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**METHODOLOGICAL SUPPORT FOR ASSESSING THE QUALITY
OF TRANSITION STAGES TO EUROPEAN NORMS AND
STANDARDS IN ACTIVITIES OF AN ARCHITECTURAL
AND CONSTRUCTION COMPANY**

The article reveals the essence and components of the applied mechanism of methodological support for assessing the quality of the stages of transition of architectural and construction companies to European standards in the context of globalization, digitalization, and the requirements of sustainable development. Based on the analysis of international and national studies, the structure of an indicative assessment model has been substantiated that covers eight key areas of transformation: from regulatory adaptation and digital transformation to the implementation of ESG principles and certification in accordance with ISO. A formula for the integral indicator Q_{total} has been proposed, which makes it possible to track the overall progress of the company's transformation. The toolkit is based on clearly defined indicators Q_1 – Q_8 , each of which evaluates a separate stage of adaptation. The algorithm of their calculation, practical application examples, and comparative analysis criteria have been substantiated. The study analyses open data from 10 leading Ukrainian companies that are implementing BIM, energy management systems, and international certifications. A comparative assessment with the German company ZÜBLIN AG made it possible to identify gaps in the implementation of digital and ESG components, which proved important for further improvement of the methodology. The material is illustrated with quantitative results in tables, goal achievement diagrams, and an applied interpretation of indicators as tools for managerial decision-making. A conclusion has been drawn about the expediency of applying the developed methodology for strategic monitoring, increasing investor trust, and preparing for participation in international tenders. The proposed approach makes it possible to form a systemic development scenario for an architectural and construction company in the context of European integration, to increase its competitiveness and compliance with sustainable development criteria. The methodology can be used both at the level of management audit and for educational and methodological purposes in the training of industry specialists.

Keywords: *European standards; architectural and construction company; quality assessment; digital transformation; indicators Q_1 – Q_8 ; methodological support; ESG approaches; regulatory adaptation; BIM technologies.*

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**МЕТОДИЧНЕ ЗАБЕЗПЕЧЕННЯ ОЦІНКИ ЯКОСТІ ЕТАПІВ ПЕРЕХОДУ
ДО ЄВРОПЕЙСЬКИХ НОРМ І СТАНДАРТІВ У ДІЯЛЬНОСТІ
АРХІТЕКТУРНО-БУДІВЕЛЬНОЇ КОМПАНІЇ**

У статті розкрито сутність і складові прикладного механізму методичного забезпечення оцінки якості етапів переходу архітектурно-будівельних компаній до європейських стандартів у контексті глобалізації, діджиталізації та вимог сталого розвитку. На основі аналізу міжнародних і національних досліджень обґрунтовано структуру індикативної моделі оцінки, яка охоплює вісім ключових напрямів трансформації: від нормативної адаптації та цифрової трансформації до впровадження ESG-принципів і сертифікації згідно з ISO. Запропоновано формулу інтегрального показника Q_{total} , який дозволяє відслідковувати комплексний прогрес трансформації компанії. Інструментарій базується на чітко визначених індикаторах Q_1-Q_8 , кожен із яких оцінює окремий етап адаптації. Обґрунтовано алгоритм їх розрахунку, приклади практичного використання та критерії порівняльного аналізу. У роботі проаналізовано відкриті дані 10 провідних українських компаній, що впроваджують BIM, системи енергоменеджменту та міжнародні сертифікації. Порівняльна оцінка з німецькою компанією ZÜBLIN AG дала змогу визначити розриви у впровадженні цифрових та ESG-компонентів, що виявилось важливим для подальшого вдосконалення методики. Матеріал ілюстровано кількісними результатами таблиць, схемами досягнення цілей, а також прикладною інтерпретацією індикаторів як інструментів управлінських рішень. Зроблено висновок про доцільність застосування розробленої методики для стратегічного моніторингу, підвищення довіри з боку інвесторів і підготовки до участі в міжнародних тендерах. Запропонований підхід дозволяє сформувати системний сценарій розвитку архітектурно-будівельної компанії в умовах євроінтеграції, підвищити її конкурентоспроможність та відповідність критеріям сталого розвитку. Методика може бути використана як на рівні управлінського аудиту, так і в освітньо-методичних цілях для підготовки фахівців галузі.

Ключові слова: європейські стандарти; архітектурно-будівельна компанія; оцінка якості; цифрова трансформація; індикатори Q_1-Q_8 ; методичне забезпечення; ESG-підходи; нормативна адаптація; BIM-технології.

Problem statement. The relevance of studying methodological support for assessing the quality of transition stages to European standards in the operations of an architectural and construction company is driven by numerous factors influencing the modern construction market. In the context of globalization and economic integration, an increasing number of enterprises, particularly in Ukraine, are faced with the need to adapt to international standards. This not only contributes to enhancing the competitiveness of companies but also ensures compliance with the requirements of European clients, which is critically important for attracting investment and implementing projects at the global level.

