Management of sustainable economic potential of construction enterprise

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Abstract. Construction is a leading industry sector of the Russian national economy, which is essential for the expansion of fixed assets, the structural restructuring of the economy, and the development of human well-being. The main feature of the construction industry is the variety of organizational and economic forms of the construction production process, a large number of participants with various functional goals and objectives, and the significant dependence of the construction production process on natural conditions. The economic potential, possessed by construction enterprises, should be used effectively. This is the main task of management. At the same time, the use of economic potential is fraught with risks. Their identification is included in the scope of economic analysis. To assess the risks in the use of economic potential, it is subdivided into resource, production and financial. Each of them has its own system of indicators. As a risk assessment method, a statistical one based on the calculation of the coefficient of variation was chosen. The values of the coefficients of variation help to determine the risk zone: allowed, critical or catastrophic. The identification of risk zones is the purpose of this article. Obtaining information on the risk category contributes making management decisions.

Keywords: economic potential, management, construction company, risk, risk zone.

1 Introduction
In the current economic conditions of construction enterprises dominant, the study of such an economic category as "economic potential" is of particular importance. The potential determines the set of abilities of the enterprise to implement development plans and programs, competitiveness and sustainable growth. The complexity of this category, as well as the variety of approaches to its definition, requires a clear finding of the economic essence of the concept of "economic potential" and its role in the modern construction industry.

At the level of a country economy, "potential can be considered as the economic opportunities of the state, depending on the level of development of productive forces and production relations, the availability of labor and production resources, as well as the effectiveness of the economic mechanism" [1, p.175]. At the level of a construction enterprise, “economic potential can be understood as a combination of potentials of resource production and financial purposes, taking into account information about incoming resources and the assessment of the effectiveness of their use” [2].

The importance of the construction sector in management, social policy and the promotion of sustainable development is expressed [3]. The construction sector is vital for the development of other sectors of economy, ensuring the social and economic needs of society [4].

Since the construction industry has specific characteristics expressed, primarily, by natural and climatic conditions, this affects the nature of industry management [5]. Construction enterprises face numerous management problems associated with the implementation of corporate strategies in order to remain competitive [6], standardization of activities [7], production efficiency increase [8] and the need for innovative development [9]. The analysis of organizational resources that provide innovative
solutions is important not only to understand the need for innovation, but also to develop a government policy to support innovation in companies [10].

Innovative solutions should ensure the greening of the construction industry [11] the need to find opportunities to reduce the environmental impact of construction [12]. In the future, environmentally friendly building technologies such as Contour Crafting Technology will become popular. Automated construction, based on such technologies, is considered to be a solution that reduces labor costs, reduces costs, increases architectural flexibility and has a positive effect on the environment [13].

As for the economic potential of construction enterprises, there is a lack of research of its implementation. First, this is due to limitations in funding, lack of technologies, resources, etc. [14]. Limited potential has a serious impact on competitiveness [15], the development of mechanisms for regulating innovation, and performance [16]. This raises an essential question of how limited potential is unfavorable for enterprises [17] and how much it can restrain the sustainable development of the construction organization. This is especially true in the context of the complication of construction processes on increasingly limited construction sites, which contributes to the search for advanced technologies to increase construction productivity [18].

Analysis is a management function that provides the enterprise management system with the necessary information [19]. Such information allows determining the possibilities of predicting the efficiency of resource use [20], which allows making rational management decisions on the effective use of the economic potential of a construction enterprise.

2 Methods

The authors used methods of analysis, synthesis, classification, modeling, tabular and graphical methods of data visualization. To describe the structure of the economic potential of the construction enterprise, risk assessment methods based on the calculation of the coefficient of variation were implemented. It allowed assessing the risk levels of structural components and the economic potential integrally. Furthermore, a comprehensive assessment of the economic potential was carried out. It allowed identifying risk zones and naming measures to ensure sustainable economic potential.

3 Results and Discussion

Assessment of the sustainability of the economic potential of a construction organization should ensure risk management. At the same time, it is important not only to be able to identify risks, but also to find ways of their neutralization.

