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EFFECTIVENESS OF ECONOMIC DIAGNOSIS OF THE QUALITY OF HIGHER EDUCATION

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Abstract: The article reveals the importance of economic diagnostics in researching a higher education institution. The role of economic diagnostics in ensuring the efficiency of the higher education institution and the importance of diagnostic models are highlighted. A scientific proposal and practical recommendations are given to diagnose the economic and financial situation of the higher educational institution or the trends of changes in it.

Key words: higher education institution, diagnostic models, economic diagnostics, integrated indicators, mathematical modeling.

Introduction:

The starting point of studying the activity of a higher education institution (HEI) through diagnostics is to identify the existing problems. For this, it is necessary to correctly imagine the educational process and other processes in the activity of HEIs. It is known that the problem is manifested as a difference between the desired result of the activity and the results that are actually being achieved. Diagnosis is required to determine the reasons for this. Logical concepts as well as quantifiable indicators serve as necessary information for diagnosis. In addition to regularly recording quantitative indicators, the information system of HEI should also demonstrate their compliance with accepted criteria (goals, norms, forecast, etc.).

The main part

It is known that HEIs are a separate element of the country's higher education system. The task of this system is to provide higher education and prepare highly qualified personnel. The educational potential of the higher education system represents the extent to which the system is able to fulfill its mission. When evaluating the educational potential of the higher education system, the following indicators are used:

socio-economic possibilities of higher education development (number of higher education institutions, number of students admitted to higher education institutions, student contingent, number of specialists trained in higher education institutions);

demographic conditions of the development of higher education (number of graduates of general education schools, number of graduates of academic lyceums and vocational colleges, number of students who wish to study at HEIs);

the labor potential of the higher education system (the number of professors, including those with academic degrees and titles, the number of teaching and support staff, the number of administrative staff);

Material and technical base of HEIs (area of educational-laboratory buildings, area of student accommodation buildings, provision of educational and experimental materials, provision of educational-scientific literature, educational equipment);

Financial potential of HEIs (volumes of financing from the budget, extra-budgetary funds, including private and foreign investments, etc.);

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indicators summarizing the effectiveness of the higher education system (the number of people applying for admission to higher education, the number of applicants for 1 place, the number of requests per 10,000 people, the number of specialists graduating from higher education per 10,000 people, the number of students per 1 teacher, per 1 student the area of incoming educational-laboratory buildings, the area of common residences per 1 student, indicators of students' learning, indicators of the reasons for exclusion from the ranks of students, indicators of employment of graduates);

indicators of the level of education of the population (the total number of highly educated people, their weight in the composition of the employed population).

Based on these indicators, it will be possible to diagnose the achieved level of higher education development in the country, including the quality of higher education. The statistics of these indicators serve to increase the reliability of diagnostic conclusions. It should be noted that the above-mentioned indicators are important for the analysis of the activity of HEIs taken separately.

Quantitative indicators are consistently used in diagnostic research. Quantitative side of research involves 3 stages: 1) measurement; 2) mathematical modeling; 3) drawing conclusions. At the measurement stage, variable indicators and laws of quantitative measurement are presented. Mathematical modeling consists of making measurement results in the form of mathematical relationships. Quantitative dimensions that eliminate the causes of problems and create conditions for optimizing the operation of the object are based on the development of conclusions.

All stages are interconnected and complement each other. The system of economic dimensions occupies a special place in the diagnosis of the quality of education. Because from the point of view of socio-economic development, it will be necessary to express the results as economic indicators. In the conditions of market relations, taking into account individual HEIs, together with the indicators of the direct educational process, secondary economic indicators should be the results of diagnostic modeling - the evaluation of the economic validity of the evaluations of the educational service provided by the HEI (the product of the HEI), the effective use of intellectual, pedagogical, social potential or the human capital accumulated in the HEI.