One of the key aspects of the transition to European standards is ensuring high quality in the execution of construction works. This requires a clear methodology for quality assessment at all stages of project implementation. Methodological support for quality assessment makes it possible not only to identify shortcomings at early stages but also to promptly adjust processes, which in turn helps reduce costs and increase the efficiency of the company's operations. The need to introduce a systematic approach to assessing the quality of transition stages to European standards is also driven by changing requirements for design and construction. European standards, in particular, emphasize energy efficiency, safety, and environmental responsibility. This requires architectural and construction companies not only to comply with regulations but also to actively implement innovative technologies, which necessitates the adaptation of existing quality assessment methods. An important aspect is also that methodological support for quality assessment can become the foundation for forming a corporate culture focused on quality. This, in turn, positively affects employee motivation and the enhancement of their professional competence. The implementation of such approaches not only improves the quality of work performed but also builds client trust, which is a key factor in the contractor selection process. In addition, the assessment of transition stages to European standards plays an important role in risk management. In the construction sector, risks can be both financial and reputational. A systematic approach to quality assessment allows for the identification of potential risks at early stages and the implementation of measures to minimize them, which is essential for company stability in a competitive environment. The relevance of the study is also reinforced by requirements for compliance with environmental safety standards and sustainable development. In today's world, environmental issues are becoming increasingly important, and construction companies must take them into account in their activities. Methodological support for quality assessment can include criteria for environmental compliance, which will help companies not only meet standards but also act as socially responsible entities. Another important aspect is the need to integrate advanced information technologies into the quality assessment process. Systems based on digital technologies can provide more accurate and timely quality evaluations, as well as simplify the monitoring of all stages of design and construction. This increases the effectiveness of management decisions and contributes to reducing the costs of quality control.

Thus, the relevance of researching and developing methodological support for assessing the quality of transition stages to European standards in the activities of an architectural and construction company stems from the need to ensure company competitiveness in the global environment, improve the quality of work performed, manage risks, and comply with environmental regulations. This study can form the basis for developing recommendations and methods that will facilitate the successful implementation of European standards in the construction sector, which is critically important for the overall development of the industry.

Analysis of recent research and publications. Recent trends in international academic discourse demonstrate growing attention to digital transformation, energy efficiency, and the implementation of European standardization systems in the field of architectural and construction activities. The identified publications have served as a basis for improving the methodological framework for assessing the quality of transformation processes, particularly regarding their structuring along key directions.

A study that conducted a bibliometric analysis of over 28,000 scientific publications identified leading countries (China, the USA, the United Kingdom), dominant terminology, and the pace of intellectual growth in the field of sustainable construction. This provided a scientific and analytical background for defining the level of globalization of standards and the role of innovation environment policies [21]. The work dedicated to the principles of next-generation housing design summarized the parameters of nZEB, with a focus on the efficiency of passive solutions, thermal

insulation technologies, integration of renewable energy sources, and smart systems. These principles were directly translated into criteria for assessing technical compliance at the company level [22]. The study of digital tools for urban resilience analyzed the potential of AI, digital twins, and edge computing in achieving the Sustainable Development Goals. The results were taken into account when forming the block of indicators for digital transformation [23]. A systematic review of the impact of BIM on project management efficiency demonstrated significant improvements in resource, timeline, and quality management. This served as the basis for detailing the implementation criteria of information modelling as a separate assessment stage [24]. A comparative study of green building certification systems highlighted the advantages and limitations of BREEAM, LEED, etc., which became a starting point for formulating certification and environmental compliance indicators [25]. The work focused on the application of LCA allowed for a more precise approach to life cycle assessment of buildings, which was used as a methodological framework for evaluating resource efficiency and environmental soundness [26]. Finally, the study on the use of digital twins in construction and facility management strengthened the development of the indicator for operational adaptability and integration of management systems [27].

Various aspects of the indicated issue have also been researched and presented in the works of Ukrainian scholars such as: N. Verkhogliadova [1]; O. Kliuchnyk, O. Kondratiuk [2]; O. Piskunov, N. Mtelenko, T. Lobodzynska [3]; I. Mamontov [4]; S. Klovanych, L. Malyshko [5]; A. Perelmutter [6]; A. Panchuk, K. Malkova [7]; O. Marchenko, R. Koliadenko [8]; V. Radkevych [9]; D. Afanasiev, O. Blonskyi [10]; O. Bakhovets, S. Polumiienko, L. Rybakov, V. Tiurin [11]; O. Pizhuk [12]; K. Vorona, A. Siryk [13]; O. Lysenko [14]; I. Makarenko [15]; T. Bolhar, L. Korchahina [16]; M. Matos [17].

Thus, the analysis of the mentioned sources made it possible to systematically identify the key components of the methodology – from regulatory compliance to digital maturity and ESG components – which ensures a comprehensive vision of the assessment of transition stages to European standards in the operations of an architectural and construction company.

Research methods:

1. System-structural analysis is used to formalize the stages of transition to European standards in the company's operations. It allows for determining the logical sequence and interrelation between the elements of the assessed system (Q_1 – Q_8), forming a coherent methodology.

2. Bibliometric analysis is applied during the review of international studies in the fields of energy efficiency, digitalization, and sustainable construction. This method helped to identify current scientific trends, geographical leaders, and indicators that support the formation of the methodological foundation.

3. Content analysis is used to study regulatory and legal documents (EN Eurocodes, ISO 9001, ESG principles), which enabled the identification of key compliance requirements and the formation of indicators for regulatory adaptation.

4. Comparative analysis (mainly as a basis for benchmarking) is used to compare the results of leading Ukrainian companies with the benchmark model of ZÜBLIN AG. This method enables the identification of deviations, gaps, and growth points in relation to European practices.

5. Empirical generalization (expert evaluation) is based on open data, interviews, and case studies, this method was used to assess average indicators across a sample of 10 Ukrainian companies. This ensured the validity of the practical part and the calculation of the integral index (Q_{total}).

6. Inductive-deductive approach ensures the generalization of research data and the formation of a unified methodological concept. Induction – for moving from examples to a model; deduction – for testing the model within real cases.

