METHODOLOGICAL REGULATION OF THE ECONOMIC AND MANAGEMENT ENSURING THE INNOVATIVE PLATFORM OF BUILDING DEVELOPMENT

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Abstract

The increase in the influence of market mechanisms in the economy, the deepening of integration processes and access to world markets as a result of the transition from a planned economy to market forms of management have increased the task of achieving and maintaining a high level of competitiveness for domestic enterprises. Solving this problem requires a deep functional analysis and, based on it, making a balanced multi-criteria structured decision using the mechanism for evaluating the effective formation and use of resources of construction enterprises as specific operational systems of development management.

The main requirements that are put forward to the methods of modeling the risks of the financial and economic activity of the enterprise are the adequacy of the assessment under conditions of information uncertainty, adaptability to the country, time period, specific industry, taking into account the unique features of the enterprise, its economic and managerial specifics, accounting for quantitative and qualitative factors.

This article proposes a project-vector approach to building development management systems. The objective function of optimal control of the project-vector environment of construction enterprises is proposed.

The results of the assessment can be used to develop the project management system and its transition to a new level. The evaluation of excellence can be carried out according to the model developed by the International Project Management Association. To ensure success in improving the organizational system for managing projects, programs and portfolios, the top management of the organization needs to determine the primary goals, establish and maintain communications with stakeholders, analyze the possibility of measuring excellence in this period, and consistently implement further improvements. Model excellence assessment focuses on a holistic analysis of project management in an organization. This model is based on the concept of organizational competence in the field of project management, which involves the analysis of both individual competencies and the organization's values ("assets").

The need to develop a complex methodological approach to assessing the financial condition of enterprises based on the application of the theory of fuzzy logic is proven. The conceptual basis of modeling the financial and economic activity of the enterprise and with further prospects for determining the appropriate level of risk are considered.

Keywords: *construction enterprise; transformation of operating systems; digitalization methodology; project administration of digital transformations of construction system, building development.*

A decisive factor in the success of an organization is the ability to respond to changes in the environment, harmonizing with them the desire to survive or the desire for development. At the same time, global trends confirm that tasks related to the development of organizations can be successfully solved through projects. Therefore, the project of transformational changes in the operational activity of the construction enterprise at the stages of its implementation life cycle is considered in the concept of the development management process, which is aimed at changing the existing business processes of the organization, and the rules of their transformation are determined by the development procedure, which requires generalization and formalization.

In the context of the rapid development of technology and the intellectualization of labor, the main tool for forecasting, planning and management are working mathematical models of operated systems. It is known that the construction of mathematical models for complex, open, developing systems begins with the process of their structural decomposition.

The organizational and technical system is understood as an automated system for managing resources, data, models, which ensures the management of all information and related processes throughout the entire life cycle of the control object.

The number of organizational and technical systems is determined by a specific the project system, but, as a rule, the presence of design, production and operational systems is mandatory. Accordingly, we will distinguish:

• a design system consisting of a subsystem for managing design work, a design model and a design environment;

• production system, consisting of production management, production model and production environment;

• an operational system consisting of a subsystem for managing the operation and maintenance of the technical system and the operational environment

The problem of decomposition is that in complex systems there is no one-to-one correspondence between the law of functioning of subsystems and the algorithm

that implements it [1]. Therefore, a decomposition variant is formed, where the system is displayed as a hierarchical structure of subsystems.

When constructing a structural decomposition, the main problem is the observance of two contradictory principles:

• completeness (the problem should be considered as comprehensively and in detail as possible);

• simplicity (the whole tree should be as compact as possible).

It should be noted that the decomposition should be limited at the stage of transition to the description of the internal algorithm of the subsystem functioning instead of the law of its functioning. In this case, we are talking about changing the level of abstraction, i.e. going beyond the structural decomposition of the system.

In modern methods, the decomposition of the model to a depth of 5-6 levels is typical. One of the subsystems is usually decomposed to such a depth. Functions that require this level of detail are often very important, and their detailed description provides the key to the basic operation of the entire system [2].

It has been proven in general systems theory that most systems can be decomposed into basic representations of subsystems. These include: serial connection of elements, parallel connection of elements, connection using feedback [3].

Let us take the concept of its life cycle as a reference point for the decomposition of a complex the project system. The life cycle describes the state of the system in different periods of time, starting from the emergence of the need for this system and ending with the moment of its collapse.