Risk acts as an integral element of the strategic management system. In the process of managing the economic potential of the organization, a risk portfolio related to the resource, production and financial potential is formed. Scientists have not yet presented algorithms for a unified approach to assessing the risks of economic potential, which creates difficulties in managing the organization. Therefore, the proposal of methodological recommendations in this matter would contribute to the development of analytical procedures for assessing risks, which would lead to improved management results in the formation and use of the economic potential of the enterprise.

Scientists express the category of “risk” differently.

The unequivocal concept of “risk” does not still exist, despite the fact that the category of “risk” is very common and found in many natural and human sciences. However, each science tries to develop its own methods for risk assessment and analysis.

COSO Corporate Risk Management - Integration with Strategy and Efficiency (COSO ERM Framework [21]) defines risk as “the chance that events will occur and will affect the achievement of the strategy and business goals.” This includes both negative consequences (e.g. a decrease in target income indicators or injury to reputation), as well as positive impacts (e.g. opportunities such as an emerging market for new products or cost-saving initiatives).

The risk essence in the organization’s activity is that together with the expected income, the risk is identified with possible damage, losses caused by the implementation of unreasonable managerial
decisions, or the influence of the external environment, including market changes, political, climatic, social and other circumstances.

While assessing the economic potential of an organization, the category “risk” is not considered in the specialized literature. This suggests that the risk of the potential can be described with the expressions given above. However, no organization will risk its resources if it does not have hope for a positive result. Considering this, risk expresses not only losses, but also the potential return on investment.

Taking a decision in the organization managing activities can be justified by conducting in-depth risk study. Risk analysis assessment is a procedure associated with identifying risks that the organization may face performing business operations. The main goal of risk assessment is aimed at making managerial decisions on the feasibility of investing in a specific project.

If the potential result justifies the risk, then the organization turns to the project implementation. Otherwise, the implementation of the project will cause a threat of material losses.

Thus, an analysis and assessment of the risks of economic potential will make it possible to predict whether monetary investments are profitable. At the same time, it becomes possible to evaluate in which processes losses can occur and what measures should be taken to reduce losses. Risk assessment is necessary for investors to decide on investing in the organization work. Risk assessment provides entrepreneurs with information on areas where it is necessary to develop their business with the least likelihood of risk situations.

If the risk is associated with the possibility of losses, then material, financial, social, marketing temporary losses may happen in the activities of an organization. It is associated with the formation of economic potential. In other words, the risks of economic potential can be expressed by the rupture of its internal structure, taking into account resource, production or financial risks, or their individual combinations.

Resource risk is caused by the absence or lack of physical, labor and other resources in case of unforeseen situations. This may be due to the shortage of labor, the shortage of raw materials and supplies, irregular supplies, delayed payments under contracts, etc. Such risky events will adversely affect the results of the organization’s activities, will determine construction appreciation or constructions in progress.

Production risk is caused by the specific conditions of construction production. This is due to climatic conditions, the complexity of the construction and installation work, work at heights, etc. Moreover, work with specialized equipment requires construction workers with professional skills. The specifics of construction requires a thorough analysis of risks, which will neutralize their impact on business results. There is a need to identify risks during the implementation of each construction process (procurement, transport, preparatory, installation and laying), which will ensure competent risk management of construction production.

If a resource risk (a shortage of construction workers) happens during construction, it can cause production risk (non-fulfillment of construction and installation work), and then transform into financial risk (revenue shortfall). At the same time, the construction project will continue beyond the normative period, the organization will require additional funds, which will subsequently be demanded from the construction facility customer.

The relationship of structural risks of the economic potential of the construction organization is determined by the following circumstances:
- the bulk of the current assets of construction organizations needs constant funding in order to reproduce inventories;
- 80% of construction organizations costs are formed in the main operating activities;
- incomes of construction companies in recent years tend to decrease;
- inflation until 2016 had a significant negative effect on the performance of construction organizations.

As follows, the formation and use of the economic potential of construction organizations are associated with risks. At the same time, it is possible to point out risks that are difficult to manage
(external risks) and internal risks that may be the object of attention on the part of the organization’s management.

For effective organization management, it is important not only to suppose the risk existence, but also to be able to perform its quantitative and qualitative assessment. The task of a qualitative risk assessment is its identification, determination of factors that influence the level of risk and loss assessment. Qualitative assessment methods associated with expert assessment methods are presented in the standard “Risk Management. Methods of risk assessment” [22] and in this study are not disclosed.