The purpose of the study is to develop a unified methodological framework for assessing the quality of the stages of transition of an architectural and construction company to European standards through the identification and implementation of key quality indicators (Q_1 – Q_8). The research will help identify effective monitoring and process improvement mechanisms that ensure compliance with international standards, enhance the company's competitiveness in the European market, and contribute to the integration of sustainable development principles.

Presentation of the main research material. The adaptation of an architectural and construction company to European norms and standards is a complex and multifaceted process that includes a number of significant aspects and specifics. In particular, adaptation involves aligning the company's activities with European standards such as EN Eurocodes, which regulate requirements for design, safety, and the quality of building structures. The process includes the implementation of quality management systems, such as ISO 9001, which ensures high standards of quality at all stages of the company's operations. The adaptation path emphasizes energy-efficient solutions and sustainable development, which meet current environmental requirements and contribute to reducing the negative impact on the environment. The adaptation process also includes the use of advanced technologies such as Building Information Modelling (BIM), digital building passports, and monitoring systems, which improve the efficiency of design and management.

The path toward implementing European standards should begin with diagnosing the current state: analysing the regulatory base, digital systems, staff's professional potential, and financial stability. This not only allows for identifying gaps in compliance with European standards but also reveals the company's strengths that can be leveraged for further development. The results of the analysis will serve as a foundation for informed decision-making at the subsequent stages.

The second step involves the development of a strategic roadmap that includes the identification of implementation priorities based on the data obtained. Among the key areas there are regulations, energy efficiency, digitalization, and other essential aspects that form a coordinated action plan. This plan should include clear timelines and designate responsible individuals for the implementation of each stage, ensuring structure and control over execution. The implementation phases will assist in adapting to new market conditions and the requirements of European clients.

The following stages – regulatory adaptation, digital transformation, and professional staff training – are critical to achieving success. Regulatory adaptation includes the translation, adjustment, and integration of European standards such as EN Eurocodes, CPR, and ISO into the company's internal regulations, enabling compliance with the requirements of European clients and tenders. Digital transformation involves the implementation of modern technologies such as BIM (Building Information Modelling), digital building passports, and ERP/CRM systems, which will significantly enhance transparency, accuracy, and efficiency in project management. Professional staff training, including instruction in energy-efficient design and the use of digital tools, will help build a competent team capable of working on the European market with high quality standards.

Institutional integration is another important stage, involving the establishment of partnerships with municipalities, universities, and international platforms. Such collaboration provides access to grants, participation in pilot projects, and knowledge exchange, all of which contribute to the company's growth and enhance its competitiveness at the international level.

The final stages including quality management, certification, inclusiveness, and ESG orientation aim to ensure high operational standards. The implementation of ISO 9001, 14001, and 45001 systems will increase client trust and ensure compliance with the requirements of international partners. Integrating the principles of sustainable development, accessibility, and

community involvement in design will help enhance the company's social capital and meet ESG criteria. The final step is monitoring and adjustment, which entails regular assessment of progress in strategy implementation and adjustments based on audit results, enabling flexible change management and improved effectiveness in implementing all stages of the transition.

An important task for any individual architectural and construction company is to define methods for assessing the quality of each transition stage to European standards (Table 1).

Table 1

Measuring progress: assessment of transition stages to European standards

№	Stage / Step	Key quality indicator (Q)	Formula / Calculation method	Explanation
1	Current state analysis	$Q_1 = (K_a / K_m) \times 100\%$	K_a – number of identified current inconsistencies; K_t – total number of control points	Defines the full scope of the company's current diagnostics
2	Strategic roadmap development	$Q_2 = (W_p / W_o) \times 100\%$	W_p – number of agreed implementation actions; W_o – total number of planned actions	Reflects the level of plan alignment among stakeholders
3	Regulatory adaptation	$Q_3 = (D_a / D_n) \times 100\%$	D_a – number of adapted documents; D_n – number of documents required for compliance	Measures compliance with EU regulatory standards
4	Digital transformation	$Q_4 = (F_a / F_p) \times 100\%$	F_a – number of implemented digital functions; F_p – total number of planned functions	Evaluates the effectiveness of digital technology implementation
5	Staff training	$Q_5 = (S_n / S_o) \times 100\%$	S_n – number of employees trained; S_o – total number of target group employees	Reflects training coverage and workforce readiness
6	Institutional integration	$Q_6 = (P_a / P_o) \times 100\%$	P_a – number of active institutional partnerships; P_o – planned number of partnerships	Measures level of external cooperation
7	Certification and quality management	$Q_7 = (C_a / C_p) \times 100\%$	C_a – number of obtained certifications; C_p – number of planned certifications	Reflects compliance with international quality standards
8	ESG and inclusiveness	$Q_8 = (I_a / I_p) \times 100\%$	I_a – number of implemented ESG initiatives; I_p – number of planned initiatives	Assesses ESG alignment and social/environmental responsibility

Source: author's development.

The overall quality implementation index (Q_{total}) can be calculated as the average of all indicators Q_1 – Q_8 or with consideration of weighted coefficients for each stage.

Let us examine in more detail the defined methodologies for each stage.

1. *Current state analysis.* The assessment of the company's current state is the first and key stage that determines the accuracy of diagnostics and serves as the foundation for further changes [1; 28]. The key quality indicator (Q_1) is calculated as the ratio of the number of identified current inconsistencies (K_a) to the total number of control points (K_m), expressed as a percentage: $Q_1 = (K_a / K_m) \times 100\%$. The control points include the regulatory framework (e.g. compliance with EN Eurocodes), the level of digitalization (availability of BIM or ERP systems), staff qualifications, and financial stability. To calculate this indicator, a comprehensive audit must be conducted using checklists that cover all areas of the company's operations. For example, if 80 inconsistencies are identified out of 100 control points, then: $Q_1 = (80 / 100) \times 100\% = 80\%$, which indicates a high number of issues that require resolution.