Representation of the life cycle of a the project system in a structured form (in the form of a hierarchically decomposed object into its constituent parts), one of the necessary conditions for the effective implementation of the process of its management in the interests of various participants.

We propose the following periods of the life cycle of a the project system (Fig. 1):

• period of system development;

• period of target functioning;

a period of progressive degradation.

The activities of the development period are associated with research, planning, design and

production activities, target functioning is associated with professional activities aimed at maintaining the specified indicators of system efficiency over time, and the period with gradually developing degradation is associated with the curtailment of project activities, restructuring of the system and other actions leading to the termination of the existence of the system in this form.

The ongoing changes in the system under external influence accumulate, as a result, the the project system loses stability and moves to a different trajectory and develops further within other boundaries of stability.

Such a loss of stability in systems theory is called a bifurcation, and the moment of a break in the trajectory, or transition, is called the bifurcation point. Based on external and internal conditions, a particular system can go through several bifurcation states, which, as a result, will determine the trajectory of its life cycle.

Let us demonstrate one of the possible variants of the trajectory of the life cycle of a complex the project system (Fig. 1).

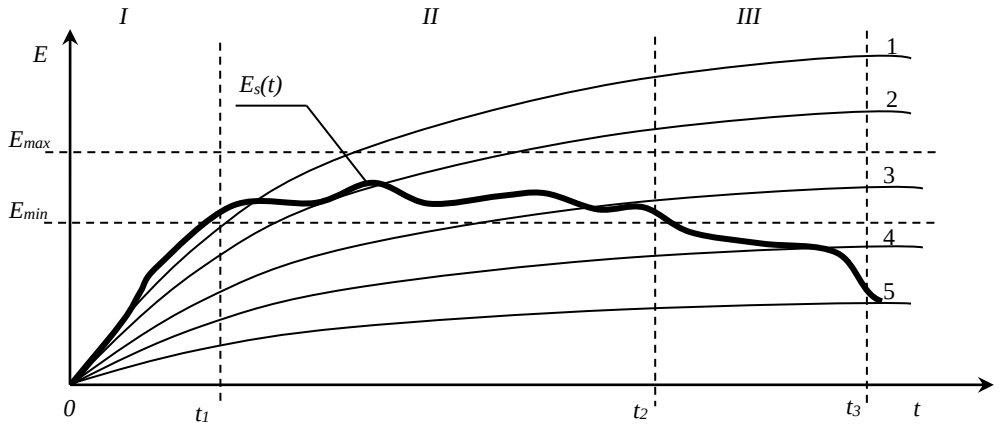

Fig.1. System life cycle trajectory:
I - period of development of the project system;
II - period of target functioning;
III - period of gradually developing degradation;
1-5 - possible trajectories of the life cycle of the project system

Consider the trajectory of the life cycle based on the totality of external and internal conditions at the time of the birth of the the project system. The beginning of the development of the project system goes along *trajectory 1*, but very quickly there are changes in important parameters for its development in the external or internal environment. The efficiency of the Es system decreases and the system is forced to switch to the *trajectory 2* closest to it, corresponding to the new conditions. For some time, the system develops steadily, but the changes taking place in the external environment accumulate so quickly that the control subsystem does not have time to make timely, effective decisions and the life cycle trajectory changes the trend.

Thus, the development of the project system like any other complex dynamic system, proceeds according to the following scheme. Until some time, the system develops along a given trajectory, there is a slow accumulation of new features, the system passes into a more stable state - the period of target functioning, and at some point its development loses stability or consistency with the development of a higher-level system, the transition to the trajectory occurs gradually developing degradation.

When studying the behavior of the project systems, it should be remembered that any system under consideration is just an element of some other, also non-linear dynamic system. And these systems, developing according to their own laws, determine many properties and circumstances of the development of their subsystems [4].

In connection with the foregoing, we note that the period of the target functioning of the the project system is the interaction of a number of organizational and technical subsystems, each of which consists of a control system, a control object and an environment.

Indeed, any the project system is a kind of integrity, in which, as in the evolution of any non-linear dynamic system, periods of calm development are replaced by a period of bifurcations, a period of transition from one development channel to another. At the same time, its organization is in constant motion, from spasmodic fluctuations to a relatively stable state.

