research [20].

Implementation of the presented instrumentation of the educational system is aimed at using them in the educational process. In particular, for use in the training of specialists capable of solving complex integrated tasks and practical problems in the field of

environmental use of lands with the use of modern devices, software and the latest methods.

It should be noted that the educational program is designed to provide scientific integrated knowledge, necessary practical skills and research activities in the field of environmental use of land. It is based on well-known provisions and results of modern scientific research on geodesy, land management, environmental safety and provides compulsory study of modern methods, methods and acquisitions of skills to use modern geodetic instruments and software, environmental and land monitoring, takes into account the scientific and practical interests of the applicants for chosen disciplines.

Implementation of the educational program is carried out on the basis of a combination of lectures, practical classes, independent and research work, applying normative literature, tutorials, lecture abstracts and experimental research, consultations with teachers.

The formation and implementation of the educational program is carried out by combining competent characteristics aimed at obtaining results:

- to know directions and modern trends in the development of the presented sphere;
- to determine the methods of collecting, processing geospatial data, to offer and analytically substantiate the models of efficient use and monitoring of land;
- to determine the directions and peculiarities of the formation of information and analytical provision of environmental monitoring;

- to analyze, determine, solve comprehensive problems in the field of environmental use of lands;
- plan and permanently decide on the environmental use of land;
- to search and analyze the information resources of environmental use of lands;
- to apply modern geospatial and ecological tools on environmental use of lands;
- organize and interact with stakeholders in the field of environmental use of lands;
- apply the regulatory and regulatory provision of land use;
- to form and implement project solutions in the field of environmental use of land.

**Conclusions and suggestions.** Thus, the study identified tools for educational activities, which consists of methods and models that have a personality-oriented nature, taking into account the interests of different groups of stakeholders. It allows to increase the effectiveness of educational activities, but the problematic aspects that arise in educational activities reduce the effectiveness of its operation. Therefore, there is a need to address them through the use of modern methods and models of educational activities. Specific ways and features of formation and implementation of the educational program of environmental use of lands, as one of the modern areas of development of an educational system, taking into account innovative approaches, tools and interaction with stakeholders.

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**Вень Мінмін, Лю Чан, Сонг Шулі, Мамонов К.А., Рибіна О.І. РОЗВИТОК ОСВІТНЬОГО НАПРЯМУ ІЗ ЗАБЕЗПЕЧЕННЯ ЕКОЛОГІЧНОГО ВИКОРИСТАННЯ ЗЕМЕЛЬ У СИСТЕМІ ФОРМУВАННЯ МОДЕЛЕЙ ТА ІНСТРУМЕНТІВ, УПРОВАДЖЕНИХ У СИСТЕМІ ОСВІТИ УКРАЇНИ**

*Доведено, що в умовах трансформаційних процесів, перманентних змін у зовнішньому і внутрішньому середовищі, негативного впливу чинників на функціонування економічних систем особливе значення має підготовка спеціалістів, які можуть адекватно реагувати на представлені проблеми. Визначено, що формування та застосування моделей та інструментів, що реалізуються в освітній системі України, їх характеристика мають велике значення.*

*Метою дослідження є характеристика методів і моделей, що реалізуються в освітній системі України в контексті розвитку освітнього напрямку екологічного використання земель. Для досягнення поставленої мети вирішено такі завдання: визначення моделей, що використовуються у освітній системі; характеристика методів для реалізації освітніх послуг; виокремлення особливостей реалізації методів і моделей, що використовуються в освітній системі; визначення шляхів формування та розвитку освітнього напрямку екологічного використання земель.*

*У результаті дослідження визначено інструментарій здійснення освітньої діяльності, який складається з методів і моделей, що мають особистісно-орієнтований характер, ураховують інтереси різних груп стейкхолдерів. Він дає змогу забезпечити зростання результативності освітньої діяльності, проте проблемні аспекти, що виникають в освітній діяльності, знижують ефективність її функціонування, тому виникає необхідність їх вирішення шляхом застосування сучасних методів і моделей здійснення освітньої діяльності. Визначено необхідність розвитку освітнього напрямку екологічного використання земель як сучасного шляху підготовки кваліфікованих спеціалістів для економіки держави і забезпечення ефективності землекористування з дотриманням екологічної безпеки.*

**Ключові слова:** екологічне використання земель, освітня система, моделі, методи, інструментарій, особистісно-орієнтований підхід.