A high Q_1 value (e.g. 70–90%) reflects the thoroughness of the audit and the precise identification of weak points, which is essential for developing an effective roadmap. A low value (below 50%) may indicate a superficial analysis or insufficient auditor competence, potentially resulting in critical issues being overlooked. To ensure the quality of this stage, it is advisable to involve external experts with experience in European standards, as well as to use data analysis software, such as SAP or Oracle. Regular updates of checklists and benchmarking against industry standards improve the reliability of the assessment.

2. *Strategic roadmap development.* The formation of a strategic roadmap for transformation is assessed by the indicator $Q_2 = (W_p / W_o) \times 100\%$, where W_p is the number of agreed actions, W_o is the total number of planned actions. This indicator reflects the level of plan alignment among all stakeholders, including management, employees, and, where necessary, external partners [2; 3; 29]. For example, if 45 out of 50 planned actions (W_o) are agreed upon (W_p), then: $Q_2 = (45 / 50) \times 100\% = 90\%$, which indicates a high level of consensus. To calculate this indicator, a series of meetings should be held during which all actions are discussed in detail. Project management tools such as Trello or MS Project should be used to document and track agreements.

A high Q_2 value (80% or above) indicates that the plan is realistic and has the support of all key participants, reducing the risk of delays or conflicts during implementation. A low value may signal insufficient communication or disagreements in priorities, requiring additional consultations. To improve the quality of this stage, it is important to engage all stakeholders early, clearly assign responsibilities for each action, and set realistic deadlines. Regular progress monitoring and team feedback ensure the roadmap remains adaptable to external changes.

3. *Regulatory adaptation.* The quality assessment of adapting technical documentation to EN Eurocodes and CPR standards is based on the indicator: $Q_3 = (D_a / D_n) \times 100\%$, where D_a is the number of adapted documents, D_n is the total number of documents requiring adaptation. For example, if 180 out of 200 documents (D_n) have been adapted (D_a), then: $Q_3 = (180 / 200) \times 100\% = 90\%$. To perform this assessment, it is necessary to inventory all project and construction documentation, check its compliance with European standards, and make the required adjustments [4; 5; 6]. The use of specialized software, such as Autodesk Revit, simplifies the adaptation process and ensures calculation accuracy.

A high Q_3 value (85% or higher) indicates successful harmonization of documentation with European standards, which opens access to international tenders and increases investor confidence. A low value may point to resource constraints, insufficient staff qualifications, or difficulty accessing the standards. To ensure quality, it is important to engage experts in EN Eurocodes, organize training for designers, and regularly monitor adaptation progress. Comparing the results with the requirements of specific tenders helps assess the company's practical readiness to operate in the European market.

4. *Digital transformation.* The quality of digital transformation [7; 8; 30; 31; 32] is evaluated using the indicator: $Q_4 = (F_a / F_p) \times 100\%$, where F_a is the number of operational functions in digital systems, F_p is the number of planned functions. For example, if 40 out of 50 planned functions in BIM, ERP, and CRM systems are successfully operational, then: $Q_4 = (40 / 50) \times 100\% = 80\%$. The evaluation includes checking the functionality of systems such as the creation of digital models in BIM, business process automation via ERP, and customer data management through CRM. This requires system testing and collecting user feedback.

A high Q_4 value (80% or higher) indicates the successful implementation of digital solutions, contributing to error reduction, project time optimization, and increased transparency. A low value may signal technical issues or insufficient staff training. To improve the quality of this stage, it is essential to choose reliable software providers, ensure technical support, and organize regular training sessions. Integration of digital systems with external platforms, such as digital building passports, enhances their efficiency and alignment with European standards.

5. *Staff training.* The quality assessment of staff training is based on the indicator: $Q_5 = (S_n / S_o) \times 100\%$, where S_n is the number of employees who completed training, S_o is the total number of target group employees. For example, if 90 out of 100 employees (S_o) have completed training (S_n), then: $Q_5 = (90 / 100) \times 100\% = 90\%$. Training should cover key areas such as BIM, EN Eurocodes, sustainable construction standards, and ESG principles [9; 10; 33]. Assessment methods may include tests, certification exams, or practical tasks confirming the acquired knowledge.

A high Q_5 value (85% or higher) indicates that the team is well-prepared to operate in European markets, which improves project quality and reduces the risk of errors. A low value may point to poor organization of the training process or low employee motivation. To ensure quality, it is necessary to cooperate with accredited training centres, develop individual learning plans, and regularly assess progress. Involving international experts and using online platforms, such as Coursera or Build Up, helps increase training effectiveness.

6. *Institutional integration.* The quality of institutional integration is assessed using the indicator: $Q_6 = (P_a / P_o) \times 100\%$, where P_a is the number of active partnerships, P_o is the planned number of partnerships. For example, if 8 out of 10 planned partnerships (P_o) are active (P_a), then: $Q_6 = (8 / 10) \times 100\% = 80\%$. Active partnerships include cooperation with municipalities, universities, and European platforms such as Horizon Europe. Evaluation is carried out by analysing signed agreements, project participation, and grants received [11; 12].

A high Q_6 value (80% or higher) indicates successful integration into the European ecosystem, ensuring access to funding and innovation. A low value may signal low activity in partner outreach or weak preparation of project proposals. To improve quality, it is advisable to establish a dedicated unit for partnership coordination, participate in industry events, and develop competitive grant proposals. Regular experience sharing with partners supports process improvement.