The functioning of any material system is aimed at its preservation by using all available potential. In this case, development involves constant updating of forms and types of activities depending on changes in technologies, value orientations, behavior in the markets of both consumers and competitors. It is related to any changes occurring in the organization and its relations with the surrounding world. Thus, the following pattern appears: if the organization does not function, it cannot develop, and if it does not develop, it cannot function [5; 6]. Therefore, one of the urgent tasks of management is the development of organizations due to a quick, clear and adequate response to market changes by releasing new (modernization of old) products, introducing new production and sales technologies, reengineering, improving the internal management system, using the latest marketing approaches, etc. As a result, development becomes an effective market mechanism for managing modern organizations, being a way of preserving enterprises and companies, helps to create new niches in the market, increase consumer loyalty, etc. [7; 8].

Many important decisions related to the vision of the organization's goals and operations arise from a series of questions related to the development of a strategic position. The answers to them lead to making decisions about development, which is most often an atypical activity of the organization, but affects it and can change it [9].

Let the functioning of the organization be ensured by a set of business processes $P = \{p_1, p_2, p_3, ..., p_J\}$. During development, these processes are transformed into a set of new business processes $N = \{n_1, n_2, n_3, ..., n_I\}$ aimed at preserving the organization in difficult economic conditions, i.e., a transformation of the type is implemented:

$$f : P \to N, \ \forall n_i \in N \ \exists p_j \in P : f(p_j) = n_i, \qquad (1)$$

where the display rule will be set by the organization's development management procedure. The basis of the development management procedure is a descriptive multi-level model of the interaction of approaches (a model based on the analogy of Euler's circles), proposed in [11] for solving goal achievement tasks in project management based on a system of balanced indicators (Table 1).

The structure of the model of the process of evaluating the content and stages of transformational changes allows changing the indicators, taking into account the field of operation of the enterprise (including construction, if the operational activity of the enterprise consists in the execution of general construction works), the state of economic development and the changing influence of the external and internal work environments of sub object of management. The hierarchy of the proposed model allows to simplify the process of evaluating the effectiveness of the implementation of investment and construction projects.

According to the algorithm, proposed in work, at the first level, with the help of the "Balance Sheet" and "Report on Financial Results", the set of K - initial input parameters is formed. These parameters correspond to the financial ratios that are used to predict the company's insolvency: k_1 – equity; k_2 – currency of the balance sheet; k_3 – raised capital; k_4 – absolutely liquid assets; k_5 – current liabilities; k_6 – current assets; k_7 – long-term payables; k_8 – current assets minus inventories; k_9 – net income; k_{10} – accounts receivable; k_{11} – accounts payable; k_{12} – cost of goods sold; k_{13} - material reserves; k_{14} – non-current assets; k_{15} – gross profit; k_{16} – net profit. The second level involves the formation of a set X of evaluation parameters of transformational changes based on a set K (Table 1). At the third level, set X ensures the formation of such parameters as financial stability (Y1), liquidity and solvency (Y_2), business activity (Y_3) and profitability (Y_4). At level A, the decision Zj is identified, which determines the effectiveness of transformational changes in operational activity construction enterprises, from the set of possible states j=1,...,J.

Table 1

A set of evaluation parameters of the effectiveness of transformational changes in the operational activity of construction enterprises

Indicator		The formula for calculating
Financial stability		
Coefficient of independence	x_1	k_1 / k_2
Coefficient of financial stability	x_2	k_1 / k_3
Coefficient of financial stability	x_3	$(k_1 + k_1) / k_2$
Coefficient of maneuverability and own resources	x_4	$(k_1 - k_{14}) / k_1$
Coefficient of provision of own working capital	x_5	$(k_1 - k_{14}) / k_3$
Liquidity and solvency		
Monetary solvency ratio	x_6	k_4 / k_5
Estimated solvency ratio	x_7	k_6 / k_5
Critical liquidity ratio	x_8	k_8 / k_5
The ratio of receivables and payables	x_9	$k_{10} /(k_5 + k_7)$
Asset mobility ratio	x_{10}	k_8 / k_{14}
Business activity		
Asset turnover ratio	x_{11}	k_9 / k_2
Accounts receivable turnover ratio	x_{12}	k_9 / k_{10}
Accounts Payable Turnover Ratio	x_{13}	k_9 / k_{11}
Inventory turnover ratio	x_{14}	k_{12} / k_{13}
The turnover ratio of fixed assets	x_{15}	k_9 / k_{14}
Equity turnover ratio	x_{16}	k_9 / k_1
Profitability		
Cost effectiveness	x_{17}	k_{15} / k_{12}
Profitability of sales	x_{18}	k_{16} / k_9
Profitability of all assets	x_{19}	k_{16} / k_2
Return on equity	x_{20}	k_{16} / k_1

