METHODOLOGICAL BASES FOR THE EVALUATION OF BUSINESS PROCESSES IN THE CONSTRUCTION INDUSTRY OF UKRAINE IN THE POST-WAR PERIOD

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Abstract. *The purpose* of the work is to develop a methodological approach to the evaluation of business processes of organizations in the construction industry of Ukraine in the post-war period. *Methodology*. In order to achieve the set goal, the following research methods are used in the work: theoretical generalization – for a deeper study of business process management issues; graphic – for building a methodical approach to the assessment of business processes in the construction industry of the national economy; system approach – when structuring indicators for calculating integral indicators of effectiveness and efficiency of a certain business process; matrix – for forming a matrix of evaluation indicators of effectiveness and efficiency of operational business processes of organizations in the construction industry. *Results*. The article presents a methodological toolkit for the analysis and evaluation of business processes in the construction industry of Ukraine. The proposed methodological approach provides for the identification of "bottlenecks" of certain business processes by calculating weighted average, integral and general indicators of effectiveness and efficiency. This makes it possible to assess the state of certain business processes of enterprises, as well as their totality, and to determine the priority of management actions for their improvement. *Practical implications*. Approval of the proposed methodological approach was carried out on the example of the organization of the construction industry. At the same time, within the framework of the proposed criteria (financial-economic, resource-production, external integration, organizational) a list of indicators was formed, taking into account the specifics of the activity of the construction organization. Evaluating the effectiveness and efficiency of business processes according to the specified criteria and indicators allows to monitor the current activity of the construction organization and evaluate the effectiveness of its functioning at any moment. The influence of certain groups of indicators according to each BSC criterion was evaluated and an integral assessment of the effectiveness and efficiency of the studied business processes was carried out. Calculations show that most of the operational business processes of the studied construction organization are performed with an average level of effectiveness and efficiency. The obtained value of the summarizing indicator of effectiveness and efficiency of the set of operational business processes of the construction organization indicates the average level of effectiveness and efficiency. *Value/originality*. It has been proven that information about the effectiveness and efficiency of the business process is the basis for management decisions by the management and is used for operational control of business processes, analysis and improvement of the activities of the construction organization.

Key words: methodological approach, assessment, business processes, construction industry.

JEL Classification: M11, O31

1. Introduction

The construction industry of Ukraine is going through difficult times. Since the war started by Russia against Ukraine on 24.02.2022 does not contribute at all to its strategic development. Today the construction industry has an unstable development trend. The reason for this is a number of internal and external threats that arise in the organization of the industry. The construction industry is one of the most important industries in any industrially developed country. Therefore, its strategic development

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will have a direct impact on the infrastructure support of the national economy in the whole post-war period. A modern enterprise should have a conscious and efficient management system of its activity in order to create sustainable advantages over competitors, which can be implemented using certain methodological approaches. Management system of an enterprise should be aimed at increasing the efficiency of its functioning, i.e., it is necessary to create a system of performance and decision analysis. It will help to distinguish and eliminate the causes of existing discrepancies, and also to determine their possible occurrence. Process approach is an effective and modern means of achieving the set condition. It directs company's activity to business processes, and company's management system to management of each business process separately and in aggregate and/or within certain projects implemented by companies.

2. Analysis of recent research and publications

Many domestic and foreign scientists have been engaged in research on methodological aspects of strategic development of the construction industry. They are N. Abdelkafi, U. Andrusiv, Ya. Vytvytskyi, O. Haltsova, O. Burukhina, A. Cherchata, D. Nam, A. Marrella and others. In the work (U. Andrusiv, O. Galtsova, 2017), the authors proposed a methodological approach to assessing the level of innovative activity of enterprises in the construction industry, where the main emphasis is placed on the implementation of business processes at all levels of enterprise management.

The work (Kratzer, 2019) emphasizes the separation of the economic categories "effectiveness" and "efficiency" in the process of evaluating business processes, since effectiveness and efficiency determine different aspects of their functioning. It is proposed to apply the concept of Balanced Scorecard (BSC) in the formation of a methodology for measuring business processes. The authors (Cherchata, Andrusiv, 2018) considered the main issues related to process-oriented management in enterprises and developed a procedure for selecting business processes for reengineering (BPR – business process reengineering) in order to improve these business processes. The work of Marrella (2019) proposes SmartPM, a model

and prototype of a process management system that includes a set of methods to support automated adaptation of knowledge-intensive processes during execution.