Quantitative risk assessment is expressed by numerical values of risk. Carrying out such an assessment allows justifying the choice of the least risky managerial decision of the possible options. The practice of economic activity has a number of methods for quantitative risk assessment, among which the statistical method and the analytical method should be pointed out.

The essence of the statistical method is expressed in the study of the dynamics of losses that occurred in the construction organization in order to identify the probability of a risky event and to identify the risk.

The main indicators of the statistical method for risk determination are: probability of the occurrence of a random event, dispersion, mean-square deviation, coefficient of variation.

The probability of occurrence of a random variable as a numerical measure of risk (R) is associated with the probability of occurrence of losses compared to the expected result

\[ R = p(x) \]  

where \( x \) - random loss variable;
\( p(x) \) - probability of loss.

For quantitative risk assessment, it is convenient to use classified risk zones. In this case, zones of allowed, critical and catastrophic risk are distinguished [23]. Taking managerial decisions on the risk admissibility, it is necessary to find out the probability that the losses will not exceed the critical level and will be within the allotted zone, i.e.:

\[ R = p(x < x_0) \]  

where \( x_0 \) - a limit value of a certain level of losses.

However, the above considerations do not allow a comparison of the riskiness of production lines due to the lack of units. While the statistical method of risk assessment, this contradiction is resolved by using the coefficient of variation (v).

Unlike statistical ones, analytical methods of risk assessment are based on the analysis of indicators of the organization’s activity and their ranking in accordance with the risk degree.

Since the economic potential has its own structure, risk assessment should be carried out, as a whole, so for each structural component of the potential. This will determine the area of the most risky type of activity and make managerial decisions necessary to neutralize risk-generating events.

Further is presented the algorithm for assessing the risk of the economic potential of an organization using analytical and statistical methods.

The first stage. The selection of indicators characterizing the economic potential of the organization in the context of resource, production and financial potential is carried out. For the assessment, dynamics data are required to provide a better risk assessment. The set of the indicators will be unique for each organization and should be replenished during the development of the organization. In this case, just absolute indicators should not be used, on the contrary, the preference is for relative indicators expressing the efficiency of management and the financial condition of the organization.

Dynamics of economic indices of LLC “Construction and Installation Management” for 2013-2018 years are given in Table 1.
The second stage. Coefficients of variation to classify the use of economic potential to specific risk areas are calculated. Coefficients of variation, expressed as a percentage, are determined by the ratio of the standard deviation (σ) to the average value for the totality of the considered indicators (X),

$$v = \frac{\sigma}{X} \times 100$$  \hspace{1cm} (3)

Using the coefficient of variation, the level of variability of indicators expressing economic potential is compared. Coefficient of variation varies from 0 to 100%. The higher the coefficient value is, the higher the level of variability. Thus, higher coefficients of variation of an indicator (a group of indicators) characterize a higher level of activity risk. Scientists have proposed the following levels of coefficient of variation for identifying risk zones [24]:
- below 10% - zone of allowed risk;
- within 10-25% - critical risk zone;
- above 25% - a zone of catastrophic risk.

The third stage. At this stage, according to distance method, the analysis of the deviations of indicators of the use of economic potential from the best values, called reference values, is performed.

The implementation of distance method assumes that when considering the dynamics of indicators, a reference series is created by selecting the best indicators for the analyzed period. Reference values are displayed in a separate column. Further, indicators are to be standardized by dividing the actual index by the value of the reference index. Finally, a rating number is derived for each indicator using the following formula [25].

$$R_i = \sqrt{(1-x_{i1})^2 + (1-x_{i2})^2 + ... + (1-x_{in})^2}$$  \hspace{1cm} (4)

where: \(x_{ij}, x_{i2j}, ..., x_{ijn}\) - standardized ratio of j year.

Table 2 illustrates the values of the coefficient of variation and the rating numbers for indicators necessary for the risk assessment of a construction organization economic potential use.