It should be noted that today, many organizations, in the course of their activities, are limited, unfortunately, only to monitoring compliance with the budget and deadlines, and very little attention is paid to other criteria for the effectiveness of project management. Therefore, the value of the results of this activity is highly questionable. It is in the context of economic turmoil that comes the understanding of how low the degree of perfection of the project management system is, what advantages the organization should take advantage of, what shortcomings need to be eliminated - in other words, what needs to be done to make the project management system meet the requirements of today. The assessment of the excellence of an organization in the field of project management can be characterized as follows: it is "the analysis, certification and assessment of the level of quality, excellence or competence of an organization and individuals in the field of project management according to certain criteria ..." [14]

This assessment defines the organization's status quo in project and program management and is based on specific norms, standards or regulations that help answer questions about what needs to be reviewed and how to review.

Let us consider in more detail the assessment of the perfection of the project management system in the organization. The project management system is understood as "a system of rules, organizational structures, processes, methods and regulations for planning, monitoring and managing projects." When an organization intends to evaluate excellence, the expected benefits of the process are often overstated, but there is also a high level of skepticism about the costs and possible side effects. What opportunities are realized through the assessment of excellence and what risks are most likely? First of all, the state of project management in the organization at the moment is assessed - the state "as is". The results of this assessment allow management to draw a conclusion about the level of development of the project management system in the organization. Next, using a reference model or standard, set the goal to be

achieved, that is, describe the “as it should be” state, and by comparing the “as is” and “as it should be” states, assess the strengths and weaknesses of the organization and determine the steps, needed to move the organization from the “as is” state to the “as it should be” state. It should be noted that the evaluation of excellence can help set the direction for action, but the implementation of any activities, as a rule, is not an integral part of it. The reference model can also be used to define a long-term strategy. Excellence assessment is also used to orient management to make the best decisions regarding the direction of development and the necessary investments in the project management system. Often, analytical work reveals elements of good management practice that can be used in the creation of new standards.

Excellence assessment can be both internal, carried out by the organization itself, and external, which involves external organizations. The external assessment of excellence also includes certification of the organization's compliance with a certain level (class) of project management, carried out by an authorized certification body (Table 2).

Table 2

A fragment of the table of expert-diagnostic assessment of the developer's activity according to the updated system of business indicators of the multi-project environment

3	**Prospect**					
3.1	Strategy					
	Target	It will allow the manager to understand the strategy and strategic processes, which provides the opportunity to manage the project, program or portfolio in the environment				
	Assessments	1	2	3	4	5
3.2	Management, structures and processes					
	Target	It will allow the manager to effectively participate and manage influence, manage, understand the structure and processes in projects, programs or portfolios.				
	Assessments	1	2	3	4	5
3.3	Compliance, standards and regulations					
	Target	It will allow the manager to influence and manage on the basis of relevant, interconnected standards and rules within the framework of the permanent organization, legislation, standards and norms, both in the organization and in society as a whole, to improve the organization's approach to these areas of knowledge				
	Assessments	1	2	3	4	5

The results of the excellence assessment can be used to develop the project management system and its transition to a new level. Excellence assessment can be carried out according to the model of the International Project Management Association analyze the possibility of assessing excellence in a given period and consistently implement further improvements.

The excellence assessment focuses on a holistic analysis of project management in an organization. This model is based on the concept of organizational competence in the field of project management, which involves the analysis of both individual competencies and the organization's values (“assets”).

Its further specification makes it possible to obtain a functional model of the project-oriented development management procedure with:

– with in the framework of the system approach, the current state of the organization is assessed and possible directions of development are determined;

- with the help of a project approach, projects are formed, the system of goals of which is compiled in the context of the development of the organization;

– the process approach helps to choose and implement a specific development project by carrying out regulated and unified actions;

– the operational approach ensures the integration of project results into operational activities with the transfer of "best practices" to the functions (operations) of the organization. Thus, the obtained model of managing the development of the organization, formed on the basis of the results of the interaction of systemic, project, process and operational approaches, makes it possible to implement the direction of development within the allocated budget and with the use of determined resources with further integration of the results into current activities. This helps to increase the consistency of the decisions made and the effectiveness of the application of typical methods in specific subject areas.

