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METHODOLOGICAL ISSUES OF ANALYSIS EFFICIENCY

Methodological issues in analyzing the effectiveness of the system approach. A set of models of calculation of actual and projected levels of efficiency in the region.

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Introduction: The level of performance has an impact on the decision of a number of economic and social objectives, such as rapid economic growth, improving living standards, reducing inflation, improving conditions of work and rest. At the heart of the concept of efficiency (from the Latin word ''effectus'' – performance, action) there are limited resources, the desire of manufacturers to save resources, time, get as much production from the available resources, hence the choice of products, mode of production and distribution of resources. Application of the concept of efficiency in economic activity can be considered the effectiveness of the production process as the ratio of what is produced to what is necessary for the production, in particular, the ratio of output to the cost of resources.

Since the evaluation of human activity, process or technology is the most important indicator, which is the basis for management decisions, the development and analysis of the performance indicator has long been consistently under scrutiny specialists in various scientific fields [4-7; 9; 10]. In view of this performance indicator is a measure of cross-cutting, because it is designed to meet the challenges of sciences and disciplines such as economics, systems analysis, optimal control, operations research, etc. Thus, the use of the efficiency index as a criterion for optimal control allows you to automate management processes, thereby minimizing the human factor.

Material interpretation: The state and industry statistics, there are over ten forms of statistics that reflect the performance indicators in enterprises, industries, regions, on the macro economy.

Analysis of these forms can distinguish three groups of performance indicators:

- Standardized performance products that are made to state standards, data sheets of products, technical and design documentation, and are used for product certification, examination and surveys;
- Indicators of efficiency of production processes that are made to standards and passports companies and are used in the implementation of state supervision over efficient use of resources and surveys by the state oversight;
- Indicators of the implementation of conservation of material, labor, financial resources (reflected in the statistical reporting, regulatory and program-methodical documents are controlled by structures of state administration and supervision).

Since the implementation of the evaluation and effectiveness analysis is needed for carrying out various operations, processes and projects, including the main requirements for performance indicators are required connection benchmarks, which are common to any operation, process or project.

Choosing the most effective and most efficient operation of the process can be carried out in a search mode, but the process of finding the optimum in this case will be accompanied by loss of time and that is also not possible economic losses. In cases where there is a basis of comparison, evaluation and effectiveness analysis and decision-making exercise based on economic, technical or other factors. However, both methods of assessing the effectiveness do not provide high accuracy. The accuracy of these methods is lower the higher the duration of the operation or process.

Since the performance measures should reflect not only the results at the end of the period, but also make it possible to manage the situation within the reporting period in order to achieve the desired results upon its expiry, evaluation of the effectiveness of the enterprise should be based on a comprehensive analysis of the final results of its effectiveness.

For the measurement, evaluation and performance analysis system applies the criteria and indicators used in practice is not itself a criterion, and built on its basis a system of indicators, each of which must be installed in the least reflect the elements of the analyzed process. Criteria and indicators are closely linked: evidence-based selection criteria to a large extent determines the precise choice of parameters. Conversely, the quality index is determined by how fully and objectively, it characterizes the adopted criterion.

The criteria of economic efficiency of management are diverse, and they can not express in any single indicator.

To assess and analyze the economic efficiency of applied differentiated and summarizing performance indicators. The effectiveness of the use of any one type of cost and resources of the system is expressed in differentiated performance. These include: labor productivity (labor input), capital productivity (capital ratio), material productivity (material intensity of production), capital productivity (capital intensity). Differentiated performance indicators are calculated as the ratio of output to certain types of costs or resources, or vice versa – costs or resources to produce goods.

To evaluate the cost-effectiveness of the whole region, the company applied generalize (complex) performance indicators. These figures allow for a more complete and in relation to take into account many factors and their components that affect the level of efficiency and dynamics.

The basis of the formation of general indicators are two conditions: the final accounting, qualitative result and reflection of the total value of costs and resources (for example, the total quantity of labor costs).

The main general indicator of economic performance include: the performance of total labor costs per ruble of commodity production, profit, profitability and product profitability, gross national product per capita national income.