### Table 1. The indices of LLC “Construction and Installation Management” for 2013-2018 years.

| Indicators                           | 2013   | 2014   | 2015   | 2016   | 2017   | 2018   |
|--------------------------------------|--------|--------|--------|--------|--------|--------|
| Resource Potential Use Indicators    |        |        |        |        |        |        |
| Output-capital ratio                 | 7.38   | 8.1    | 8.99   | 10.91  | 10.74  | 10.46  |
| Material productivity                | 9.27   | 9.37   | 7.8    | 8.84   | 12.96  | 12.87  |
| Labor efficiency                     | 793.8  | 1187.5 | 954.51 | 1541.8 | 1254.1 | 1367.0 |
| Loan return                          | 12.9   | 11.2   | 10.2   | 8.3    | 11.3   | 9.9    |
| Capacity ratio                       | 0.78   | 0.75   | 0.82   | 0.84   | 0.8    | 0.81   |
| Production mechanization index       | 0.69   | 0.73   | 0.79   | 0.86   | 0.89   | 0.89   |
| Line of production index             | 0.7    | 0.58   | 0.68   | 0.67   | 0.67   | 0.67   |
| Financial Potential Use Indicators   |        |        |        |        |        |        |
| Equity Ratio index                   | 0.61   | 0.66   | 0.64   | 0.52   | 0.73   | 0.74   |
| Asset turnover ratio                 | 2.2    | 2.26   | 2.36   | 3.16   | 2.22   | 2.76   |
| Working capital ratio                | 1.42   | 1.22   | 1.57   | 1.19   | 1.08   | 1.11   |
| Profit margin ratio                  | 2.67   | 3.21   | 4.89   | 3.25   | 3.15   | 3.21   |
Table 2. Statistical performance indicators of LLC “Construction and Installation Management”

| Indicators                                | V   | R   |
|-------------------------------------------|-----|-----|
| Output-capital ratio                      | 16.4| 0.53|
| Material productivity                     | 16.5| 0.69|
| Labor efficiency                          | 26.0| 0.86|
| Loan return                               | 13.9| 0.45|
| Resource Potential Use Indicators         | 18.2| 0.65|
| Capacity ratio                            | 4.3 | 0.18|
| Production mechanization index             | 10.4| 0.39|
| Line of production index                  | 11.2| 0.30|
| Production Potential Use Indicators       | 8.6 | 0.30|
| Equity Ratio index                        | 10.2| 0.41|
| Asset turnover ratio                      | 14.9| 0.66|
| Working capital ratio                     | 13.8| 0.46|
| Profit margin ratio                       | 29.1| 0.98|
| Financial Potential Use Indicators        | 17.0| 0.67|
| Assessment of Economic Potential          | 14.6| 0.54|

The obtained data allow pointing out a scale in accordance with the levels of riskiness of economic potential use. If the rating number does not exceed 0.4 then economic potential is related to the zone of allowed risk; within 0.41-0.8 – to the zone of critical risk; from 0.8 and above - a zone of catastrophic risk.

The fourth stage. The risk assessment allows presenting a graphical interpretation of the economic potential riskiness in the context of individual components (Figure 1).

Figure 1. Risk zones for the economic potential of a construction organization use.

The Figure 1 relates the use level of the organization’s economic potential to the critical risk zone. The best use demonstrates the production potential, assigned to the zone of allowed risk. The worst use demonstrates financial and resource potentials, which are rather close to the catastrophic risk zone.

The fifth stage. The performed studies on risk assessment of the economic potential of the organization allow starting developing measures aiming at reducing the level of activity risk.

Each risk level will have its own measures to neutralize risk in future periods. For the zone of allowed risk, there is no need to develop measures, aimed at reducing risk. An allowed level of risk always exists and it does not pose a threat to the sustainable development of the organization.
For a critical risk area, activities should focus on more efficient use of resources, the expansion of the market for products, the attraction of new customers, and the cost optimization. This will help maintain the necessary level of profit to overcome the crisis manifestations.

For the catastrophic risk zone, the measures should be associated with the restoration of the financial solvency, which depends on the willingness of creditors to carry out debt restructuring and production upgrades. Otherwise, creditors have the right to apply to the Arbitration Court with a claim for declaring the organization a bankrupt.

4 Conclusions
The article presents concerns dealing with the management of sustainable economic potential of a construction organization. An evaluation method for analyzing the risks of economic potential use, consisting of five stages, is proposed. The method allows to categorize potential into three component parts: resource, production and financial; to determine, based on the coefficient of variation, the risk zone of each type of economic potential and potential in general, and to make proposals on risk neutralization.

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