DOI: 10.55643/fcaptp.4.69.2026.5272

Oksana Zybareva
D.Sc. in Economics, Professor of the Department of Business and HR Management, Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine;
e-mail: zybareva.edu@outlook.com
ORCID: 0000-0002-3069-6462
(Corresponding author)

Liubov Zgalat-Lozynska
D.Sc. in Economics, Professor of the Department of Economic Theory, Accounting and Taxation, Kyiv National University of Construction and Architecture, Kyiv, Ukraine;
ORCID: 0000-0002-2063-5738

Ihor Krysovatyy
D.Sc. in Economics, Associate Professor of the Department of Entrepreneurship and Trade, West Ukrainian National University, Ternopil, Ukraine;
ORCID: 0000-0002-4063-6324

Inna Lopashchuk
Candidate of Economic Sciences, Associate Professor of the Department of Business and HR Management, Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine;
ORCID: 0000-0001-9934-6607

Zinaida Zhyvko
D.Sc. in Economics, Professor of the department of aviation management, Ukrainian State Flight Academy, Kropyvnytskyi, Ukraine;
ORCID: 0000-0002-4045-669X

Received: 20/07/2026
Accepted: 15/08/2026
Published: 31/08/2026

© Copyright
2026 by the author(s)

This is an Open Access article distributed under the terms of the Creative Commons CC-BY 4.0

FINANCIAL AND SOCIAL SECURITY OF CONSTRUCTION ENTERPRISES AND POSSIBLE SCENARIOS FOR ITS PROVISION

ABSTRACT

This article describes the development and testing of a methodological approach to the integrated assessment of the financial and social security of construction companies in 2022–2025. It is proposed to consider financial and social security as the ability of an enterprise to maintain solvency, profitability, asset turnover, income security, wage adequacy, personnel reproduction, and labor productivity without critical loss of stability. The methodological support combines a system of eight indicators, threshold normalization, the Saaty hierarchy process analysis method, group and integral indices, scenario modeling, and a Monte Carlo simulation to verify the robustness of the results. The weights are formed using a reproducible, consistent matrix of pairwise comparisons, for which the consistency coefficient is 0.0138. Empirical testing was conducted for PJSC HC Kyivmiskbud, Altis-Construction LLC, BC Intergal-Bud LLC, and KEBC LLC using open financial reporting data and administrative employment indicators. The results revealed significant heterogeneity in safety trajectories. KEBK LLC approached a high level, while other companies maintained a low level or fell into it due to unprofitability, declining revenue, or a weak social component. Scenario assessment demonstrated the advantage of a balanced recovery for most companies, while for KEBK LLC, the financial scenario is the priority. The practical significance of this approach lies in the formation of an analytical basis for selecting differentiated safety measures.

Keywords: financial and social security, construction company, integrated assessment, Saaty method, normalization, scenario modeling, employment, wages, financial stability

JEL Classification: C43, G32, J21, L74, M21

INTRODUCTION

The construction industry plays a vital role in the national economy, as it creates and restores production, housing, transport, social, and energy infrastructure, generates demand for products from related economic activities, and supports significant employment. The performance of construction companies directly impacts the pace of investment activity, territorial restoration, the implementation of state and local infrastructure programs, and the ability to provide housing and essential social facilities. At the same time, construction is characterized by high capital intensity, a long operating cycle, and significant dependence on the cost of materials, availability of credit, customer solvency, stable logistics, and the availability of qualified personnel. Therefore, any negative changes in the external environment quickly translate into financial, personnel, production, and social threats for construction companies. The period 2022-2025 is particularly challenging for construction companies in our country. Full-scale war has resulted in the destruction of production facilities, residential buildings, and infrastructure, disrupted supply chains, increased costs of construction materials, shortages of certain raw materials, reduced private investment demand, and increased risks for long-term projects. Inflation, currency fluctuations, rising energy prices, limited access to borrowed capital, rising insurance costs, and the need to strengthen worker protections have added pressure. At the same time, the need to rebuild devastated areas, develop temporary and permanent housing, modernize critical infrastructure, and expand international support creates new opportunities for construction companies, the exploitation of which depends on their financial stability, human capital, and ability to quickly adapt to change.

Under these circumstances, the financial security of a construction company cannot be considered in isolation from the social component of its functioning. A decline in liquidity, solvency, or profitability limits a company's ability to pay wages on time, ensure adequate worker protection, maintain employment, invest in the professional development of its personnel, and create acceptable working conditions. At the same time, staff losses, high employee turnover, reduced productivity, insufficient motivation, and deteriorating employment conditions have a direct impact on financial results, the duration of the construction cycle, and the ability to fulfill contractual obligations. Consequently, financial and social security form an interconnected system, in which negative changes in one component increase threats to the other.

The scale of future recovery increases the role of the construction sector, but does not eliminate the risks for individual enterprises. According to estimates from the World Bank, the Government of Ukraine, the European Commission, and the United Nations (2026), the need for recovery and reconstruction by the end of 2022-2025 is approaching USD 588 billion. At the same time, significant demand for construction work does not automatically translate into an improvement in the situation of each enterprise, as access to contracts, working capital, war risk insurance, technical resources, and workers remains uneven. IOM data (2024) also confirm that employment and population mobility constitute a separate risk area for the domestic labor market.

The financial and social security of a construction enterprise represents a state of security in which financial potential, income, and capital flows are consistent with the ability to maintain employment, adequate wages, and staff productivity. Therefore, the assessment should reflect not a single sum of coefficients, but a balanced combination of two interconnected components. This integrated approach allows for comparison of enterprises of different sizes, identification of sources of deterioration, and linking diagnostics to possible safety assurance scenarios.

LITERATURE REVIEW

The issue of economic security of enterprises occupies an important place in the research of Ukrainian scientists. Zinenko and Kobelyeva (2022) define the economic security of an enterprise as a complex state of security of its functioning and distinguish financial, personnel, technical and technological, informational, political and legal, and environmental components. An important provision of their research is the need to take into account industry specifics when forming a system of indicators. For construction enterprises, such specifics are associated with a long production cycle, significant capital requirements, dependence on a contractual portfolio and the involvement of qualified personnel. Kovtun (2023) considers the economic security of construction enterprises as one of the prerequisites for the stability of modern business and emphasizes the need for constant monitoring of financial threats, insolvency risks, and changes in the external environment. The advantage of this approach is the focus on timely detection of negative trends. At the same time, the proposed provisions are mainly conceptual in nature and do not provide for a simultaneous quantitative assessment of the financial and social parameters of the enterprise's activities.

The sectoral vision of economic security is developed by Kapral and Sekretar (2025), who distinguish the financial, technical-technological, market, legal, and informational components of the security of construction enterprises. Scientists justify the feasibility of diversifying activities, improving planning, and implementing management technologies. At the same time, staff stability, wages, employment retention, and staff productivity are not combined in their approach with financial indicators in a single integral index.

The social component of corporate security is considered by Mishin, Chechetova-Terashvili, Mishina and Logvinenko (2025). The authors systematize internal and external social threats characteristic of the period of martial law, and justify the need to integrate social security into the general system of enterprise management. This position confirms that personnel losses, insufficient remuneration, deterioration of employment conditions, and reduced productivity should be assessed in relation to the financial capabilities of the enterprise.