Because the most important indicators of economic efficiency of production – labor productivity (labor input), capital productivity (capital ratio) material productivity (material intensity of production), capital productivity (capital intensity) – have a similar calculation procedure and the economic efficiency of enterprises are mainly quantitatively measured by comparing the two quantities obtained in manufacturing process results and costs of labor and materials to achieve it, we consider the implementation of the calculation and analysis of performance based on its most important component – the productivity of labor. In this case, are analyzed indicator should be viewed as a system.

The system – the Greek word, literally meaning "whole, consisting of the parts." In another sense – this is the order defined by the systematic, regular arrangement of parts as a whole, some parts of relationships. Any socio-economic system has certain properties that must be considered in the analysis. These properties include: dynamism, openness, activity, emergence [8].

Dynamic means that such systems are not in the statistical state, and continually evolving. Openness means that research into the socio-economic system in isolation, without considering the impact of the environment, it is impossible. In open systems there is a constant interaction with the environment. Activity – an active, not always predictable reaction to the impact of the system. Emergence means the presence of properties that are not inherent in her subsystems. Also, be aware that the processes occurring in the socio-economic systems are stochastic in nature.

All the properties described above are responsible for the complexity of the investigation and analysis of socio-economic systems. In some cases, the extreme complexity of the system is necessary to resort to its decomposition – the division of the system into parts and studying these parts as separate systems. Note also that due to the fact that the main method of research systems is a method of modeling used in the analysis of formal models, ie models that describe the object, the original iconic tools (formulas, diagrams, etc.).

Use a systematic approach to analyzing the effectiveness of the calculation involves not only actual but also the projected levels of performance indicator. In predicting the socio-economic indicators is the most common approach, when the analyzed time series of predicted values of the indicator is set in the pattern of changes in the rate of time and then extrapolated this relationship to future times. Thus, the basis for predicting the socio-economic indicators make up the inertial properties of the object (ie, "cause" is the time). Distributed by the approach when considering the basis for prediction of cause-effect relationship between the predicted parameter and factors affecting on it [6; 9]. However, such approaches often yield poor prognosis because they are formed only on the account of the reasons for a change in the projected figure. Using a systematic approach to forecasting the socio-economic indicators improves the accuracy of prediction [11].

The term "systems approach" denotes the group of methods by which the real object is described as a set of interacting components. The main principles of the systems approach are: integrity, which allows to consider both the system as a whole and at the same time as a subsystem for the higher levels, the hierarchical structure, that is, the presence of multiple (at least two) elements on the basis of the subordination of the lower-level elements of the elements higher level, structuring, which analyzes the elements of the system and their relationships within a particular organizational structure. Typically, the process of the system due not so much the properties of its individual elements as properties of the structure, multiplicity, allowing the use of a variety of economic and mathematical models to describe the individual elements and the system as a whole, systematic, object property, have all the characteristics of the system [8].

Taking into account the principles of a systematic approach, its requirements can be fully realized only limit in the complex models, which in the course of its operation some models of functional tasks would act as an inter-related problems [2].

For an analysis of actual and projected levels of productivity and total labor living in the region we have developed a set of economic-mathematical and mathematical-statistical models. The complex patterns identified two sub models:

- the calculation of the actual performance levels of living and the total labor in the region;
- the calculation of projected levels of living and productivity of total labor in the region.

Each of these subcomplexes contains three models qualitatively disparate groups: information models, matrix models, models of the formation of the output.

The structure of the information sub models calculate actual performance levels of living and the total labor in the region includes models that provide the formation of: technical and economic indices of the matrices of direct costs {1}; data on the final release of products {2}, the data on gross output {3}; data on cost of living labor to produce one unit of each product sector {4}.

The group of deterministic matrix models as part of the sub as the basic model includes providing calculation: direct costs production per unit of each product sector {5}; total cost of production per unit of each product sector {6}; indirect costs output per unit of each product sector {7}, gross output {8}, the total labor costs to produce each product sector {9}, cost of living labor to all the gross production industry {10}, total labor costs for all Gross production industry {11}. The group model of formation of the output data of the sub models included models generate output data for the analysis of labor productivity in user-friendly form {12}.

Panel data models that are part of sub models for calculating the projected levels of performance combined living and working in the region, the model includes: the formation of the initial data {13}, dimensional deterministic prediction of parameters for the future {14}, dimensional non-deterministic prediction of parameters

for the future {15}.