The above-mentioned 3 stages - measurement, mathematical modeling and development of conclusions have their own characteristics. At the moment, their mutual differentiation is conditional. For example, the measurement itself can be thought of as a mathematical modeling, any indicator or its measurement scale can be considered a mathematical model (in relation to an economic indicator - an economic-mathematical model), and this model reflects the important relationships inherent in the object. In general, measurement can also be interpreted as a research method using a model. In size, as in modeling, the economic problem is transferred to the language of mathematics. In both cases, the main problem is to quantify the object and its important characteristics. The inseparability of tasks in measurement and modeling is also evident in the research of HEIs. Because economic processes occur in OTM as well as in economic systems, albeit differently in different areas of its activity.

Of course, economic measurements will consist of more indirect measurements. Here it is necessary to take into account the relationship between the characteristics to be measured and the possibilities of measurement. The economic-mathematical model serves as a form of expression of such relationships. The modeling process can be considered as a search for optimal amounts of variable factors.

It can be seen that the economic diagnostics of the quality of education in the activity of HEIs is one of the problems to be researched through economic-mathematical modeling. As stated, the model reflects in some way the important properties, processes and interrelationships in real systems.

Models can be built on different bases: models representing the properties or movement of a real existing object; models embodying any or all conceptually expressed concepts; models that represent action and generalize in thought (concept).

In economic-mathematical modeling, socio-economic problems are expressed in the language of mathematics. The study of the system of equations, mathematical formulas or other mathematical expressions allows to study in sufficient depth the relationships that have a quantitative expression in real phenomena. Thus, the model serves as a tool for object research. The model can be used to control, evaluate and analyze the activity of the studied phenomenon or system. The model is also used for educational purposes. The composition of modeling includes 3 stages: 1) model development; 2) model research; 3) study of a real object based on a model.

Depending on the measurement tools used, metric and non-metric models are distinguished. The metric model is developed as a mathematical algorithm. In this algorithm, it mathematically expresses the dependence of the dependent variable on other independent variables (indicators) that determine it. Non-metric models show structural descriptions of phenomena and relationships between elements.

Descriptive and normative models can be distinguished depending on the research tasks. Descriptive models How is the phenomenon occurring? or how can it develop? seeks answers to the questions. Sometimes it is interpreted that the tasks of diagnostics consist of these questions. In this case, the diagnosis is limited to explaining the observed facts and giving a forecast, that is, it plays a passive role. For example, in descriptive models in the form of correlation analysis, the object is studied by approximating, that is, by evaluating the statistical compatibility of the real situation with the dimensions in the model, which represent the relationship between the phenomenon and the variables defining it.

How should normative models be? answers the question. Such models are aimed at ensuring that any state of the object under study is reached, and the factors necessary to achieve the optimal state are studied. The main goal is to show the reasonable directions of the object's activity along with the reflection of the real reality. Whether a model is a descriptive or a normative model depends on its mathematical structure and the nature of its use. Therefore, diagnostics requires the use of normative models to a greater extent.

One of the problems in the development of diagnostic models of higher educational institutions is the generalization of indicators (indicators) used for different purposes. A summative assessment is an important source of information when describing a problem related to an event or situation. Also, in any research, summary indicators are referred to several criteria.

It should be noted that in the quantitative representation of the resulting event, which is represented by several indicators or whose signs are considered important, it is necessary to use generalizing indicators. Such phenomena are multidimensional, and their quantifiable properties can be considered as points in a multidimensional space. Each HEI has many characteristics from the point of view of educational quality diagnostics, and their quantitative measurement can be done in different ways depending on the research objectives. But the selection of indicators (indicators) to reflect the multidimensional result cannot be random, and it is necessary to rely on logical qualitative analysis. In order to measure any economic or social quantity, it is necessary to select quantities (indicators) that are realistically connected with it, which, when considered together, make it possible to draw certain conclusions about the object of research or its activity.