Methodological aspects of quantitative assessment of economic security are presented in the works of Shylo (2022) and Onisenko et al. (2025). Shylo (2022) systematizes indicators for assessing the level of economic security and justifies the use of an integral approach. Onisenko et al. (2025) combine the normalization of primary data with the calculation of partial and integral indices of financial and social security of the enterprise. These studies form a methodological basis for quantitative analysis, but do not cover comparisons of construction enterprises over a long period, scenario adjustment of indicators, and verification of the stability of results to changes in weight coefficients.

A separate direction of assessment of financial insolvency of construction enterprises has been formed in foreign studies. Horta and Camanho (2013) confirmed the need to adapt bankruptcy prediction models to the industry characteristics of construction. Ng, Wong, and Zhang (2011) investigated the possibilities of using Z-score models to distinguish solvent and

DOI: 10.55643/fcaptp.4.69.2026.5272

insolvent construction enterprises. Wang et al. (2024) systematized modern directions of financial insolvency prediction in the construction industry. A common feature of these works is the predominant focus on financial ratios, while the human resources and social prerequisites for the stability of enterprises are taken into account to a limited extent.

Another area of foreign research is related to the social sustainability of construction. Zuo, Jin, and Flynn (2012) substantiated the importance of social factors for the long-term effectiveness of construction activities. Valdes-Vasquez and Klotz (2013) proposed including social criteria in the planning and design processes. Sierra, Pellicer, and Yepes (2017) and Hendiani and Bagherpour (2019) have developed multi-criteria and integrated approaches to assessing the social sustainability of infrastructure and construction projects. Gurmu et al.'s (2022) systematization confirmed the importance of employment, safe working conditions, professional competencies, worker well-being, and stakeholder participation.

Attempts to combine financial and non-financial indicators are presented in the study by Morosan-Danila et al. (2025). The advantage of this approach is a comprehensive assessment of the sustainability of construction enterprises. However, its application is focused primarily on financial, social, and environmental indicators of sustainable development and does not provide for the definition of differentiated scenarios for ensuring the financial and social security of individual enterprises.

The scientific contribution of the study does not consist in the separate use of integral assessment, normalization, weighting, scenario analysis, or simulation, since these methods are well established in economic-security research. The methodological novelty lies in their configuration into a reproducible financial-social security assessment procedure designed for construction enterprises and based on publicly available data. In contrast to bankruptcy-oriented models focused predominantly on financial distress and sustainability models combining broader ESG dimensions, the proposed procedure identifies the imbalance between financial and social components, determines the indicators responsible for this imbalance, and directly links the diagnostic profile of an enterprise with differentiated recovery scenarios. Thus, the novelty concerns the architecture and managerial interpretation of the assessment rather than the individual mathematical methods applied.

Compared with bankruptcy prediction models, the proposed approach has the advantage of incorporating employment, remuneration and labour productivity together with financial characteristics, although it is not intended to predict insolvency probability. Compared with broad sustainability and ESG indices, the model uses a narrower set of indicators available from open enterprise-level data and therefore provides greater reproducibility. Its main advantage over a conventional integral index is that the calculation is continued through component diagnostics, sensitivity assessment, and differentiated scenarios rather than ending with a single ranking value.

AIMS AND OBJECTIVES

The purpose of this article is to substantiate and test a methodological approach to the integrated assessment of the financial and social security of construction companies and identify possible scenarios for ensuring this. This objective requires developing a system of indicators, constructing a threshold normalization procedure, establishing weights using the Saaty method, calculating group and integral indices for 2022–2025, modeling scenarios based on 2025, and testing the robustness of the findings under varying weights.

METHODS

The study was conducted using systemic, comparative, coefficient, index, expert-analytical, scenario, and simulation methods. The systemic method was used to present financial and social security as interrelated components of the functioning of a construction enterprise. Comparative and dynamic analysis was used to identify differences between enterprises and changes in their indicators during 2022–2025. The coefficient method was used to calculate financial autonomy, net profitability, asset turnover, income preservation, wage adequacy, wage dynamics, employment preservation, and labor productivity. To bring indicators with different units of assessment to a comparable form, threshold normalization with fixed lower and upper limits was used. This method was chosen instead of normalization by the actual minimum and maximum values of the sample, since it reduces the influence of extreme results of an individual enterprise on the assessments of other sample participants. The weighting factors were determined by the Saati hierarchy analysis method. For their formation, expert-analytical reproduction of the agreed matrix of pairwise comparisons, built according to the structure of the two-round Delphi procedure, was used. The proposed procedure is not presented as an actual confidential survey of employees of the studied enterprises. The consistency of the matrix was checked by the consistency index and consistency coefficient. The index method was used to calculate the group indices of financial and social security and the general integral index. The scenario method was used to assess possible changes in the level of security under the inertial scenario, the financial stabilization scenario, the social stabilization scenario, and the balanced recovery scenario. Monte

Carlo simulation modeling was used to check the sensitivity of the results to a random change in the weighting factors within ±10%. The empirical basis of the study is the data of four real construction enterprises that differ in the scale of activity, financial results, and employment dynamics. The sample includes PrJSC HC Kyivmiskbud, Altis-Construction LLC, BC Intergal-Bud LLC, and KEBK LLC, the main type of economic activity of which is the construction of residential and non-residential buildings under code 41.20. The information base was formed using open data from Opendatabot on annual income, net financial result, assets, liabilities, average salary before tax, and average number of employees for 2022–2025.

The sample is purposive rather than statistically representative of the entire construction sector. The four enterprises were selected as multiple cases representing substantially different combinations of scale, financial results, capital structure, employment dynamics, and labour productivity within the same principal economic activity, NACE 41.20. Therefore, the empirical results are interpreted as a methodological validation and comparative case analysis and are not extrapolated to all construction enterprises in the country. Sector-wide generalization requires a substantially larger sample and is identified as a direction for further research.

The sample covers four real-life companies, differing in scale, specialization, and financial performance trajectory. The sample includes PJSC HC Kyivmiskbud (primary activity 41.20), Altis-Construction LLC (primary activity 41.20), BK Intergal-Bud LLC (primary activity 41.20), and KEBC LLC (primary activity 41.20). The information base is compiled using open data from Opendatabot, including annual revenue, net financial result, assets, liabilities, average wage before tax, and number of employees (Table 1).

Table 1. System of indicators for the financial and social security of a construction enterprise.

Code	Component	Indicator	Economic interpretation
F1	Financial	Equity ratio	Share of equity in total assets
F2		Net profit margin	Net financial result relative to revenue
F3		Asset turnover	Revenue per UAH 1 of assets
F4		Revenue retention	Revenue relative to 2022
S1	Social	Wage adequacy	Average salary relative to the statutory benchmark
S2		Wage dynamics	Change in average salary relative to the previous year
S3		Employment retention	Change in the number of employees relative to the previous year
S4		Labour productivity	Revenue, UAH million per employee

Financial indicators were calculated using Equations (1) – (4). Equity was calculated as the difference between assets and liabilities. A negative F1 value indicates that liabilities exceed assets, whereas a negative F2 value indicates loss-making operations (1-4):

$$F1_{it} = (A_{it} - L_{it}) / A_{it} \quad (1)$$

$$F2_{it} = P_{it} / R_{it} \quad (2)$$

$$F3_{it} = R_{it} / A_{it} \quad (3)$$

$$F4_{it} = R_{it} / R_{i,2022} \quad (4)$$

In Equations (1) – (4), A denotes assets; L, liabilities; P, net financial result; R, revenue; i, the enterprise; and t, the year.

