The building production management systems analysis in the context of striving for balanced innovative development

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Abstract: The territorial systems’ development deformation in socio-economic aspects is a key problem in ensuring the sustainable development of the country’s regions. The result of imbalances is a decrease in living standards, the effectiveness of the manufacturing sector’s individual sectors. In this regard, consideration of the effectiveness of management systems’ improving, based on the methodological tools’ development for assessing the balanced development of territories, is imperative to achieve the concept of sustainable functioning of any state. With regard to the construction production, this approach will allow us to formulate a concept for the company’s development and transfer it into the specific strategic objectives’ plane. The current system of construction management, based on the self-development and self-government principles, is an imperative to ensure the balanced innovative development. However, the transition to a new stage of functioning is fraught with a number of problems requiring an adequate approach and quick resolution. The study substantiates the main provisions of the self-regulatory mechanism of construction production, proposes a methodological toolkit for assessing the effectiveness of the management system based on a balanced system of indicators for the construction production. It is based on the principle of maintaining a balance between the payback of innovative products, consumer preferences, the harmony of interests and needs of the society, comparing the investment and the volume of output in a regional context. The proposed approaches to assessing the construction management effectiveness while striving for a balanced development are universal in nature and can be used for various sectors of the regional economy of the primary, tertiary and quaternary sectors.

1 Introduction

In the framework of solving the national problems of sustainable development of the Russian territories, the most important point is the issue of providing the population with affordable housing and lowering the level of interest rates on borrowing by individuals. The current construction production management system, based on the principles of self-development and self-government, is an imperative to ensure the balanced innovative development \([10]\). The self-regulatory mechanism formed in 2008 on the state territory has already expanded the opportunities for entrepreneurship in this sector, made the process of conducting business activities independent and proactive, and housing in most regions is more affordable for the middle-income population. To achieve this goal in the Russian Federation a self-regulatory organization (SRO) which is a system for admitting construction...
products, works and services to the market began to function legally in May 2012. The general provisions of the self-regulatory mechanism and initiative are presented in Table 1.

Table 1. The construction complex self-regulatory mechanism provisions’ systematization.

| The concept | Characteristic |
|-------------|---------------|
| Goal        | Association of organizations to carry out one type of activity, to improve the quality of products, the effectiveness of the supplier-consumer services’ interaction. |
| Subject     | Entrepreneurial and professional activities |
| Funds       | Standards and rules based on the provision of opportunities, the prohibition of activities; inclusion, exclusion of organizations in SRO; |
| Functions   | Determines the conditions of business entities’ membership; Control over entrepreneurial activity; Providing information access; Control over entrepreneurial activity within the framework of the SRO; Protection of SRO members interests |
| Principles  | Compliance principle; The principle of self-development; The principle of initiative; The principle of harmonization; The principle of protective mechanisms; The principle of universality; The competency principle |
| Tools       | Administrative, economic, environment-forming, optimizing, accompanying, functional, motivational. |
| Members     | Individuals as individual entrepreneurs, legal entities. |

Thus, the presented provisions of the self-organization mechanism are the institution formed on the principles of responsibility, self-development, initiative, harmonization, regulating the civil law mechanism in the business environment. Increasing its effectiveness is possible due to the balanced production process and implementation, which is based on the development itself, self-regulation and initiative. The introduction of green standards and innovative orientation in the activities of business entities will allow to bring the construction business to the innovative development trend and enhance its competitiveness.

The existing problems are associated with the lack of a specialization system for construction organizations by the type of work (services) being carried out, and the insufficient responsibility of members of the organization. It is possible to solve this problem by forming a building cluster and integrating a mechanism into the management based on the principles of self-organization and motivation. In this connection, it seems relevant to determine the conceptual model of the management process from the imbalance zone to the balanced development of the construction process.

2. Results

The innovative orientation of construction production should be considered in the plane of balancing the regional and national economies with medium-term and long-term strategies. The introduction of new goods and services in this industry is not widespread due to the low level of investment activity, which causes an urgent need to develop an integrated mechanism to improve the management of the regional construction sector.

The concept of balance in world scientific sources has a different key meaning. The direct meaning is interpreted as sustainability, maintaining economic growth under the influence of external factors, continuous functioning [2, 9]. With regard to the development of economic systems, most authors, such as A.N. Gladilin, A.V. Krivov [1], A.D. Ursul [4] identify the concepts of “stability” and
“balance”. Some researchers argue that balance is a narrower content and is an integral element of sustainable development \cite{5,7}.

From our point of view, a balanced development is a systematic, proportional, harmonization of indicators to improve the management of the economic system, based on the principles of universalization, regionalization, greening, which should be taken into account when calculating the selected indices and criteria.

Based on the construction production balanced development’s principles, it is possible to distinguish the following mechanism based on a combination of components: innovation, reliability, payback, efficiency.