An important role in this group of information models play a one-dimensional models predict deterministic and nondeterministic settings in the future. The group of one-dimensional models predict the parameters determined for the future includes five models for different purposes: a model of {14.1} prediction index based on the trend and variability, the model {14.2} autoregressive prediction, the model {14.3} forecast annual average rate and its confidence limits, the model {14.4} of the trend line and its confidence limits, {14.5} model prediction of a particular level of the indicator and its confidence limits.

Model {14.1} prediction index based on the trend and variability, as well as the model {14.2} autoregressive forecasts are based on studying the trends of the random variable in the past and extrapolating the trend for the future. In these models, it is assumed that the size of the sign, which characterizes the figure is influenced by many factors, both known and unknown. However, they are given implicitly in terms of their impact on the effective annual rate. Model {14.3} in the operation generates forecast annual average rate and its confidence limits. Model {14.4} defines the position of the trend line and its confidence limits. Model {14.5} provides a definition of a point forecast of a particular level of the indicator and its confidence limits [1].

In the one-dimensional models predict non-deterministic parameters for the future {15} implemented method of forecasting the one-dimensional non-deterministic parameters, which allows to calculate the one-dimensional projections with a given a priori reliability [3]. The basis of calculations by the method of operation of the model is the result of {14.5} (point forecast a quantitative value of a specific indicator of the confidence limits, and change it).

The group of non-deterministic matrix models of the sub model includes the following models: estimated direct costs of production per unit of each product sector {16}, projected total costs of production per unit of each product sector {17}; projected indirect costs of production per unit of each product sector {18}; formation of through the forecast gross output {19}; formation of through the forecast total demand for labor {20}.

The structure models of the formation of {21} output data of the sub models included models generate output data for the analysis of labor productivity in a user-friendly form.

Information basis for empirical research on the subcomplex models calculate actual performance levels of living and the total labor in the region are mainly data on the actual cash resources of production in the region for a number of successive time intervals allocated to the study period, as well as the cost of resources for the production of each type of product, the gross and final production output in the region.

On the basis of these data in the operation of models {1} {2} {3} and {4} preparation of information provided by "inputs" for the deterministic matrix models. Thus, a model of technical and economic indices of the matrices of direct costs {1} is preparing input data for models of formation of the direct costs of production in the production sector {5}. For each type of product information model of the economy of the region {1} developed the technical and economic coefficients of the direct costs of production per unit of this type of production. Ratio of direct costs shows how many units of the i-th type of product consumed directly as a means of production to units of the j-th type of product. Modules Models {2} and {3} models serve as the basis of quantitative determination of the values of the vector of gross output in a deterministic matrix model {8}. The basic functionality of the model of formation data for cost of living labor to produce one unit of each product {4} is the formation of the initial data for models of calculation of total labor costs per unit of production {9} and cost models of human labor on all gross production output {10}.

The basis for the construction of a deterministic matrix model of the direct costs of production per unit of each product sector are designed in modules of information models of technical and economic coefficients of the direct costs of production per unit of product sector. Using these ratios to the detailed product mix economies in the region built the matrix A – matrix model for the direct costs of production per unit of product, the industry {5}. The output of the model used in the modules {6}, {7}, {8}, {9} and {10} deterministic matrix models.

The quality of the calculations to analyze the performance of the proposed complex models is determined, other things being equal, the authenticity of incoming economic data in the model.

The use of a defined set of economic-mathematical and mathematical-statistical models for the calculation of actual and projected levels of performance in the region will enable a new level of quality to analyze efficiency in the region.

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РЕЗЮМЕ

Дюкіна Тетяна

Методологічні питання аналізу ефективності

Розглянуто методологічні питання аналізу ефективності з позицій системного підходу. Запропоновано комплекс моделей розрахунку фактичних і прогнозованих рівнів ефективності в регіоні.

РЕЗЮМЕ

Дюкина Татьяна

Методологические вопросы анализа эффективности

Рассмотрены методологические вопросы анализа эффективности с позиций системного подхода. Предложен комплекс моделей расчета фактических и прогнозируемых уровней эффективности в регионе.

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