Social indicators were calculated using Equations (5)– (8). For S1, the annual average statutory minimum-wage benchmark was applied, amounting to UAH 6,550 in 2022, UAH 6,700 in 2023, UAH 7,775 in 2024, and UAH 8,000 in 2025 (5-8):

$$S1_{it} = W_{it} / MW_t \quad (5)$$

$$S1_{it} = W_{it} / MW_t \quad (6)$$

$$S3_{it} = E_{it} / E_{i,t-1} \quad (7)$$

$$S4_{it} = R_{it} / E_{it} \quad (8)$$

In formulas (5) – (8), W denotes the average wage, MW denotes the regulatory base, and E denotes the average number of employees.

DOI: 10.55643/fcaptp.4.69.2026.5272

For 2022, indicators S2 and S3 are assigned a neutral base value of 1, as the previous year is not included in the assessment interval. S4 is represented in millions of UAH of revenue per employee.

Using minimax normalization based on the actual minimums and maximums of the sample could create a distortion, since in 2025, the damage to Kyivmiskbud Holding Company PJSC significantly exceeds typical values. Therefore, threshold normalization with fixed lower and upper boundaries was used. This approach ensures comparability over time and does not alter the assessment of one enterprise due to the occurrence of an extreme value at another enterprise (9):

$$z_{ijt} = \min\{1; \max[0; (x_{ijt} - a_j) / (b_j - a_j)]\} \quad (9)$$

In Equation (9), z is the normalized value; x, the actual value; and a with b, the lower and upper threshold bounds, respectively.

The normalization parameters are presented in Table 2.

Table 2. Threshold parameters for indicator normalization. *(Source: compiled by the authors as normative and analytical bounds for comparative application)*

Code	Lower threshold (a)	Upper threshold (b)	Interpretation
F1	−0.10	0.50	From negative equity to adequate financial autonomy
F2	−0.20	0.10	From substantial losses to sustainable profitability
F3	0.00	2.00	From no turnover to UAH 2 of revenue per UAH 1 of assets
F4	0.50	1.50	From a 50% loss of base-year revenue to a 50% increase
S1	1.00	4.00	From the statutory benchmark to a fourfold excess
S2	0.80	1.30	From a 20% wage decline to a 30% increase
S3	0.70	1.20	From a 30% employment decline to a 20% increase
S4	0.50	10.00	From UAH 0.5 million to UAH 10.0 million of revenue per employee

To eliminate the subjectivity associated with expert-defined weights, the weighting coefficients were determined using the CRITIC method. The method determines the information contribution of each indicator from its variability and its correlation with the remaining indicators. The calculation was performed using the pooled normalized enterprise-year observations for 2022–2025. Indicators characterized by greater variability and lower correlation with other criteria receive greater weights, whereas indicators containing largely duplicated information receive lower weights. Consequently, the weighting procedure is based on the empirical structure of the dataset and does not require assumptions concerning an unobserved expert consensus.

Table 3. Pairwise comparison matrix of indicators using Saaty's method. *(Source: author-developed reproducible pairwise comparison matrix)*

Criterion	F1	F2	F3	F4	S1	S2	S3	S4
F1	1	1	1	2	2	2	1	2
F2	1	1	1	1	1	2	1	2
F3	1	1	1	1	1	2	1	1
F4	1/2	1	1	1	1	2	1	1
S1	1/2	1	1	1	1	2	1	1
S2	1/2	1/2	1/2	1/2	1/2	1	1/2	1
S3	1	1	1	1	1	2	1	1
S4	1/2	1/2	1	1	1	1	1	1

$$A \cdot w = \lambda_{max} \cdot w; \ \Sigma_j w_j = 1 \quad (10)$$

$$CI = (\lambda_{max} - n) / (n - 1) \quad (11)$$

$$CR = CI / RI \quad (12)$$

For the constructed matrix, λ_{max} equals 8.1364, the consistency index CI is 0.0195, and the consistency ratio CR is 0.0138. Since CR is substantially below 0.10, the matrix is consistent. The resulting weights are presented in Table 4.

Table 4. Weighting coefficients of financial and social security indicators. Note: The aggregate weight of the financial component is 0.5716, and that of the social component is 0.4284.

Code	Indicator	Weight	Share, %
F1	Equity ratio	0.1742	17.42
F2	Net profit margin	0.1445	14.45
F3	Asset turnover	0.1318	13.18
F4	Revenue retention	0.1211	12.11
S1	Wage adequacy	0.1211	12.11
S2	Wage dynamics	0.0722	7.22
S3	Employment retention	0.1318	13.18
S4	Labour productivity	0.1033	10.33
	Total	1	100

The integral index and component indices were calculated using Equations (13) and (14).

$$I_{it} = \Sigma_{j=1}^{8} w_j z_{ijt} \quad (13)$$

$$G_{kit} = [\Sigma_{j \in k} w_j z_{ijt}] / [\Sigma_{j \in k} w_j] \quad (14)$$

The integral index was interpreted using a four-level scale. The interval 0–0.25 corresponds to a critical level; 0.251–0.500, a low level; 0.501–0.750, an acceptable level; and 0.751–1.000, a high level. The same scale was applied to all enterprises and years.

RESULTS

The initial data reveal significant heterogeneity among the companies. Kyivmiskbud Holding Company (KHC) maintained a significant positive equity position, but experienced a sharp decline in revenue and deepening losses in 2024–2025. Altis-Construction LLC exhibited negative equity throughout the entire period, while simultaneously experiencing a short-term profit in 2024. Intergal-Bud, Inc. (BC), transitioned from a minor profit in 2022 to a loss, but significantly increased average wages and maintained a small positive equity position, profitability, and high wage growth, although turnover and head-count fluctuated unevenly (Table 5).