The complexity of the approach in determining the control mechanism effectiveness is based on the search for methodological approaches based on two directions. The first is the search for generalized cost indicators that reflect the quantitative side of the financial and economic activities of the construction sector and its contribution to the economy of the region. The second approach is based on the use of heuristic methods based on determining the coefficient of consumer preferences, including the data from the expert groups, questioning of target groups and the collection of official data from government statistics agencies. The mechanism for evaluating the effectiveness of the management mechanism based on a balanced scorecard is presented in Figure 1.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{efficiency_mechanism}
\caption{The mechanism for assessing the management effectiveness of the region’s construction sector’s balanced development}
\end{figure}
J_{idj} – innovation index, shows the ratio of innovations introduced in construction to production. J_{edj} – the contribution of the construction cluster to the economy of the region:

$$E^n = K_d * \frac{\sum_{i=1}^{n} E_{k_i}}{n}.$$  

where $K_d$ – is defined as the arithmetic mean value of population confidence indices obtained by the heuristic method (Figure 2). Preliminary studies have allowed to determine this indicator at the level of 0.41, which will be the basis for the analysis of the management effectiveness of the regional construction cluster [9]. The main source is the working groups on the study of the socio-economic development of regions, state statistics bodies.

The system of criteria for economic indicators included: $E_{k_1}$ – structure of construction production in GRP, %; $E_{k_2}$ – the value of commissioned residential premises of one territory per 1000 population to the average value of this indicator in the whole country, %; $E_{k_3}$ – the proportion of people employed in the construction of the economically active population in the total number of employed people in the whole country, %; $E_{k_4}$ – the number of innovations put into production to the total value of output; $E_{k_5}$ – return on investment; $E_{k_6}$ – share of construction organizations in the total size of organizations in the region, %.

![Figure 2](image)

**Figure 2.** The generalized confidence index of the population in the regional building cluster [9]

J_{rdj} shows the return on investment and depends on the initial cost of investing, the amount of income for each year of the investment project, adjusted for the discount rate.

J_{E_dj} defines the economic efficiency, determined on the basis of the production cost, product prices, output.

3. Discussion

The transformation of construction infrastructure companies into self-regulatory organizations has made it possible for business entities to operate without a licensing process for production activities. Against the background of a general improvement in economic indicators, such as the volume of work performed, an increase in investment in fixed assets, there was a decrease in the financial results of construction companies from 2014 to 2017. The economic activity of the entities in 2016 was characterized by positive dynamics and growth in financial indicators (Table. 2).

| Indicato | 2005-2010 | 2012-2018 |
|----------|-----------|-----------|

Table 2. The comparative analysis of the management system effectiveness for 2005-2018.
The profitability of goods sold has unstable growth dynamics. The investments proportion in fixed assets in the construction sector tends to decrease. So, in 2010 this indicator exceeded 61%, in 2016 - 57.8%, in 2017 - 55.7%. One of the problems in the construction production development is the depreciation of fixed assets. So, over the past ten years, this figure has exceeded the level of 50% in 2018. In terms of “modernization and reconstruction”, the situation is deteriorating. In 2005, the share of borrowed funds in this industry amounted to 22%, in 2017 barely reached the level of 16%.

| rs                     | 2000 | 2005 | 2008 | 2010 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Ave    |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|--------|
| Total organizations, thousand units | 129  | 113  | 155  | 196  | 205  | 217  | 226  | 232  | 271  | 279  | 278  | 106,0  |
| The volume of work performed billion r. | 22,8 | 1754,4 | 4528,1 | 4454,1 | 5714,1 | 6019,5 | 6125,2 | 701,0,4 | 7213,5 | 7573 | 838,5,7 | 106,7  |
| Commissioning of residential buildings, million m2 | 30,3 | 43,6 | 49,6 | 58,4 | 65,7 | 70,5 | 84,2 | 85,3 | 80,2 | 79,2 | 75,7 | 102,7  |
| Investments in the main capital stock allocated for construction, billion rubles | 1165,2 | 1727,7 | 8781,6 | 4047,7 | 5597,6 | 5805,0 | 6145,0 | 614,0,6 | 6507,3 | 8708,0 | 908,2,4 | 108,7  |
| The average annual number of employees, million people | 4,3 | 4,9 | 5,5 | 5,4 | 5,6 | 5,7 | 5,7 | 6,4 | 6,2 | 6,3 | 6,3 | 103,2  |
| Balance financial result, billion rubles | 11,4 | 39,0 | 41,0 | 87,0 | 176,2 | 601,3 | -75,1 | -54,3 | 39,8 | -30,4 | 133,7 | -     |
labor productivity index since the period of 2010 has a mostly negative value. In 2010 - 0.4%, in 2017 - 2.4%.

The most favorable economic situation is observed in the North-West and Ural Federal Districts. Less stable situation in the Southern Federal and Far Eastern regions (Figure 3).

![Figure 3. The economic situation assessment in construction, as a percentage of the organizations surveyed](image)

These circumstances indicate the inefficiency of the current management system and confirms the need to find an approach based on a balanced scorecard.

4. Summary
Considering the current management system and determining ways to increase the efficiency of the economy construction sector, it is necessary to highlight that the current trends in its development are in the recession stage, as evidenced by the official data from the government statistics agencies. The construction production development is determined by the state and the national economy all sectors formation potential opportunities. Therefore, it is advisable to consider the directions for further development and increasing the production activities efficiency in the construction sector from the perspective of a balanced development of the economic indicators as a whole, taking into account the return on the innovative products, consumer preferences, harmony of interests and needs of the society, comparing the investment and the volume of output in a regional context green production.

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