However, the issue of developing methodological tools for evaluating the business processes of construction organizations remains underexposed.

The **aim** of the work is to develop a methodological approach to the evaluation of business processes of organizations in the construction industry of Ukraine in the post-war period.

3. Presentation of the main research material

Business processes are the foundation of process-oriented management of organizations. The process approach includes not only the description of the enterprise as a network of interrelated business processes, but also the continuous monitoring, management, and improvement of business processes. In order to identify business processes that need to be changed in the construction industry, the authors developed a methodical approach to evaluating the business processes of organizations in the construction industry of Ukraine (Figure 1).

This approach, unlike the existing ones, is based on a system of balanced indicators and will make it possible to evaluate the effectiveness and efficiency of business processes of organizations in the construction industry.

Determinations of normalized estimated Business Process Effectiveness Indicators (Ki) are calculated using the ratio of actual to planned values for each indicator according to the formula (1):
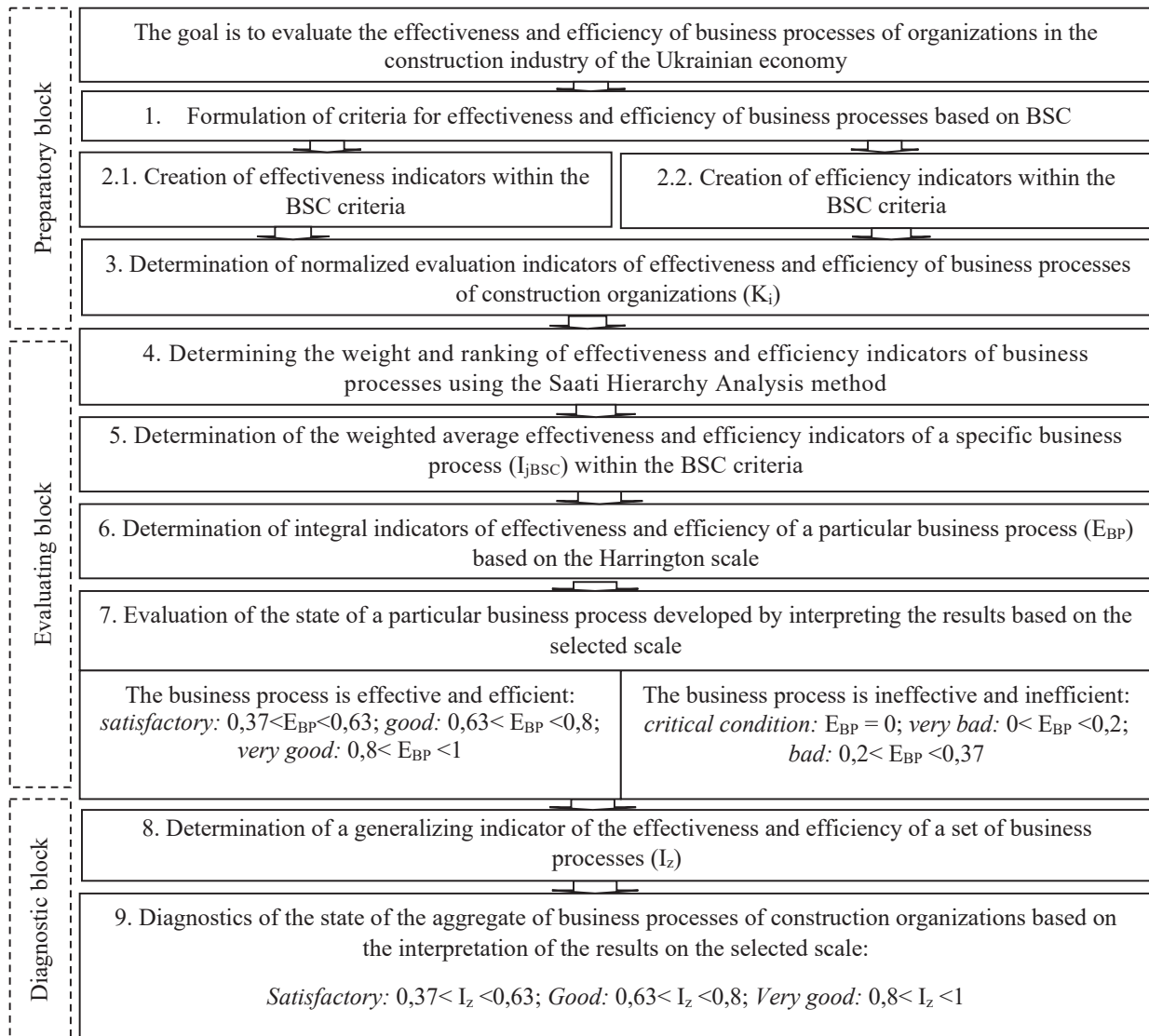
$$Ki = \frac{Xn}{Yn} \qquad (1)$$

