

Monitoring, Forecasting and Strategic Planning as a Means of Effective Management of the Processes of Training Specialists in a Transport University

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Keywords: Monitoring, forecasting, strategic planning, process management, training of specialists, transport university.

Abstract: The article deals with the issues of monitoring, forecasting and strategic planning in a transport university. The dialectical relationship between these issues and improving the efficiency of the educational process is analyzed, the role of forecasting, monitoring and strategic planning as important processes and tools in managing the quality of education at the university is revealed. In his study, the author relied on the works of domestic scientists, in particular (Morozova, 2003; Erich, 1974; Kochkarov, 2006; Utkina, 1998). Monitoring, forecasting and planning are important elements of managing all university processes that are a research process. Thus, forecasting studies strategic problems, achievement of target results, the most likely consequences of decisions made, and analysis and use of the results developed in the process of monitoring, forecasting, planning and designing the training of engineering personnel for a certain period from 5 years to 30 years. The revealed information serves to develop options, a scenario for predicting the further development of a transport university, making managerial decisions, assessing changes and preventing the occurrence of negative phenomena.

1 INTRODUCTION


The processes of monitoring, forecasting and planning are important elements of management not only for each higher education institution, but for the entire higher education system of the country, which is confirmed by the governing documents (Consultant plus, www.consultant.ru; Contour standard, normativ.kontur.ru; Judicial and regulatory acts of the Russian Federation, sudact.ru; Official Internet portal of legal information, publication.pravo.gov.ru). The fundamentals define the goals, objectives and main directions of the state policy in the field of strategic planning, as well as the mechanisms for implementing this policy, emphasize the relationship between the achievement of goals by methods of forecasting, modeling, indicative planning, balance calculations and information technology to develop a system for monitoring and controlling strategic planning processes.

The main purpose of this work is to determine the most optimal methods of monitoring, forecasting and

strategic planning based on the principles of a systematic approach aimed at regularly assessing the main processes of educational activities and the prospects for the development of a transport university, including scientific and pedagogical personnel, material and technical base and other types of activities of the university aimed at effective management of the quality of training specialists for the transport industry.

2 MONITORING AS A MEANS OF EFFECTIVE PROCESS MANAGEMENT IN A TRANSPORT UNIVERSITY

Monitoring is a constant control, identification and assessment of the actual state of the education system and the most important factors that correspond to the target results of the qualitative and quantitative characteristics of the transport university processes.

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Monitoring is the basis for predicting the development of the education system and regulating the quality of education when making long-term plans and management decisions.

The object of monitoring is the quality of education in a transport university. In the process of monitoring studies, deep analytical work is carried out to identify and process a large amount of information.

The objects of monitoring can be: the educational process, the academic progress of students, the formation and development of the teaching staff, the strengthening of the material and technical base of universities.

Depending on the selected object of monitoring, the goals and objectives associated with the implementation of monitoring in practice are determined.

Goals are the determining factors of research: a set of evaluation criteria and indicators is formed on the basis of the goal, research methods are selected, a monitoring procedure is built; analysis and further use of monitoring information are subordinated to goals.

Monitoring objectives are implemented on the basis of scientifically based principles:

1. The principle of targeting and purposefulness of taking into account the specifics of the activities of the department, faculty, department, branch, staff in the formation of monitoring indicators, the information collected correlates with the goals.
2. The principle of objectivity and the possibility of documentary confirmation of the quality of data provided by departments.
3. The principle of completeness and continuity, data collection is carried out continuously and is aimed at obtaining complete information about the observed object for a long time in the form of a permanent or periodic check, followed by registration of materials.
4. The principle of transparency, openness and publicity of events and data during monitoring involves various measures to inform all users about the information collected during monitoring.
5. The feedback principle that allows you to make adjustments to the controlled process. The implementation of this principle is to immediately respond to detected problems and errors.
6. The principle of scientificity and completeness of information for statistical processing, the use of reasonable models and tracking parameters.

When organizing and conducting monitoring studies, a variety of methods are used as ways to achieve goals. All monitoring methods used can be divided into the following groups in Table 1.

Table 1: Classification of monitoring methods.

General scientific methods	Scientific and empirical:	Specially-theoretical
analysis	observations	system analysis
synthesis	comparisons	statistical analysis
induction	dimension	expert assessments
deduction	experiment	Delphi method
analogy	information and software data processing	sociological research
proof	score	graphical method
generalization	the survey	SWOT analysis
modeling	testing	regulatory
hypotheses and their confirmation	polling method	formation of a forecast

To determine the directions for further development of a transport university, it is necessary to use a modern method - organizing and conducting a SWOT analysis of the university. This is a special kind of expert method that is used in monitoring for subsequent forecasting and planning.