The implementation of this scientific and methodological scheme is proposed to be carried out within the framework of the vector approach to building a project management system. Based on the presented classification of projects, namely, traditional, operational and procedural projects, it is proposed to identify the directions in which the products of information projects are formed in the project-vector space by classes of vectors: project-informational (for traditional projects), project-procedural (for procedural project) and design-technological (for operational projects). A set of changes, which are the essence of the named projects, will be represented by a set of vectors in some space. We will call this space project-vector.

Two main advantages over other concepts for creating control systems can be seen from the vector approach.

First, it is a decomposition of a rather complex organizational-technical system of solving functional tasks into simple, development-oriented components of individual project entities, described by project-informational, project-procedural, and project-technological vectors.

Secondly, if it is possible to determine whether this type of activity is implemented through a project, then, accordingly, a project approach can be applied to the implementation of this activity. And this allows you to use a sufficiently powerful project management tool to improve management processes.

The vector approach, in contrast to the matrix (two-component) technologies of project management, is an n-component structure (each component is one dimension of the project-vector space of the university), which are based on different subsets of methods and means of project management and implementation, but collectively represent a unique, albeit differently oriented, development process of both the internal environment and product projects.

Based on the proposed representation of the project-vector space, it is possible to proceed to the formulation of the task of optimal management of the project-vector environment of the university. The basis of this management is the understanding that movement in the direction of the coordinate axes of the project-vector space is equivalent to the development of some component of the project. Ego products, stakeholders, organization, technology, quality, and project management. That will lead to a reduction in the terms of project implementation, a reduction in cost and the achievement of the required level of quality. Then the target function of the optimal management of the design vector environment of the project will have the form:

$$\forall N_p : \sum_{j} \sigma_j \int_{t} (\upsilon_p(t) - l(\vec{A^{(j)}}, t))dt \to \min,$$

subject to restrictions:

$$p, \upsilon_p(t), \sigma_j, N_p, A^{(j)}$$

where N_p – – measurement of the project-vector space;

σ_j – **the priority of the essence of the project-vector space Q_j;**

$\upsilon_p(t)$ – **given maximum displacement rate in the N_p direction (required development rate at the moment t in the N_p direction);**

$l(\vec{A^{(j)}}, t)$ – is the length of the vector $A^{(j)}$ (the actual rate of development at the moment t in the direction N_p).

The main tasks of the structure are the implementation of the policy and strategy of the project activity of the system, the implementation of strategic decisions and the implementation of tactical (situational) management.

Many researchers are inclined to single out individual characteristics of a sociotechnical system that are key to its effective functioning in modern conditions, and at the same time could characterize the level of structural interaction.

From the point of view of project management, the following can be distinguished:

1) organizational awareness, based on the understanding by employees of their goals and the purpose of the entire system, their constant readiness to share with top management the full responsibility for the results of the implementation of a particular project;

2) an organizational management structure that provides ordinary team members with real rights to participate in project management;

3) a new approach to the development of jobs and the role of the contractor in project activities;

4) new approaches to the maintenance and repair of technical systems that are part of the socio-technical system;

5) new forms and methods of training and retraining of personnel, a more flexible personnel policy aimed at increasing the level of competence;

6) new criteria in assessing the economic efficiency of using modern technology and investing in the development of a sociotechnical system.

It is in the information aspect that the structural interconnection of subsystems is manifested. Indeed, operational, working information, reflecting the content of the subsystem, creates, forms and improves various, relatively stable structures. In turn, the newly formed structures cause new cycles of operational information. And this happens until irreversible processes begin in the system, leading it to a state of gradually developing degradation.

Indeed, any socio-technical system is a kind of integrity, in which, as in the evolution of any non-linear dynamic system, periods of calm development are replaced by a period of bifurcations, a period of transition from one development channel to another. At the same time, its organization is in constant motion, from spasmodic fluctuations to a relatively stable state.

It is important to note that the subsystems we have identified are characterized by different levels of organization, and, accordingly, the processes taking place in them differ in the pace and intensity of information flows.

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