where Ki – relative single i-th process indicator;
Xn – actual value of the indicator;
Yn – planned value of the indicator.

The weighted average indicator of effectiveness and efficiency of a particular business process with fixed values within each proposed BSC criteria using the weighted sum of indicator estimates is calculated using the formula (2):

$$I_{jBSC} = \sum_{i=1}^{n} Ki \times wi , \qquad (2)$$

where I_{jBSC} – weighted average indicator of the effectiveness and efficiency of a particular business process within j-th BSC criteria;

| Preparatory block | The goal is to evaluate the effectiveness and efficiency of business processes of organizations in the construction industry of the Ukrainian economy |
| | 1. Formulation of criteria for effectiveness and efficiency of business processes based on BSC |

Figure 1. Methodical approach to the evaluation of business processes in the construction sector of the national economy

Source: author's development

Ki – normalized estimated i-th indicator of the business process;

wi – weighting coefficient of the indicator;

n – number of indicators.

The integral indicator of the effectiveness and efficiency of a particular business process as a whole is the sum of the weighted average effectiveness and efficiency indicators within all selected BSC criteria and is calculated using the formula (3):

$$E_{BP} = \sum_{j=1}^{m} I_{jBSC} \qquad (3)$$

where E_{BP} – integral indicator of the effectiveness and efficiency of a particular business process;

I_{jBSC} – weighted average indicator of the effectiveness and efficiency of a studied business process within j-th BSC criteria;

m – number of BSC criteria used for evaluation.

Determination of a generalizing indicator of effectiveness and efficiency of a set of business processes (I3) is calculated using the formula (4):

$$I_z = \sum_{i=1}^{k} E_{BP} / k, \qquad (4)$$

where I_z – a general indicator of the effectiveness and efficiency of a set of business processes in an organization;

E_{BP} – integral indicator of the effectiveness and efficiency of a specific business process;

k – number of business processes under study.

After calculating the value of the generalizing indicator of the effectiveness and efficiency of the set of business processes of the enterprise I_z, the level of the state of the set of operational business processes of the enterprise is determined according to the Harrington scale adopted at the 7th stage. At the same time, it is important to analyze changes in the integral indicator of effectiveness and efficiency of the studied business processes in dynamics, which will allow us to formulate reasonable conclusions about the factors and managerial actions that influence the activity of the enterprise and the trajectory of its development.

The proposed methodological approach will be tested on the example of one of the existing organizations in the construction industry. The information on the planned indicators of the criteria was taken from the action plans of the organizations and departments. The implementation of the methodology in the practical activities of a construction organization is carried out as follows:

Stages 1-6. Evaluate the effectiveness and efficiency of the company's business processes. These stages include determination of planned values, determination of actual values for each indicator, and determination of the significance of each indicator within business processes. According to this method, a list of indicators and criteria of a construction enterprise is formed. At the same time, attention is focused on business processes related to the main (operational) activity of the construction organization, and production business processes, business processes of resource supply, storage of material and technical resources, and transport support are highlighted in order to exert managerial influence on them.