7. *Certification and quality management.* The assessment of certification quality is an important tool for evaluating the effectiveness of the quality management system at an enterprise. The main indicator is Q_7 , which is calculated by the formula $Q_7 = (C_a / C_p) \times 100\%$, where C_a is the number of certificates obtained (for example, ISO 9001, ISO 14001, ISO 45001), and C_p is the number of planned certificates. For example, if the enterprise obtained 2 certificates out of 3 planned, then $Q_7 = (2 / 3) \times 100\% \approx 67\%$. This indicator reflects the degree of achievement of certification goals and helps assess how successfully the organization fulfils its obligations regarding compliance with international standards.

Certification according to ISO standards, such as ISO 9001 (quality management), ISO 14001 (environmental management), and ISO 45001 (occupational health and safety), involves a thorough verification of the enterprise's processes for compliance with established requirements.

This process includes documentation audits, analysis of operational procedures, risk assessment, and verification of the implementation of quality assurance measures [13; 14]. Obtaining certificates confirms that the organization adheres to international standards, which increases its competitiveness, customer and partner trust, and also contributes to the optimization of internal processes.

Quality management through certification is not limited to obtaining certificates alone. It requires continuous process improvement, monitoring of quality indicators, and regular internal and external audits. The Q_7 indicator is only one of the evaluation tools, but it does not reflect the full picture. For example, a low Q_7 value may indicate problems in planning, insufficient preparation for audits, or non-compliance of processes with standards. Therefore, enterprises must analyse the causes of deviations and develop corrective action plans to improve effectiveness.

To increase the Q_7 indicator and the overall quality of certification processes, organizations can apply a systematic approach. This includes staff training, implementation of modern management methodologies such as Lean or Six Sigma, and the use of information systems to automate processes. Additionally, it is important to set realistic goals regarding the number of certificates (C_p), taking into account the enterprise's resources and the complexity of standard requirements. Such an approach not only facilitates obtaining certificates but also ensures sustainable improvement of the quality management system, which is key for long-term success.

8. ESG and inclusiveness. The assessment of the effectiveness of ESG initiatives (Environmental, Social, Governance) is based on the indicator Q_8 , which is calculated by the formula $Q_8 = (I_a / I_p) \times 100\%$, where I_a is the number of implemented ESG initiatives, and I_p is the number of planned initiatives. This indicator allows assessing how well the organization fulfils its commitments regarding social and environmental responsibility. For example, if an enterprise implemented 8 out of 10 planned initiatives, then $Q_8 = (8 / 10) \times 100\% = 80\%$. The Q_8 indicator is key for evaluating the company's contribution to sustainable development and inclusiveness, reflecting its ability to achieve set goals in these areas.

ESG initiatives cover a wide range of measures aimed at reducing environmental impact, ensuring social justice, and improving corporate governance. Environmental initiatives may include reducing carbon emissions, implementing energy-efficient technologies, or waste recycling. Social initiatives include ensuring equal opportunities, supporting diversity and inclusiveness, and improving working conditions. Governance aspects relate to transparency, ethical business conduct, and anti-corruption efforts [15; 16; 17; 34]. The Q_8 assessment helps determine how effectively the organization integrates these principles into its activities and identifies gaps in plan implementation.

Calculating Q_8 requires clear definition and documentation of both planned and implemented initiatives. For example, an enterprise may plan 10 initiatives such as installing solar panels, conducting inclusiveness training for employees, or developing an anti-corruption policy. Only initiatives that are completed and confirmed by appropriate evidence, such as reports on emission reductions or certificates of completed training, are considered implemented. A low Q_8 value may indicate insufficient funding, lack of resources, unrealistic planning, or poor coordination between departments. Analysis of this indicator allows management to adjust strategies to achieve better results.

To improve the Q_8 indicator, organizations need to pay attention to the planning and monitoring of ESG initiatives. It is important to set realistic goals, taking into account available resources and the needs of stakeholders such as employees, clients, or the local community. The implementation of modern tools, such as project management software or emission monitoring systems, can facilitate progress tracking. Additionally, involving employees and partners in the development and implementation of initiatives contributes to creating a culture of responsibility and inclusiveness, which positively affects the company's reputation and its long-term development.

Inclusiveness, as part of the social component of ESG, plays a special role in shaping the organization's positive image. Ensuring equal opportunities for all employee groups, including people with disabilities, representatives of various ethnic groups, or genders, is not only an ethical requirement but also a factor that increases productivity. Organizations can implement training programs, create inclusive workplaces, and develop policies that support diversity. The Q₈ indicator helps assess the effectiveness of such measures, allowing organizations not only to comply with modern sustainable development standards but also to create value for society and the environment.

Very important examples. As a result of the general analysis of open data from 10 Ukrainian companies: Altis-Holding Corporation, RAUTA GROUP LLC, Intergal-Bud Construction Company LLC, Kovalska Industrial and Construction Group, UDP (Ukrainian Development Partners), K.A.N. Development LLC, Perfect-Group LLC, Stolitsya Group LLC, TMM LLC, Chemproject PJSC, which actively implement BIM, ISO certification, energy-efficient solutions (nZEB, LEED, BREEAM), and also participate in international projects or pilot reconstruction initiatives. Average indicators of a number of dynamics in defined directions were identified (Table 2).