Table 5. Financial indicators of the enterprises under study in 2022–2025, UAH million. *(Source: calculated from publicly available Opendata-bot data)*

Enterprise	Year	Revenue	Net financial result	Assets	Liabilities
Kyivmiskbud	2022	1,806.4	-54.9	16,558.0	3,230.2
	2023	2,035.4	-111.6	14,734.9	2,501.6
	2024	904.8	-147.3	11,474.3	1,769.4
	2025	384.4	-1,002.3	13,027.8	1,633.7
Altis-Construction	2022	210.8	-23.7	1,024.2	1,049.3
	2023	143.0	-20.4	1,002.9	1,076.8
	2024	274.0	27.3	791.4	838.0
	2025	207.1	-2.3	837.9	888.0
Intergal-Bud	2022	1,250.3	7.9	1,748.9	1,739.4
	2023	959.2	-23.0	1,694.0	1,702.4
	2024	839.1	-61.3	1,584.0	1,649.7
	2025	1,114.1	-40.8	1,813.8	1,900.4
KEBK	2022	655.8	0.5	3,556.2	3,542.3
	2023	2,459.2	1.9	2,679.5	2,667.7
	2024	2,302.3	16.9	1,371.2	1,342.6
	2025	1,820.9	4.4	815.8	801.5

The social indicators demonstrate that wage growth did not always correspond to employment retention and productivity improvement. Kyivmiskbud increased its average salary from UAH 12,620 to UAH 23,162, while the number of employees

DOI: 10.55643/fcaptp.4.69.2026.5272

declined from 321 to 152 and productivity fell sharply after reaching its highest value in 2023. Altis-Construction experienced a continuous reduction in employment and maintained a salary-to-benchmark ratio below 1 throughout the assessed period, which signals a weak social component. Intergal-Bud substantially expanded employment in 2025 and increased average remuneration, although revenue per employee decreased from UAH 11.685 mln. in 2022 to UAH 2.917 mln. in 2025. KEBK demonstrated the strongest wage indicators and employment recovery, but the increase in personnel during 2025 was accompanied by lower labour productivity (Table 6).

Table 6. Social and performance indicators of the enterprises under study in 2022–2025.

Enterprise	Year	Average salary, UAH	Employees	Productivity, UAH million/employee	Salary-to-benchmark ratio
Kyivmiskbud	2022	12,620	321	5.627	1.927
	2023	12,989	185	11.002	1.939
	2024	18,613	155	5.838	2.394
	2025	23,162	152	2.529	2.895
Altis-Construction	2022	2,005	277	0.761	0.306
	2023	1,358	232	0.616	0.203
	2024	2,247	196	1.398	0.289
	2025	5,723	166	1.248	0.715
Intergal-Bud	2022	6,346	107	11.685	0.969
	2023	14,557	113	8.489	2.173
	2024	21,610	145	5.787	2.779
	2025	25,378	382	2.917	3.172
KEBK	2022	11,158	462	1.419	1.704
	2023	17,933	393	6.258	2.677
	2024	28,607	320	7.195	3.679
	2025	40,004	439	4.148	5.000

The calculated primary indicators clarify the sources of risk. At Kyivmiskbud Holding Company, the equity ratio increased from 0.805 to 0.875, but the net profit margin deteriorated from -0.030 to -2.607. This situation indicates that significant equity capital does not compensate for the loss of operating activity. At Intergal-Bud, LLC, the equity ratio became negative, but the wage adequacy in 2025 exceeded the regulatory base by more than three times. KEBC LLC combined a low equity ratio with a positive financial result, high wages, and employment recovery. For Altis-Construction LLC, the combination of negative equity, low wages based on the administrative indicator, and unstable income remains a critical constraint.

The normalized values clarify the internal structure of enterprise-level security in 2025. Kyivmiskbud achieved the maximum value for financial autonomy, while its profitability and revenue-retention indicators fell to zero and asset turnover remained close to the lower threshold. Therefore, its strong capital position was unable to offset the deterioration in operating activity. Altis-Construction demonstrated relatively favourable wage dynamics and profitability normalization, although wage adequacy remained at the minimum level and employment retention was weak. Intergal-Bud achieved the maximum normalized value for employment retention and relatively strong wage adequacy, while its financial autonomy remained low. KEBK obtained maximum values for asset turnover, revenue retention, wage adequacy, wage dynamics, and employment retention. Its remaining weaknesses were associated with financial autonomy and labour productivity (Table 7).

Table 7. Normalized financial and social security indicators in 2025. *(Source: authors' calculations using Equation (9))*

Enterprise	zF1	zF2	zF3	zF4	zS1	zS2	zS3	zS4
Kyivmiskbud	1	0	0.015	0	0.632	0.889	0.561	0.214
Altis-Construction	0.067	0.630	0.124	0.483	0.000	1	0.294	0.079
Intergal-Bud	0.087	0.544	0.307	0.391	0.724	0.749	1.000	0.254
KEBK	0.196	0.675	1	1	1	1	1	0.384

The component indices reveal a persistent imbalance between financial and social security at three of the four enterprises. In 2025, Kyivmiskbud recorded a financial index of 0.308 compared with a social index of 0.553, which confirms that personnel-related improvements could not compensate for the sharp decline in revenue and profitability. Intergal-Bud displayed an even wider gap, with a social index of 0.700 and a financial index of 0.318. This relationship indicates substantial social potential that has not yet been transformed into adequate financial results. Altis-Construction maintained low values for both components, which limits the effectiveness of isolated corrective actions. KEBK demonstrated the strongest combination, with financial and social indices of 0.673 and 0.851, respectively, allowing its integral value to approach the high-security threshold (Table 8).

Table 8. Component and integral financial and social security indices in 2022–2025. *(Source: authors' calculations using Equations (13)–(14))*

Enterprise	Year	Financial index	Social index	Level
Kyivmiskbud	2022	0.566	0.469	acceptable
	2023	0.576	0.407	acceptable
	2024	0.345	0.520	low
	2025	0.308	0.553	low
Altis-Construction	2022	0.242	0.259	critical
	2023	0.116	0.088	critical
	2024	0.483	0.281	low
	2025	0.311	0.278	low
Intergal-Bud	2022	0.416	0.493	low
	2023	0.319	0.701	low
	2024	0.234	0.778	low
	2025	0.318	0.700	low
KEBK	2022	0.349	0.342	low
	2023	0.540	0.565	acceptable
	2024	0.641	0.661	acceptable
	2025	0.673	0.851	acceptable

The trajectories presented in Figure 1 confirm the absence of a uniform trend among the studied construction enterprises. KEBK demonstrated continuous growth of the integral index during the entire period, increasing from 0.346 to 0.749. Kyivmiskbud followed the opposite trajectory, with a relatively stable position during 2022–2023 and a subsequent decline caused by falling revenue and deepening losses. Intergal-Bud remained within a narrow interval of 0.449–0.482, which reflects relative stability at a low security level rather than sustainable improvement. Altis-Construction demonstrated the most volatile trajectory, falling to a critical value of 0.104 in 2023, recovering in 2024, and declining again in 2025. The figure therefore confirms the need for differentiated scenarios adapted to the dominant weaknesses of each enterprise.