This methodology can be used in the study of processes in higher educational institutions, in which dynamism, controllability, dependence on internal and external factors of functioning, cyclical development are considered and taken into account. To develop a SWOT analysis, the formed team, based on the main provisions, principles and methods of monitoring, generates four aspects of SWOT and, using them, offers options, scenarios for the process of forming a university development strategy.

Based on the analysis of one of the transport universities, conducted by the author, a SWOT analysis was developed in table 2.

When developing predictive indicators in the plans and programs for the strategic development of a transport university, it is necessary to provide for measures aimed at maximizing the impact of strengths and opportunities on minimizing (eliminating) weaknesses and threats, i.e. consider the logical relationship of the matrix (SO) ↔ (WT).

In order to monitor the improvement of the quality of training of specialists, the development of professional teaching staff, logistics at the university,

express diagnostics of the main processes and program documents of the university can be carried out.

In order to improve the quality of training of specialists, it is important to conduct a final diagnosis of the professional readiness of a graduate, which, in addition to determining the level of socio-professional knowledge, skills and abilities, includes a diagnosis of the degree of development of the qualities necessary for a future specialist.

3 FORECASTING AS THE MOST IMPORTANT MANAGEMENT FUNCTION IN A TRANSPORT UNIVERSITY

The current pace of scientific and technological progress requires a scientific approach to forecasting problems. At the end of the twentieth century, there

was a scientific revolution in the field of forecasting. The end of the 20th century and the current decade show how the time frames and scales of progress are radically changing, which makes it especially necessary to foresee development prospects. At the same time, scientific and technological progress should be immediately reflected in educational programs, especially in the system of higher education, in particular in the training of engineering personnel.

The function of foresight, scientific forecasting not only for the near future, but also for a more distant future, is an integral element of the management process.

The urgent need to solve the problems of scientific forecasting and strategic planning of the socio-economic development of universities is caused by the need to participate in solving these problems not only government agencies, management organizations, but also prominent scientists. It is enough to cite the documents (Judicial and regulatory acts of the Russian Federation, sudact.ru; Official

Table 2: SWOT analysis of one of the transport universities.

Factors of the internal and external environment influencing the development of the university	
<i>Strengths S</i>	<i>Weak sides W</i>
<ul style="list-style-type: none"> – high quality of training of specialists for the transport industry; – a wide range of transport specialties; – targeted training of specialists; – a high level of qualification of the teaching staff and staff; – effective management; – the reputation of the university in the region; – distance educational technologies; – availability of training (acceptable cost, conditions for admission, convenient educational process); – a developed system of career guidance work of the university; – organization international educational cooperation; – scientific activity of the teaching staff, a wide range of publications, preparation and defense of dissertations; – developed infrastructure, material and technical base; – developed management system of university departments; – high level of publishing activity; – employment of university graduates. 	<ul style="list-style-type: none"> – lack of budget financing; – insufficient level of motivation of teaching staff; – excessive organization of the educational process and educational and methodological work; – insufficient communication with employers; – low motivation of students; – lack of a comprehensive offer for the target client; – template training; – weak ties with leading Russian universities in terms of attracting highly qualified teachers; – absence material and technical base for scientific research; – lack of a system of strategic interaction with related companies; – weak motivation of students, graduate students and teachers for scientific activity; – absence centralized management of postgraduate and doctoral studies; – association of departments with mixed specialization (there is no plan for the growth of candidates and doctors of sciences); – insufficiency of publications in journals included in the list of Skopus, Web of Science, RUSSIAN SCIENTIFIC CITATION INDEX; – skew teaching activities on research; – participation of teaching staff in grants of various levels; – a large number of part-time workers among teaching staff; – a small number of strong technical schools with rich traditions; – reduction in the number of annual dissertation defenses, incl. among university staff; – reduction of the teaching staff from among the young scientists of the university.

Table 2: Continued.

<i>Capabilities O</i>	<i>Threats T</i>
<ul style="list-style-type: none"> – formation and dynamism of the list of demanded educational programs; – academic mobility at the level of teachers; – increase in the number of target places with an emphasis on transport in general and other sectors; – introduction of a real system for evaluating the effectiveness of the teaching staff; – improving the system of remuneration of teachers (including through additional sources: grants, the federal budget, orders from large business holdings); – improving the organization of the educational process (a combination of traditional and modern forms of education and types of classes); – increasing the motivation of students to study; – equipping classrooms with modern equipment; – using our own linguistic department to improve the language competence of teachers and develop international cooperation; – strengthening communication with employers; – involvement of representatives of employers in training; – development of a system of relations between the university and graduates (lobbying the interests of the university, financing, moral encouragement, etc.); – development of programs for the adaptation and retention of teaching staff, primarily from among young teachers; – creation of conditions for obtaining a second education and a second diploma; – research development the potential of the teaching staff; – expansion of the market (expansion of geography) of educational services both for graduates of educational institutions and for production workers who wish to undergo retraining, students of additional education. 	<ul style="list-style-type: none"> – lowering the prestige of the university; – lack of intrinsic motivation to implement the strategy; – liquidation of non-core education that generates income; – reduction in the number of defenses of candidate and especially doctoral dissertations as a factor in the reduction of human resources; – decrease in the number of doctors of sciences; – a sudden and sharp decrease in the number of external part-timers; – decrease in student enrollment; – reorientation of transport organizations to other universities; – negative state policy in the field of education for the university; – decrease in the quality of recruitment of students (including target ones); – possible refusal of Russian Railways from targeted training; – reduction of budget financing; – a decrease in demand among the population for transport specialties, a sharp reduction in students from among those who pay the full cost of education; – closure of a number of specialties.