Table 2

**Integral assessment of progress in implementing European standards based
on a sample of Ukrainian construction companies**

№	Stage / Step	Formula / Calculation	Q Value (%)	Target Value (%)	Degree of Goal Achievement (% of target)	Explanation
1.	Current state analysis	$Q_1 = (18 / 20) \times 100\%$	90%	100%	90.0%	Audit conducted on 20 criteria, 18 actual nonconformities found
2.	Roadmap formation	$Q_2 = (12 / 15) \times 100\%$	80%	95%	84.2%	12 out of 15 planned actions agreed upon
3.	Regulatory adaptation	$Q_3 = (9 / 12) \times 100\%$	75%	95%	78.9%	9 out of 12 necessary documents adapted
4.	Digital transformation	$Q_4 = (6 / 8) \times 100\%$	75%	90%	83.3%	6 out of 8 digital functions implemented
5.	Staff training	$Q_5 = (45 / 60) \times 100\%$	75%	90%	83.3%	45 out of 60 employees completed training
6.	Institutional integration	$Q_6 = (4 / 5) \times 100\%$	80%	95%	84.2%	4 out of 5 planned partnerships concluded
7.	Certification and quality management	$Q_7 = (2 / 3) \times 100\%$	66.7%	90%	74.1%	2 out of 3 planned certificates obtained
8.	ESG and inclusiveness	$Q_8 = (3 / 4) \times 100\%$	75%	90%	83.3%	3 out of 4 ESG initiatives implemented

Source: author's development.

Average degree of goal achievement:

$$S = \frac{90 + 84.2 + 78.9 + 83.3 + 83.3 + 84.2 + 74.1 + 83.3}{8} \approx 82.6\%.$$

Based on the assessment of average indicators for the implementation of European standards in the sample of Ukrainian construction companies, the following conclusions can be made regarding the level of key step implementation.

1. Current state analysis ($Q_1 = 90\%$; target – 100%). This indicator reflects a high level of enterprise readiness for transformation. Conducting a detailed audit across most key control points demonstrates a systematic diagnostic approach, which is a good start for strategic renewal. However, the presence of 10% of unresolved items indicates the need to improve the completeness of coverage of unique requirements of individual subsystems.

2. Roadmap formation ($Q_2 = 80\%$; target – 95%). The result is above average but indicates certain difficulties in ensuring full agreement among structural divisions or external stakeholders. Partial alignment of strategic actions may cause inconsistencies in further implementation. It is advisable to strengthen project office management or develop an adaptive prioritization system.

3. Regulatory adaptation ($Q_3 = 75\%$; target – 95%). At this stage, a moderate level of EU norm integration is recorded. Despite the basic level of compliance, there is a gap in the full implementation of the technical regulation, which may limit companies' access to international tenders and certifications. Legal and standardization expertise should be intensified.

4. Digital transformation ($Q_4 = 75\%$; target – 90%). The level of digital solution implementation (BIM, CRM, ERP) already allows for improved process management efficiency but is not yet fully integrated at all levels. Often implementation occurs in the form of separate pilot modules rather than a unified management system. The next step should be digital integration of processes with customers and suppliers.

5. Staff training ($Q_5 = 75\%$; target – 90%). Personnel transformation has not yet reached a systemic level. Training mostly occurs in isolated instances or within separate projects, which limits the accumulation of internal knowledge capital. To achieve stable growth, it is advisable to create internal academies within companies or establish cooperation with international educational platforms.

6. Institutional integration ($Q_6 = 80\%$; target – 95%). Companies actively enter markets of interaction with government bodies, educational institutions, and international associations. However, full involvement in European initiatives, experience exchange networks, or grant programs has not yet been achieved. The potential here is very high, and its realization is a matter of strategic vision.

7. Certification and quality management ($Q_7 = 66.7\%$; target – 90%). This indicator demonstrates the lowest level of performance among all areas. Many companies are only beginning the certification process, mostly with ISO 9001, and do not cover important areas of environmental (ISO 14001) and occupational (ISO 45001) responsibility. Strengthening this area is critically important for international trust.

8. ESG and inclusiveness ($Q_8 = 75\%$; target – 90%). Companies already implement individual initiatives – "green offices", energy-saving solutions, inclusive design. However, systematic ESG reporting, risk assessment, and public participation are not yet common practice. To convert reputational capital into competitive advantage, integrated ESG strategies need to be implemented.

A specific example. ZÜBLIN AG (full name – Ed. Züblin AG) is one of the largest construction companies in Germany, founded in 1898 by engineer Eduard Züblin. Its headquarters

are located in Stuttgart, and since 2005 it has been part of the Austrian STRABAG SE group, one of the leaders in the European construction market.

Key facts about the company:

- Field of activity: turnkey construction, engineering structures, tunnels, bridges, steel and wooden structures, environmental technologies, digital design.
- Number of employees: over 15,000 people.
- Annual construction volume: over €4.5 billion.

ZÜBLIN is known for projects such as the Opera Tower in Frankfurt, the new Axel Springer office in Berlin, tunnels and bridges in the Netherlands, Switzerland, Iraq, as well as innovative energy-efficient buildings certified by DGNB (German Sustainable Building Council) [18; 19].

This company combines the tradition of engineering excellence with a digital future and can serve as a benchmark for Ukrainian enterprises aspiring to European integration.