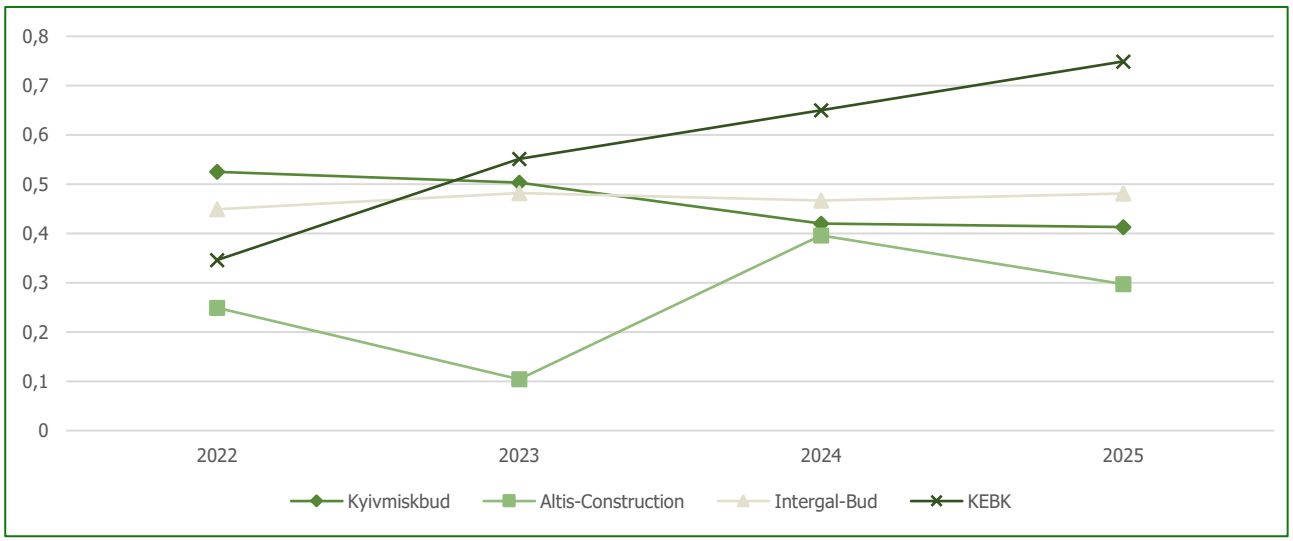

Figure 1. Dynamics of the integrated financial and social security index in 2022–2025.

DOI: 10.55643/fcaptp.4.69.2026.5272

KEBK LLC demonstrated the best trajectory. The integrated index increased from 0.346 in 2022 to 0.749 in 2025, approaching the high limit. This increase was driven by a simultaneous improvement in the financial and social components, although financial autonomy remains low. Intergal-Bud LLC remained at a low level during the period, but its social index exceeded its financial index. Consequently, personnel resources were not fully converted into financial results. Kyivmiskbud Holding Company (PJSC) dropped from an acceptable level of 0.525 in 2022 to a low level of 0.413 in 2025. The main reason is not the capital structure, but a sharp decline in income and extremely deep losses. Altis-Construction LLC reached a critical level in 2022–2023, after which it recovered to a low level. However, a value of 0.297 in 2025 indicates a significant remaining vulnerability.

Four scenarios have been developed to transition from diagnostics to management decisions. The business-as-usual scenario leaves 2025 indicators unchanged. The financial stabilization scenario assumes the largest increases in normalized autonomy and profitability. Social stabilization focuses on wages and employment. A balanced recovery assumes a moderate simultaneous improvement in all indicators.

$$I_i^s = \Sigma_{j=1}^{8} w_j \cdot \min[1; z_{ij,2025} + \Delta_j^s] \quad (15)$$

In formula (15), I_i^s represents the calculated value of the integral index for the iiith enterprise under the sss scenario; w_j is the weight coefficient of the jjjth indicator; $z_{ij,2025}$ reflects the normalized value of the j th indicator of the i th enterprise in the base year 2025.

The scenario increments were structured to reflect different priorities of enterprise recovery. Financial stabilization provides the largest increases in financial autonomy and profitability, with additional adjustments to turnover, revenue retention, and selected social indicators. Social stabilization concentrates resources on wage adequacy, wage dynamics, employment retention, and labour productivity. Balanced recovery distributes moderate increments across all eight indicators and therefore supports coordinated improvement of the financial and social components. The inertial scenario serves as the baseline and preserves the normalized values observed in 2025. Such a scenario structure allows the assessment to determine whether each enterprise requires concentrated financial intervention, targeted social measures, or a simultaneous improvement of both security components (Table 9).

Table 9. Increments in normalized indicators under the scenarios. Note. The increments represent normative changes in the normalized indicators rather than forecasts of specific accounting values.

Scenario	ΔF1	ΔF2	ΔF3	ΔF4	ΔS1	ΔS2	ΔS3	ΔS4
Inertial	0	0	0	0	0	0	0	0
Financial stabilization	0.20	0.20	0.12	0.12	0.03	0.03	0.02	0.05
Social stabilization	0.04	0.05	0.04	0.05	0.18	0.15	0.18	0.1
Balanced recovery	0.14	0.16	0.10	0.12	0.12	0.12	0.12	0.1

The scenario results demonstrate that balanced recovery generates the greatest improvement for Kyivmiskbud, Altis-Construction, and Intergal-Bud. Kyivmiskbud increases its integral index from 0.413 to 0.512 and crosses the boundary between the low and acceptable levels. Altis-Construction obtains the largest relative increase of 39.1%, although the resulting value of 0.412 remains within the low interval and confirms the need for deeper restructuring. Intergal-Bud reaches 0.590 under balanced recovery, slightly exceeding the result of financial stabilization. KEBK differs from the remaining enterprises because financial stabilization increases its index to 0.818, which represents the highest scenario value in the sample. Its already strong social component limits the additional effect of social improvements because several normalized indicators are close to their upper boundaries (Table 10).

Table 10. Scenario assessment results based on 2025 Data. Note: The cells report the integral index and the increase relative to the inertial scenario.

Enterprise	Inertial	Financial stabilization	Social stabilization	Balanced recovery
Kyivmiskbud	0.413	0.486 / +17.6%	0.495 / +20.0%	0.512 / +24.1%
Altis-Construction	0.297	0.402 / +35.6%	0.378 / +27.4%	0.412 / +39.1%
Intergal-Bud	0.481	0.587 / +21.8%	0.550 / +14.2%	0.590 / +22.6%
KEBK	0.749	0.818 / +9.2%	0.774 / +3.3%	0.807 / +7.7%

Balanced recovery produces the highest columns for Kyivmiskbud, Altis-Construction, and Intergal-Bud, while financial stabilization provides the strongest result for KEBK. The ranking of enterprises remains unchanged across all scenarios, with KEBK retaining first position and Altis-Construction remaining fourth. However, the distance between individual enterprises changes substantially. The balanced scenario reduces the gap between Kyivmiskbud and Intergal-Bud, while KEBK strengthens its leading position under financial stabilization. Consequently, scenario selection should be based on the composition of the existing weaknesses rather than the mechanical application of the same measures to every construction enterprise.

The balanced recovery has the greatest impact for three companies. For Kyivmiskbud Holding Company, the index increases to 0.512, bringing it to an acceptable level. For Intergal-Stroy, LLC, the index rises to 0.590, and for Altis-Construction, LLC, it rises to 0.412. The latter value remains low, so moderate improvements do not replace a more in-depth restructuring of capital, the contract portfolio, and costs. For KEBK, LLC, financial stabilization is better than the balanced scenario, increasing the index to 0.818. This is explained by the already high normalized social indicators, for which additional increases are partially limited by the upper limit of 1.