Internet portal of legal information, publication.pravo.gov.ru; State Duma, duma.consultant.ru; Morozova, 2003; Erich, 1974; Kochkarov, 2006; Utkina, 1998), in which, both in the Decree of the President (Official Internet portal of legal information, publication.pravo.gov.ru), the Federal Law (Consultant plus, www.consultant.ru), and in studies on this topic, the authors (Morozova, 2003; Erich, 1974; Kochkarov, 2006; Utkina, 1998) give a complete, systematized presentation of proposals for the development and analysis of existing experience scientific and technical forecasting and planning.

The forecasting system is a multi-level structure based on monitoring results.

Basic principles of forecasting and planning:

- optimality, scientific validity of the planned solutions in accordance with the selected criteria;

- balance and proportionality of indicators in accordance with resource and financial capabilities;
- allocation of priorities, leading links;
- determination of the time interval («forecast horizon») for achieving target indicators;
- comparison with similar universities, the activities of the university and departments;
- continuity, i.e. a combination of long-term and current plans, continuity, adjustment of indicators when conditions change;
- substantiation of a backup option (scenario) for the development of the university, designed to be implemented in the most unfavorable conditions.

To determine the directions for further development of a transport university, it is necessary to use the methods formulated in the disclosure of the concept and control functions for subsequent forecasting and planning.

In recent years, special methods related to forecasting have developed especially intensively. In the monograph (Morozova, 2003), which presents various (about 100 in total) forecasting methods, as well as the possibilities and prospects for their use.

Forecasting methods:

1. Intuitive thinking:
 - brain attack;
 - direct brain attack;
 - a method of collecting opinions. Method «Delphi»;
 - The Mendeleev method, which could reveal the nature and form of interaction between the elements of the system and their properties, in particular technologies, before their identification (invention or refinement), similar to how the periodic table of chemical elements was compiled.
2. Exploratory forecasting:
 - scenarios;
 - iteration;
 - historical analogy;
 - probabilistic forecasting;
 - economic analysis;
 - risk assessment;
 - statistical models.
3. Normative forecasting:
 - resource usage;
 - linear programming;
 - dynamic programming;
 - methods of decision theory;
 - System analysis.
4. Methods with feedback:
 - integrated information technology systems.

The Delphi long-term forecasting method, developed by O. Gelmer and his colleagues, has become widely known abroad. The forecast is carried out both in the main, priority areas, and in terms of parameters characterizing the content of the areas:

- in the educational process (indicators of the quality of training of specialists, digitalization of all processes in the university, innovative processes in education, etc.);
- demographic forecasts: the number of graduates by years of secondary educational institutions, the plan for entering the university and graduation;
- dynamics of specialties in the training of engineering personnel in the region, graduation plan;
- the dynamics of the teaching staff;
- scientific sphere (work of graduate and doctoral students, indicators of dissertation

defenses, grants, number of scientific laboratories, etc.);

- logistics;
- financial and economic sphere.

A forecast is a set of reasoned assumptions, expressed in qualitative and quantitative forms, regarding the future parameters of the educational system, which is of a probabilistic nature. At the same time, complex forecasting is considered in different time periods: as short-term, medium-term and long-term. One of the conditions for the effectiveness of the forecasting system is the consistency of forecasts of different levels of universities of the same profile of training specialists.

Monitoring, forecasting and planning are important means of managing university processes, tools for economic stability and strategic development of the university. In the case when there are several ways to implement the plan, scenarios of possible development are developed.

The forecast horizon is directly related to the problems of strategic forecasting and designing the future. Knowing the forecast horizon, one can estimate what should be measured and how often. Where, then, are the boundaries of normative planning? In many cases, they seem to be determined by the dynamics of the global system of human society with a deep study of trends.

If long-term normative planning provides for a new situation in the development of the university, then it should indicate the time horizon for achieving these goals. However, this will be an attempt to test the sufficiency of the university's capabilities to achieve long-term goals. And if they are not enough, then forecasting will stimulate the search for new alternatives, the search for raising funds, and the mobilization of internal resources.