Table 3

Assessment of ZÜBLIN AG's progress towards European standards transition

№	Stage / Step	Formula / Calculation	Q Value (%)	Comment
1.	Current state analysis	$Q_1 = (20 / 20) \times 100\%$	100%	Full compliance audit with EN, ISO, ESG
2.	Roadmap formation	$Q_2 = (18 / 18) \times 100\%$	100%	Digitization strategy and ESG integrated into corporate policy
3.	Regulatory adaptation	$Q_3 = (12 / 12) \times 100\%$	100%	Implementation of EN Eurocodes, ISO 9001, 14001, 45001
4.	Digital transformation	$Q_4 = (10 / 12) \times 100\%$	83.3%	Use of BIM, digital passports, partial process automation
5.	Staff training	$Q_5 = (320 / 400) \times 100\%$	80%	Training on BIM, ESG, digital tools
6.	Institutional integration	$Q_6 = (6 / 6) \times 100\%$	100%	Participation in EU BIM Task Group, collaboration with universities
7.	Certification and quality management	$Q_7 = (3 / 3) \times 100\%$	100%	ISO 9001, ISO 14001, ISO 45001
8.	ESG and inclusiveness	$Q_8 = (5 / 6) \times 100\%$	83.3%	ESG reporting, inclusive design, public participation

Source: author's development.

Average implementation index (Q_{total}):

$$Q_{total} = \frac{100 + 100 + 100 + 83.3 + 80 + 100 + 100 + 83.3}{8} \approx 93.3\%.$$

This indicates a high level of integration of European standards, especially in terms of regulatory compliance, ESG, and digitalisation (Table 3). Such an example can serve as a benchmark for Ukrainian companies aspiring to international integration.

Next, we compare the key indicators of ZÜBLIN AG and PJSC "Chemproject" (Table 4).

PJSC "Chemproject" is a Ukrainian engineering company founded in 1996, specialising in the design of industrial facilities, particularly in the petrochemical, metallurgical, and oil refining sectors. The company has completed over 100 projects, including international collaborations, and positions itself as a technologically progressive player focused on quality, innovation, and adaptability to challenging conditions [20].

Table 4

**Comparative assessment of ZÜBLIN AG and PJSC "Chemproject"
in terms of implementation of European standards**

№	Stage / Step	ZÜBLIN AG (Germany) – Q (%)	PJSC "Chemproject" (Ukraine) – Q (%)	Comment / Explanation
1.	Current state analysis	100%	80%	ZÜBLIN has a comprehensive compliance audit; Chemproject – limited to BIM aspects
2.	Roadmap formation	100%	75%	ZÜBLIN integrates ESG and digitisation into corporate policy; Chemproject applies it in specific projects
3.	Regulatory adaptation	100%	60%	ZÜBLIN applies full EU technical standards; Chemproject partially adopts ISO and national standards
4.	Digital transformation	83.3%	70%	Both companies use BIM, but ZÜBLIN integrates it with enterprise systems
5.	Staff training	80%	65%	ZÜBLIN provides structured internal training; Chemproject conducts training per project needs
6.	Institutional integration	100%	50%	ZÜBLIN engages in European networks; Chemproject partners with domestic educational institutions
7.	Certification and quality management	100%	66.7%	ZÜBLIN holds major international certifications 9001, 14001, 45001; Chemproject has limited scope
8.	ESG and inclusiveness	83.3%	55%	ZÜBLIN publishes ESG reports; Chemproject implements selective ESG actions without systematic reporting

Source: author's development.

Average implementation index (Q_{total}):

- ZÜBLIN AG: ≈ 93.3%
- PJSC "Chemproject": ≈ 65.2%

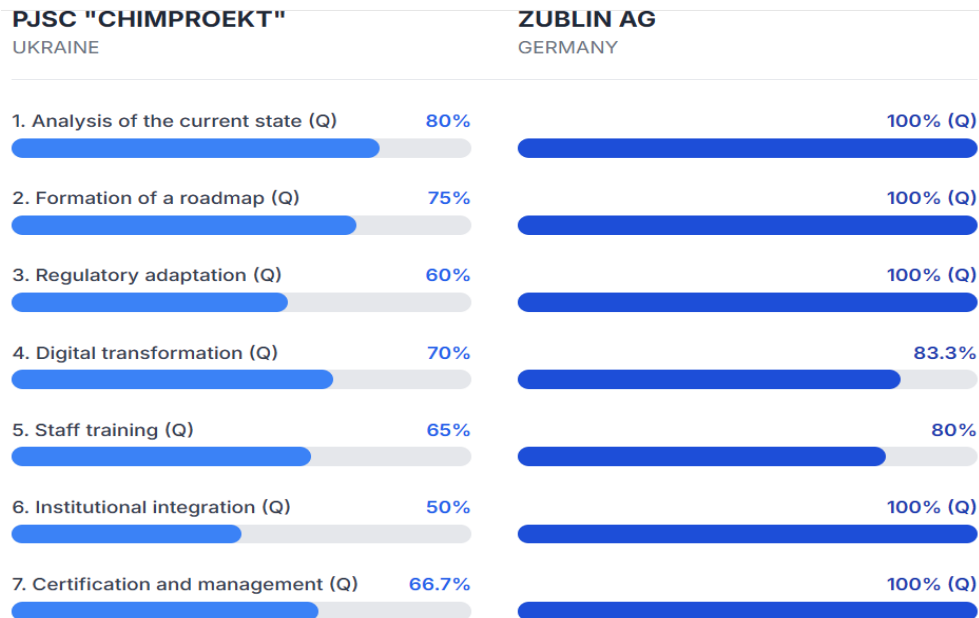
This table shows that Ukrainian companies already possess strong technical potential, particularly in BIM and digitalisation. However, they still need to strengthen institutional integration, ESG approaches, and certification processes to achieve full compliance with European standards.