The robustness of the findings was verified using a Monte Carlo simulation. The robustness analysis was performed using 10,000 Monte Carlo iterations. In each iteration, the weighting coefficients were randomly perturbed within ±10% and subsequently re-normalized. In addition, a one-at-a-time sensitivity analysis was conducted by changing each normalized indicator while holding the remaining indicators constant. This procedure identifies which financial or social indicators exert the strongest influence on the integral index and whether changes in individual criteria alter the ranking or security-level classification. Classical population-level significance tests are not applied because the empirical stage represents a purposive four-enterprise case sample rather than a probabilistic sector-wide sample.

$$w_j^{(q)} = w_j(1 + \varepsilon_j q) / \Sigma_i w_i(1 + \varepsilon_i q),\ \varepsilon_j q \sim U(-0.10;\ 0.10) \quad (16)$$

In formula (16), $w_j^{(q)}$ represents the normalized weight coefficient of the j-th indicator in the q-th iteration; wjw_jwj is the initial weight coefficient obtained by the method of hierarchy analysis; $\varepsilon_j q$ denotes the random deviation of the weight of the j-th indicator in the q-th iteration, formed according to the uniform distribution U(−0.10;0.10).

The denominator of the formula provides re-normalization of the changed weights to a sum of 1. The q index takes values from 1 to N, where N represents the total number of Monte Carlo iterations.

Table 11. Monte Carlo robustness test of the 2025 results.

Enterprise	Mean index	Standard deviation	P5–P95 interval	Same level, %	Stable rank
Kyivmiskbud	0.413	0.009	0.399–0.427	100	3
Altis-Construction	0.297	0.006	0.287–0.306	100	4
Intergal-Bud	0.481	0.006	0.471–0.492	100	2
KEBK	0.749	0.007	0.738–0.761	54.2	1

The simulation results confirmed the stability of the comparative ranking of enterprises under the condition of a random change in weight coefficients within ±10%. KEBK LLC retained 1st place, BC Intergal-Bud LLC – 2nd place, PrJSC HC Kyivmiskbud – 3rd place, and Altis-Construction LLC – 4th place in all iterations. For PrJSC HC Kyivmiskbud, Altis-Construction LLC, and BC Intergal-Bud LLC, the initial level of financial and social security was maintained in 100% of iterations. For KEBK LLC, the share of maintaining the initial acceptable level was 54.2%, since the base value of 0.749 is located directly near the lower limit of the high level, which is 0.751. In other iterations, KEBK LLC moved to the high level, but in each case retained 1st place. Therefore, the sensitivity of its result concerns the level classification, not the comparative rank (Table 12).

The proposed measures show that the same set of management decisions cannot ensure an improvement in the situation at all the enterprises under study. For PrJSC HC Kyivmiskbud, the primary direction is the restoration of operational activities while simultaneously preserving critical employees. Altis-Construction LLC needs a deeper restoration of equity and social conditions of employment. For BC Intergal-Bud LLC, the main task is to transform the formed human resource potential into increasing income, asset turnover, and productivity. KEBK LLC should focus on financial autonomy and productivity, while maintaining the achieved social results. Thus, the practical significance of the calculations lies in the transition from formal ranking of enterprises to the definition of targeted measures in accordance with the structure of their weak indicators.

DOI: 10.55643/fcaptp.4.69.2026.5272

Table 12. Identified problems and priority measures for strengthening the financial and social security of the studied enterprises.

Enterprise	Identified problems	Target indicators	Priority measures
PrJSC HC Kyivmiskbud	Zero normalized values of net profit margin and revenue retention, almost zero asset turnover, a decrease in the number of employees from 321 to 152, and low labour productivity	F2, F3, F4, S3, S4	Conducting a project-by-project analysis of unfinished construction projects; terminating or revising economically unjustified contracts; developing a schedule for restoring cash flows; accelerating the collection of accounts receivable; selling or ensuring the productive use of idle assets; retaining critically important specialists; linking the variable component of remuneration to the completion of particular project stages.
Altis-Construction LLC	Negative equity, inadequate wages, declining employment, the lowest labour productivity within the sample, and unstable revenue dynamics	F1, F4, S1, S3, S4	Restoring equity through additional contributions from owners, reinvestment of future profits, or restructuring of liabilities; reviewing costs for each project; removing economically unjustified contracts from the project portfolio; increasing the transparency of employment and payroll records; gradually bringing wages closer to statutory and industry levels; aligning the number of employees with the confirmed order portfolio
BC Intergal-Bud LLC	Low financial autonomy, a negative financial result, a significant gap between the social index of 0.700 and the financial index of 0.318, and a decrease in revenue per employee following a sharp increase in employment	F1, F2, F3, F4, S4	Aligning the pace of recruitment with the volume of confirmed orders; introducing revenue and cost control for each project; reducing the duration of unfinished construction; accelerating payments from customers; improving asset turnover; applying productivity indicators based on completed stages of construction work; developing an incentive system linked to the performance of project teams.
KEBK LLC	Low financial autonomy, considerable dependence on liabilities, declining labour productivity amid an increase in the number of employees, and proximity of the integral index to the threshold of a high level	F1, F2, S4	Increasing equity by retaining part of the profit; reducing dependence on short-term liabilities; planning working capital for individual projects; controlling the profitability of contracts; aligning the number of employees with production workload; improving labour productivity through professional development, technological support, and optimization of work organization.

The methodology can be implemented as a quarterly enterprise-level monitoring tool in which accounting and personnel data are automatically converted into normalized indicators, component indices, and a general security profile. Construction enterprises can use the results to prioritize financial and personnel measures, while financial institutions may use the model as an additional analytical instrument for borrower risk screening. Public authorities may apply an expanded version to monitor groups of construction enterprises involved in reconstruction programs. The monetary effect of implementation should be assessed ex post as the value of avoided financial losses, financing costs, and personnel losses less the costs of implementing corrective measures; the present study does not assign a hypothetical monetary effect in the absence of such implementation data.

DISCUSSION

The results obtained confirm the positions of Ukrainian scientists on the complex nature of the economic security of enterprises, but specify them regarding the relationship between the financial and social components in the construction industry. Zinenko and Kobelyeva (2022) substantiate the multi-component structure of economic security and the need to take into account industry specifics. The results of this study are consistent with this position, since the values of indicators of construction enterprises are formed under the influence of capital intensity, project cycle duration, income fluctuations, and dependence on qualified personnel. The difference of the proposed approach lies in narrowing the broad system of economic security to 2 directly interconnected components that can be reproducibly assessed using open data. Kovtun (2023) focuses on threat monitoring, financial stability, and timely response to changes in the external environment. We agree with the need for constant control of financial threats, but their qualitative identification alone is not enough to select management priorities. Kapral and Sekretar (2025) consider the financial, technical-technological, market, legal, and informational components of the economic security of construction enterprises. Such a structure provides a broad vision of the sources of security. At the same time, the results of our study show that even within the financial and social components, significant internal imbalances can arise. PrJSC HC Kyivmiskbud had a high value of financial autonomy, but deep losses and a decrease in income led to a low integral level. BC Intergal-Bud LLC, on the contrary, had a relatively strong social component, but its positive results were not converted into sufficient financial returns.