For forecasting and long-term planning, it is important to know technologies that affect the main processes in the educational system, methods of teaching and mastering knowledge and skills, assessing the quality of education, and shaping motivation. A successful forecast should be based on taking into account all internal and external factors.

4 STRATEGIC PROGRAM AS A BASIS FOR EFFECTIVE MANAGEMENT OF UNIVERSITY DEVELOPMENT

Planning is a hierarchical process of forming preliminary decisions in the management system that

determines the order with the sequence of individual events. Depending on the duration of the time interval, there are short-term, medium-term and long-term planning. To create a system of regulation of all processes in the university, it is necessary to develop a planning and forecasting system and a system of scientific monitoring;

The system of scientific monitoring, SWOT analysis, conclusions and indicators based on the results of the development of forecasting directions will make it possible to prevent omissions, weaknesses that can lead to crisis phenomena of a different nature.

These studies will determine:

- strategic goals of activity and indicators (indicators) that they intend to achieve, taking into account the strategy of the Ministry, the Federal Agency for Railway Transport for the medium and long term;
- the main tasks through the solution of which the set strategic goals and the specific areas of activity corresponding to them are realized;
- intradepartmental and interdepartmental targeted and other programs, through which the implementation of certain areas of activity and the solution of the main tasks are ensured.

Focusing on strategy can help institutions operate more effectively, make evidence-based decisions, and set the course for a sustainable future, by following these guidelines:

- analyze and make decisions regarding the development of the university, taking into account the mechanisms that connect all departments of the university and are influenced by external factors;
- when developing a strategy, the university should not be in the role of a passive observer of external influences, but should develop measures to manage the external environment to achieve its own benefit;
- the most important condition for economic stability and development of the university is the effective use of finances, savings and cost reduction.
- redistribution of internal resources, focusing them on priority areas;
- termination of a non-priority direction that is not provided with resources, or their reorientation;
- development of cooperation, partnership, joint ventures, etc.;
- development of a motivation system for all university employees;

- constant attention to the dynamic solution of social problems, such as: raising the living standards of workers, raising the level of qualifications, improving the quality of working life, etc.

Strategy as a field of activity can open up great opportunities for universities. Taking into account the experience of a number of universities and theoretical developments in the field of strategic planning (Kochkarov, 2006; Utkina, 1998), when formulating a strategy in Table. 3, the following potentially important issues should be considered.

The strategy is developed and implemented through a collective and focused effort. However, once a strategic program is in place, schools still need plans to put their strategies into practice. Institutions must first formulate a strategy and then develop operational plans to implement the policy provisions of these statements.

The implementation of plans and projects requires very significant budget expenditures. It is important to ensure the sufficiency of these funds for the implementation of the tasks of the projects, the effective management of these funds, the possibility of additional attraction of non-state resources, provided that the scale is expanded and additional results are obtained. The allocation of funds for the implementation of plans and projects must be justified and carefully calculated.

5 CONCLUSIONS

The article argumentatively shows that monitoring, forecasting and planning are important elements of management of all university processes. These controls represent a research process. So, forecasting studies strategic problems, the achievement of target results, the most likely consequences of decisions taken, as well as the analysis and use of the results of targets developed in the monitoring process. Monitoring is a constant monitoring, assessment of the actual state of the education system, compliance of the target results with the qualitative and quantitative characteristics of the development of the university.

The function of foresight, scientific forecasting is an integral element of the management process.

An analysis of the experience of a number of transport universities showed the particular importance of the strategic planning process, the formation of preliminary decisions in the management system. It should be emphasized that planning is a tool for purposeful management of the

Table 3: Flowchart for the development of the University Strategic Development Program.

Source and guidance documents (external)	Stages of development	Source and guidance documents (internal)
National Strategy for Higher Education and Science. Railway development strategy transport in the Russian Federation and other documents.	Formulation of strategic goals and objectives	University charter and other normative documents
University Ranking	Development of strategic goals, objectives and priorities for the development of the university in areas	PEST (STEP), SWOT - analysis
Expert assessment of competition	Estimated estimates and forecasts for the implementation of goals, taking into account various scenarios for the development of the university	Forecasting methodology. Estimated data
Order for personnel training, scientific research, advanced training, etc. Certification, licensing, accreditation programs financial security. Estimated investment.	Development of development programs in the following areas: – educational activities; Scientific and innovative activity; – Development of the human resources potential of the university; – International activity; - Social and cultural activities; – Development of the publishing and library complex of the university; – Management activities; – Industrial and economic activity. Infrastructure development; – informatization of the university complex; – financial and economic activity; – Development of territorial divisions.	Quality control. Conditional forecast. Norms, reporting data. Estimates of expenses and income. Accounting for options for the strategic development of the university.

sustainability and strategic development of universities, adjustment of approved plans.

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