Individual factors are the influence of each indicator on the measured general characteristic, that is, on the quantity of the integral indicator, which is the significance of the indicator. In importance, on the one hand, the object characterizes its own property. On the other hand, the

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determination of significance is made by the researcher, depending on how he approaches the determination of the integral indicator, what methods he uses, and so on. In fact, the most correct way to determine its weight in the general or integral indicator is to determine the effect of each specific indicator based on a logical analysis, based on a deep theoretical basis. However, such an opportunity is not always available when performing diagnostics.

It is also possible to refer to mathematical statistics when evaluating the significance of the indicator. In the simplest approach, it is determined by the extent to which the effect of the indicator or indicators under consideration determines the total variance characteristic of the event. The correlation coefficient of the integral indicator with the specific indicator is taken as a quantitative expression of the importance of the specific indicator. In some cases, the importance of indicators is determined by an expert or all indicators are considered equally important.

If the individual indicators are summed up into an integral indicator, giving weight to them according to their importance, it will be in the form of the following formula:

$$y = \sum_{i=1}^{n} a_i \, x_i$$

Here:
y – the amount of the integral indicator;
n – the weight of private indicators
a_i – i- the weight of the indicator
x_i – i- the weight of the private indicator

The following conditions must be met in order for this formula to be valid for reasonable development and use of diagnostic conclusions:

x_i private indicators can be measured quantitatively on a continuous scale, their amounts are known for all objects, and the greater number of them, other things being equal, has a positive effect on the results of system activity;

the effect of changes in private indicators on the results is constant in the studied interval;

integral exponent is a flat (smooth) function of its arguments in the existing and studied limits, and therefore the function can be differentiated as many or as many times as needed.

In the above formula, the importance of private indicators is expressed in the weights given to them.

The formation of an integral indicator from specific indicators can also be expressed in the form of an exponential function, and it is based on the following formula:

$$y = x_1^a * x_2^a \dots x_n^a$$

In cases where the impact of specific indicators on the integrated indicator is complex, it is more difficult to generalize them. For example, complex indicators can be proposed to express the effectiveness of HEIs or the potential of HEIs.

$$CKK = \sqrt{P^2 + Y^2 +} F^2 + M^2 + U^2$$

Here:
CKK – complex coefficient of efficiency;
P – the level of execution of the production plan by specialists;
Y – the level of the number of students per 1 teacher compared to the norm;
F – armed with fixed assets relative to the benchmark;
M – the level of material costs compared to the standard;
U – graduate employment rate.

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Summary

Integral indicators can also be used in the diagnosis of the economic and financial situation of the HEI or the trends of changes in it. For example, it is possible to draw conclusions by using liquidity coefficients and combining financial indicators with them based on a certain algorithm. However, one cannot ignore the fact that many integral indicators are characterized by a number of shortcomings. Including:

in the development of integrated indicators, a certain amount of information is lost due to generalization. Because in general indicators, deterioration of results on some indicators may be compensated by improvement on other indicators. In reality, it is often possible that the deterioration of the result in one aspect may not be compensated by its improvement in another aspect. Different socio-economic indicators cannot be completely equivalent to each other and can replace each other only within certain limits (pedagogical skills cannot replace the shortage of reagents);

integrated indicators developed without relying on mathematical statistics are not sufficiently complex in nature, because the effect of the indicators included in the aggregation will not be visible in the final result;

when determining the weighting coefficients or category limits, one has to rely on common sense or empirical data, and it is not possible to justify them sufficiently logically and theoretically;

methods of calculating integral indicators are not always justified and interpreted;

integrated indicators do not cover all the existing problems, and do not indicate that they are emerging.

neglecting the interaction of factors in integrated indicators prevents the full disclosure of the influence of factors;

changing the composition of the used indicators depending on their importance is not envisaged in some cases;

in most cases, it is necessary to use the empirical norms that have been decided in practice, and they lack precision and are also small in number.

It is clear that the necessary results cannot be achieved without modeling in the economic diagnosis of higher education, and the development of new models in principle is required.

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