Mishin et al. (2025) define social security as a component of corporate security and emphasize the importance of employee protection, employment stability, and management of social threats in martial law. Our results confirm the importance of these factors, but at the same time clarify that an increase in wages or staff numbers does not in itself provide an increase in financial and social security. The example of BC Intergal-Bud LLC showed that the rapid expansion of employment was accompanied by a decrease in income per 1 employee. For KEBK LLC, the increase in staff numbers also increased the risk

of a decrease in productivity. Therefore, social policy should be coordinated with the order portfolio, the pace of project implementation, and the financial capabilities of the enterprise. Onisenko et al. (2025) use normalization and integral indices to assess the financial and social security of the enterprise. The methodology we propose continues this direction, but differs in 5 provisions. First, an inter-enterprise comparison of 4 construction enterprises was carried out for 2022–2025. Second, fixed thresholds were used, so that the extreme value of one enterprise does not change the assessments of others. Third, the weights were formed using the Analytic Hierarchy Process (AHP) with consistency checking. Fourth, the calculation of group indices makes it possible to identify disparities between the financial and social components. Fifth, the diagnostic results were continued with scenario modeling and Monte Carlo stability testing.

The results of the study are partially consistent with the conclusions of Horta and Camanho (2013), Ng, Wong, and Zhang (2011), and Wang et al. (2024), which confirm the importance of financial ratios for assessing the insolvency of construction enterprises. In our opinion, focusing exclusively on financial indicators narrows the analytical capabilities of the assessment, as it does not take into account the ability of the enterprise to retain employees, provide adequate remuneration, and maintain productivity. At the same time, the approaches of Zuo, Jin, and Flynn (2012), Sierra, Pellicer, and Yepes (2017), Hendiani and Bagherpour (2019), and Gurmu et al. (2022), focusing on social sustainability, do not sufficiently reflect the financial constraints of implementing social policy. The calculations have shown that a prolonged deterioration in one component is not compensated by an improvement in another.

At the same time, the results complement studies of social sustainability by Zuo et al. (2012), Sierra et al. (2017; 2018), Hendiani and Bagherpour (2019), and Gurmu et al. (2022). Those approaches provide a broader assessment of social sustainability, whereas the present model deliberately concentrates on social variables that can be directly connected with enterprise financial capacity and reproduced from open data. The results are also consistent with recent studies emphasizing analytical procedures, uncertainty, optimization, and qualimetric assessment (Polishchuk et al., 2026). The principal methodological difference is therefore the transition from a general integral score to a diagnostic sequence linking component imbalance, sensitivity, and a differentiated managerial scenario.

The scientific novelty of the study lies in the improvement of the methodological approach to the integrated assessment of the financial and social security of construction enterprises. The approach combines 8 financial and social indicators that can be calculated using open data, fixed threshold normalization, determination of weights using the analysis of hierarchies' method, calculation of group and integral indices, differentiated improvement scenarios, and verification of the stability of the results. Unlike approaches aimed primarily at determining the general level of security or the risk of bankruptcy, the proposed methodology links the profile of weak indicators of each enterprise with a specific scenario of managerial response.

The limitations of the study are associated with the use of open reporting. The available data do not contain information on the structure of employment, personnel turnover, wage arrears, professional training, industrial injuries, repayment terms of obligations, the structure of receivables, regional placement of projects and compliance with construction schedules. The weighting coefficients were formed according to a reproducible expert-analytical procedure, and not on the basis of a closed survey of employees of the studied enterprises. These limitations do not cancel the comparative results, but determine the boundaries of their interpretation.

CONCLUSIONS

The study confirmed the feasibility of an integrated assessment of the financial and social security of construction companies based on eight interrelated indicators. The methodological approach combines threshold normalization, the Saaty method, group indices, scenario modeling, and Monte Carlo robustness testing. The weight matrix consistency coefficient is 0.0138, and the simulation results confirm the stability of the ranking with weight variations within ±10%. Based on the 2025 results, KEBK LLC achieved a value of 0.749 and took first place; BK Intergal-Stroy LLC received 0.481, Kyivmiskbud Holding Company PJSC received 0.413, and Altis-Construction LLC received 0.297. The differences between the financial and social group indices demonstrate that one component does not compensate for the long-term deterioration of the other. Balanced recovery is most effective for Kyivmiskbud Holding Company, Altis-Construction LLC, and Inter-Stroy Construction Company LLC, while financial stabilization is more beneficial for KEBK LLC. Practical application of the proposed approach provides management with an analytical basis for aligning financial decisions with employment, compensation, and productivity policies.

Based on the results of the study, it has been demonstrated that the financial and social security of a construction company is a comprehensive measure of its ability to maintain financial stability, meet obligations on time, maintain employment, ensure adequate worker protection, and create the conditions for further development. A separate assessment of the

DOI: 10.55643/fcaptp.4.69.2026.5272

financial or social components does not provide a complete picture of the company's level of security, as deteriorating financial results quickly impact HR processes, while labor shortages, decreased productivity, and increased social tensions worsen the financial situation. Therefore, a comprehensive combination of these components is essential for obtaining objective results. The conducted assessment confirmed the feasibility of using an integrated approach to compare construction companies and track changes in their performance over the period 2022–2025. This approach allows for combining indicators with different content and assessment units into a single integrated value and reduces the risk of making management decisions based on a single financial ratio.

Future research opportunities include expanding the sample of construction companies, conducting regional and cross-industry comparisons, and extending the assessment period. The methodological approach should be supplemented with indicators of liquidity, the term structure of liabilities, accounts receivable and accounts payable, timely project completion, staff turnover, wage arrears, professional development, and occupational safety. A separate area of focus is the verification of threshold values and weighting factors based on the results of an actual multi-round survey of financial managers, construction industry specialists, and labor relations experts. Further research should also include assessing the impact of territorial military risks, order portfolio structure, and funding sources on financial and social security. The practical development of the proposed approach involves the creation of a management decision support system that provides automated index calculation, sensitivity testing, and scenario selection tailored to the individual company profile.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

FUNDING

The Authors received no funding for this research.

CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

REFERENCES

1. Choi, H., Son, H., & Kim, C. (2018). Predicting financial distress of contractors in the construction industry using ensemble learning. *Expert Systems with Applications, 110*, 1–10. https://doi.org/10.1016/j.eswa.2018.05.026
2. Gurmu, A., Shooshtarian, S., Mahmood, M. N., Hosseini, M. R., Shrestha, A., & Martek, I. (2022). The state of play regarding the social sustainability of the construction industry: A systematic review. *Journal of Housing and the Built Environment, 37*, 595–624. https://doi.org/10.1007/s10901-022-09941-5
3. Hendiani, S., & Bagherpour, M. (2019). Developing an integrated index to assess social sustainability in construction industry using fuzzy logic. *Journal of Cleaner Production, 230*, 647–662. https://doi.org/10.1016/j.jclepro.2019.05.055
4. Horta, I. M., & Camanho, A. S. (2013). Company failure prediction in the construction industry. *Expert Systems with Applications, 40*(16), 6253–6257. https://doi.org/10.1016/j.eswa.2013.05.045
5. Hsu, C.-C., & Sandford, B. A. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research, and Evaluation, 12*(10), Article 10. https://doi.org/10.7275/pdz9-th90
6. International Organization for Migration. (2024, November). *Employment, mobility and labour market dynamics in Ukraine: November 2024*. https://dtm.iom.int/reports/ukraine-employment-mobility-and-labour-market-dynamics-ukraine-november-2024
7. Kapral, O., & Sekretar, I. (2025). Content characteristics of economic security of construction enterprises. *Economy and Society*, *(74)*, Article 6. https://doi.org/10.32782/2524-0072/2025-74-6
8. Kovtun, A. V. (2023). Economic security of enterprises as a factor of success of modern business. *Ways to Improve Construction Efficiency, 52*(3), 133–143. https://doi.org/10.32347/2707-501x.2023.52(3).133-143
9. Martin, H., Zhou, Y., & Raman, R. (2025). Financial metrics and environment, social, governance (ESG) performance: A cross-border comparison of China and the United Kingdom construction industries. *Buildings, 15*(8), Article 1236. https://doi.org/10.3390/buildings15081236
10. Mishyn, O. Yu., Chechetova-Terashvili, T. M., Mishyna, S. V., & Lohvynenko, D. V. (2025). Ensuring social security in the corporate security management system in wartime conditions. *The Problems of Economy*, *3*(65), 344–356. https://doi.org/10.32983/2222-0712-2025-3-344-356