The effectiveness and efficiency of business processes for each BSC (I_{jBSC}) criterion are determined by formula (2), in which the Ki indicator is calculated by formula (1). At the same time, it should be noted that individual effectiveness and efficiency indicators are direct, i.e., their value increases with the improvement of the enterprise's performance, and inverse, that is, their value decreases with the improvement of the enterprise's performance, so to calculate the value of the normalized estimated Ki indicator for specific indicators, it is proposed to use an improved calculation formula:

For indicators where a reduction leads to improved results:

$$Ki = 1 - \frac{Xn}{Yn} \qquad (5)$$

Ki – normalized estimated i-th process indicator;
Xn – actual value of the indicator;
Yn – planned value of the indicator.

For indicators that decrease leading to a deterioration in results:

$$Ki = \frac{Xn}{Yn} \qquad (6)$$

For indicators where an increase will lead to improved results:

$$Ki = 1 - \frac{Yn}{Xn} \qquad (7)$$

For indicators where an increase leads to a deterioration in results:

$$Ki = \frac{Yn}{Xn} \qquad (8)$$

Based on the calculation of the value of the Kendall's coefficient of concordance (0.81), the degree of reliability of the conducted research for each aspect of the Balanced Scorecard system is confirmed.

The influence of partial indicators of effectiveness and efficiency on the integral evaluation for identifying bottlenecks in the studied business processes is shown in the Table 1.

Thus, the impact of certain groups of indicators on each BSC criterion was evaluated and an integral assessment of the effectiveness and efficiency of the studied business processes was performed. Calculations show that most of the operational business processes of the studied construction organization are performed with an average level of effectiveness and efficiency.

However, the business process of resource management of the construction process has a low level of effectiveness and efficiency and needs to be improved. The obtained value of a generalizing indicator of effectiveness and efficiency of a set of operational business processes of a construction organization indicates an average level of effectiveness and efficiency. The aggregate functions effectively, but it is necessary to develop corrective actions.

4. Conclusions

Based on the above, it can be argued that correct identification and rational organization

Table 1

**Matrix of estimated indicators of effectiveness and efficiency
of operational business processes of construction industry organizations**

Criteria / Business processes	Financial and economic (fe)	Productive (resource) (pr)	External integration (ei)	Organisational (o)	Integral indicator of the effectiveness and efficiency of a business process (EBP)	Rank
Productive (P)	$I_{P\text{-}fe}$ 0,12	$I_{P\text{-}pr}$ 0,17	$I_{P\text{-}ei}$ 0,06	$I_{P\text{-}o}$ 0,14	*0,49*	III
Resource provision of construction production (RP)	$I_{RP\text{-}fe}$ 0,11	$I_{RP\text{-}pr}$ 0,08	$I_{RP\text{-}ei}$ 0,06	$I_{RP\text{-}o}$ 0,07	*0,32*	I
Storage of material and technical resources (SR)	$I_{SR\text{-}fe}$ 0,2	$I_{SR\text{-}pr}$ 0,12	$I_{SR\text{-}ei}$ 0,04	$I_{SR\text{-}o}$ 0,043	*0,4*	II
Transport support (TS)	$I_{TS\text{-}fe}$ 0,04	$I_{TS\text{-}pr}$ 0,33	$I_{TS\text{-}ei}$ 0,11	$I_{TS\text{-}o}$ 0,03	*0,51*	IV
Generalizing indicator of a set of operational business processes (I_z)					$I_z = 0,43$	

of business processes, timely research and evaluation of business processes allow to identify problem areas and make effective management decisions. In this regard, the author offers a methodical approach to the evaluation of business processes of organizations in the construction sector of the national economy, which allows to analyze and evaluate the effectiveness of the organization's business processes. Calculating the effectiveness and efficiency indicators of individual business processes and the totality of these business processes as a whole allows to obtain and aggregate data on the degree of achievement of the goals of both individual business processes and the synergistic goals of the totality of these business processes. Information about the effectiveness and efficiency of business processes is used as a basis for management decisions, for operational control of business processes, and for analysis and improvement of the organization's activities.

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