Let us provide a summarised analytical overview based on the comparison of ZÜBLIN AG and PJSC "Chemproject" (Table 4, Fig. 1):

- The strategic maturity level of ZÜBLIN AG is nearly maximal: the company demonstrates full regulatory compliance, deep digital integration, ESG reporting, and systematic staff training. Its participation in international initiatives, such as the EU BIM Task Group, reflects strategic integration into the European construction space. ZÜBLIN can be considered a benchmark in terms of consistency, comprehensiveness, and scalability in implementing European standards.

- PJSC "Chemproject" shows a progressive trajectory, especially in BIM implementation, point innovations, and ISO adaptation. The company has made a strong move toward digitalisation, but most of its transformations are project-based or partial. Key areas for further development

include institutional partnerships, the deployment of an ESG strategy, and full certification under ISO 14001 and 45001.



Source: author's development.

Fig. 1. Comparative analysis of achievements of ZÜBLIN AG and PJSC "Chemproject" in the implementation of European standards

Thus, both companies possess strong technical potential, but ZÜBLIN has already established a systemic model of sustainable development, while PJSC "Chemproject" is in the transition phase from local to corporate solutions. PJSC "Chemproject" has a great opportunity, building on its existing achievements, to develop a comprehensive strategy for integration with the European construction ecosystem – with a focus on standardisation, partnership, and social responsibility.

Conclusions. The assessment of the transition stages to European standards using a set of key quality indicators (Q₁–Q₈) provides a unified approach to monitoring and improving organisational performance. Each indicator reflects progress at a specific stage – from the analysis of the current state (Q₁) to the implementation of ESG initiatives and inclusiveness (Q₈). For example, $Q_1 = (K_a / K_m) \times 100\%$ assesses the completeness of discrepancy diagnostics, while $Q_7 = (C_a / C_p) \times 100\%$ and $Q_8 = (I_a / I_p) \times 100\%$ indicate compliance with international quality standards and socio-environmental requirements. These metrics allow organisations not only to track achievements, but also to identify weaknesses requiring corrective action.

A key aspect of a successful transition to European standards is systematic and consistent implementation across all stages. For example, a high Q₂ value (roadmap alignment) and Q₅ (coverage of staff training) indicate effective planning and human resource preparation, which form the foundation for further regulatory adaptation (Q₃) and digital transformation (Q₄). In contrast, low Q₆ values (institutional integration) or Q₈ (ESG and inclusiveness) may point to insufficient stakeholder engagement or weak implementation of sustainable development initiatives, which require enhanced coordination and stakeholder involvement.

Special attention should be paid to the integration of all stages into a unified strategy. For instance, digital transformation (Q₄) can support certification (Q₇) through automation of quality management processes, while inclusiveness and ESG initiatives (Q₈) contribute to shaping a

positive organisational image in the European context. Regular monitoring of indicators allows for timely detection of deviations, resource optimisation, and adjustment of plans. This is particularly important for ensuring compliance with strict European requirements, which combine quality, environmental responsibility, and social justice.

By way of conclusion, the transition to European standards requires not only high scores in indicators Q_1 – Q_8 but also the creation of a culture of sustainability and innovation. Organisations that invest in training, digital technologies, partnerships, and ESG initiatives not only meet EU requirements but also enhance their competitiveness in the global market. A systematic analysis of progress across all stages allows not only the assessment of the current state but also the development of long-term strategies for ensuring sustainable development and integration into the European economic environment.

In particular, the practical component of the study allows for the following generalisations:

1. The integration of indicators Q_1 – Q_8 enables effective measurement of the dynamics of the transition of architecture and construction companies to European standards. As the calculations show, the average level of achievement of the set goals for the sample of Ukrainian companies is approximately 82.6%, indicating a fairly high pace of transformation. The highest results were recorded in the categories of "Current state analysis", "Roadmap formation", and "Institutional integration", which points to a mature approach to change planning.

Problem areas for growth remain certification and ESG approaches. The integrated values of Q_7 ($\approx 66.7\%$) and Q_8 ($\approx 75\%$) demonstrate a fragmented nature of their implementation. In particular, the insufficient level of certification according to ISO 14001/45001 and the lack of a consistent ESG reporting cycle slow down compliance with the requirements of international partners. This indicates the relevance of implementing centralised training programmes on quality management and corporate development ethics.

2. The comparison of the cases of ZÜBLIN AG and PJSC "Chemproject" confirms that systematisation, digital integration, and ESG maturity are critical success factors. For instance, ZÜBLIN's average implementation index stands at 93.3%, compared to 65.2% for PJSC "Chemproject". The greatest differences are observed in the areas of institutional integration (Q_6) and ESG (Q_8), highlighting the importance of participation in European initiatives and the presence of a strategic responsibility policy.

The data in the tables clearly demonstrate that digital transformation (Q_4) not only improves internal processes but also enhances other areas such as certification, reporting, and monitoring. For example, ZÜBLIN's integration of BIM and ERP systems is directly linked to a high level of transparency and quality management. This presents an opportunity for Ukrainian companies, particularly "Chemproject", to scale up digital solutions from the local to the systemic level.

3. The results of the practical assessment indicate that the methodology based on Q -indicators serves not only as a measurement tool but also as a management navigator. Companies can use it to audit their current status, identify investment priorities, and define strategic KPIs. This approach is particularly effective in the context of post-war recovery, where transparency, standard compliance, and trust are crucial conditions for attracting international support.

Therefore, adaptation to European standards is an investment in the future. It allows Ukraine not only to meet current requirements but also to shape its own architectural identity in dialogue with European culture. This is a path toward building cities that are comfortable, safe, environmentally friendly, and inclusive. And therein lies the true meaning of integration – not only regulatory, but also value-based.

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