11. Morosan-Danila, L., Grigoras-Ichim, C.-E., Jeflea, F. V., Filipeanu, D., & Tugui, A. (2025). Assessing the sustainability of construction companies in the digital context: An econometric approach based on financial, social, and environmental indicators. *Sustainability, 17*(10), Article 4744. https://doi.org/10.3390/su17104744

12. Ng, S. T., Wong, J. M. W., & Zhang, J. (2011). Applying Z-score model to distinguish insolvent construction companies in China. *Habitat International, 35*(4), 599–607. https://doi.org/10.1016/j.habitatint.2011.03.008

13. Onysenko, T., Mykytiuk, O., Magomedova, A., Kravchenko, T., Kovalenko, O., & Petrenko, K. (2025). Modeling of the economic security system of an enterprise as a factor of transformation of its business model. *Financial and Credit Activity: Problems of Theory and Practice, 5*(64), 191–204. https://doi.org/10.55643/fcaptp.5.64.2025.4835

14. Polishchuk, Y., Tepliuk, M., Gernego, I., Ivashchenko, A., Horbov, V., & Lavreniuk, V. (2026). Business model design in relocation management through qualimetric approach. *Business: Theory and Practice, 27*(1), 34–44. https://doi.org/10.3846/btp.2026.21915

15. Saaty, T. L. (1980). *The analytic hierarchy process: Planning, priority setting, resource allocation*. McGraw-Hill International Book Company.

16. Shylo, Zh. (2022). Method for assessing the level of economic security of an enterprise. *International Science Journal of Management, Economics & Finance, 1*(4), 17–25. https://doi.org/10.46299/j.isjmef.20220104.03

17. Sierra, L. A., Pellicer, E., & Yepes, V. (2017). Method for estimating the social sustainability of infrastructure projects. *Environmental Impact Assessment Review, 65*, 41–53. https://doi.org/10.1016/j.eiar.2017.02.004

18. Sierra, L. A., Yepes, V., & Pellicer, E. (2018). A review of multi-criteria assessment of the social sustainability of infrastructures. *Journal of Cleaner Production, 187*, 496–513. https://doi.org/10.1016/j.jclepro.2018.03.022

19. Valdes-Vasquez, R., & Klotz, L. E. (2013). Social sustainability considerations during planning and design: Framework of processes for construction projects. *Journal of Construction Engineering and Management, 139*(1), 80–89. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000566

20. Wang, J., Li, M., Skitmore, M., & Chen, J. (2024). Predicting construction company insolvent failure: A scientometric analysis and qualitative review of research trends. *Sustainability, 16*(6), Article 2290. https://doi.org/10.3390/su16062290

21. Wang, K., Yu, S., Mei, M., Yang, X., Peng, G., & Lv, B. (2023). ESG performance and corporate resilience: An empirical analysis based on the capital allocation efficiency perspective. *Sustainability, 15*(23), Article 16145. https://doi.org/10.3390/su152316145

22. World Bank, Government of Ukraine, European Commission, & United Nations. (2026). *Ukraine fifth rapid damage and needs assessment (RDNA5): February 2022–December 2025*. World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099022026094036395

23. Zinenko, K., & Kobielieva, T. (2022). Economic security of the enterprise: Methodological essence and components of formation. *Bulletin of the National Technical University "KhPI". Economic Sciences*, (4), 9–16. https://doi.org/10.20998/2519-4461.2022.4.9

24. Zuo, J., Jin, X.-H., & Flynn, L. (2012). Social sustainability in construction—An explorative study. *International Journal of Construction Management, 12*(2), 51–63. https://doi.org/10.1080/15623599.2012.10773190

Зибарева О., Згалат-Лозинська Л., Крисоватий І., Лопащук І., Живко З.

ФІНАНСОВО-СОЦІАЛЬНА БЕЗПЕКА БУДІВЕЛЬНИХ ПІДПРИЄМСТВ І МОЖЛИВІ СЦЕНАРІЇ ЇЇ ЗАБЕЗПЕЧЕННЯ

Статтю присвячено формуванню та апробації методичного підходу до інтегрального оцінювання фінансово-соціальної безпеки будівельних підприємств протягом 2022–2025 рр. Актуальність дослідження визначається одночасним впливом воєнного стану, руйнуванням виробничої та житлової інфраструктури, нестабільністю фінансування будівельних проєктів, дефіцитом кваліфікованого персоналу й нерівномірним відновленням ділової активності. Запропоновано розглядати фінансово-соціальну безпеку як здатність підприємства підтримувати платоспроможність, прибутковість, оборотність активів, збереження доходу, достатність оплати праці, відтворення персоналу й продуктивність праці без критичної втрати стійкості. Методичне забезпечення поєднує систему восьми індикаторів, порогову нормалізацію, метод аналізу ієрархій Сааті, групові та інтегральний індекси, сценарне моделювання й перевірку стійкості результатів методом Монте-Карло. Ваги сформовано за відтворюваною узгодженою матрицею попарних порівнянь, для якої коефіцієнт узгодженості становить 0,0138. Емпіричну апробацію проведено для ПрАТ «ХК «Київміськбуд», ТОВ «Альтіс-Конструкшн», ТОВ «БК «Інтергал-Буд» і ТОВ «КЕБК» за відкритими даними фінансової звітності та адміністративними показниками зайнятості. Отримані результати засвідчили істотну неоднорідність траєкторій безпеки. ТОВ «КЕБК» наблизилося до високого рівня, водночас інші підприємства зберегли низький рівень або перейшли до нього внаслідок збитковості, скорочення доходу чи слабкої соціальної складової. Сценарне оцінювання довело перевагу збалансованого відновлення для більшості підприємств, а для ТОВ «КЕБК» пріоритетним постає фінансовий сценарій. Практичне значення підходу полягає у формуванні аналітичного підґрунтя для вибору диференційованих заходів забезпечення безпеки.

DOI: 10.55643/fcaptp.4.69.2026.5272

Ключові слова: фінансово-соціальна безпека, будівельне підприємство, інтегральне оцінювання, метод Сааті, нормалізація, сценарне моделювання, зайнятість, оплата праці, фінансова стійкість

JEL Класифікація: C43, G32, J21, L74, M21