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ASPECTS IMPLEMENTATION OF INNOVATIVE TECHNOLOGIES IN THE BUSINESS PROJECTS OF CONSTRUCTION COMPANIES IN TODAY'S CONDITIONS

АСПЕКТИ ВПРОВАДЖЕННЯ ІННОВАЦІЙНИХ ТЕХНОЛОГІЙ У БІЗНЕС-ПРОЕКТАХ БУДІВЕЛЬНИХ КОМПАНІЙ В УМОВАХ СЬОГОДЕННЯ

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Growing competition, environmental and safety requirements, as well as the rapid development of construction technologies require companies to be flexible and ready to adapt to new challenges. The implementation of innovative projects and the use of innovative technologies in the activities of construction enterprises is an integral part of strategic development in today's conditions. This includes implementing the latest technologies, methods, and practices to improve business processes and production productivity. The use of innovative technologies in the activities of construction enterprises plays a significant role in the implementation of construction processes. Namely: increases productivity during the implementation of innovative projects.; the use of the latest technologies improves the quality of the final product; Innovation can help to use resources more efficiently and reduce costs. Therefore, for the effective and effective activity of enterprises, it is necessary to study their use of innovative technologies in the business processes of construction companies and provide proposals for improving the implementation of innovative projects in the activities of construction enterprises.

Keywords: enterprise, business process, innovation activity, innovation, innovative technologies, implementation, construction company, production.

В умовах сьогодення у стрімких темпах технологічного розвитку виникає постійна потреба в інноваціях, зокрема і в бізнес-процесах будівельної галузі. Для цього перед будівельними компаніями ставляться завдання щодо ефективного дослідження і розробки процесів реалізації інноваційних проектів. Використання інноваційних технологій та впровадження інновацій стає визначальним фактором для забезпечення якості, швидкості та сталої конкурентоспроможності. Важливим аспектом є зростаюча увага до екологічних аспектів будівництва, що вимагає від підприємств впровадження нових технологій і методів, спрямованих на зниження впливу будівництва на навколишнє середовище. Із зростанням попиту на нові та сучасні будівлі та споруди зростає і складність будівельних проектів, що вимагає оптимізації управлінських і технологічних процесів. Дослідження та удосконалення реалізації інноваційних проектів у діяльності будівельних підприємств є невід'ємною складовою стратегічного розвитку в даній сфері, що включає ряд важливих аспектів, зокрема

дослідження новітніх технологій, таких як нові будівельні матеріали та технології, системи управління будівництвом, автоматизація та роботизація, що допомагає підприємствам підвищувати продуктивність та знижувати витрати; грамотне управління інноваційним проектом. Дослідження та удосконалення впровадження інноваційних проектів у бізнес-процесах будівельних підприємств, зокрема використання BIM-технологій при проектуванні дозволить побачити помилки на ранніх етапах і не допустити їх виникнення на будівельному майданчику. Використання інноваційних технологій та реалізація інноваційних проектів дає компанії конкурентні переваги на ринку, адже вона може більш ефективно використовувати свої ресурси, знижувати витрати на проекти, виробляти більш якісний продукт. А це є в свою чергу підвищить продуктивність під час реалізації інноваційних проектів; підвищить якість кінцевого продукту та допоможе більш ефективно використовувати ресурси і знижувати витрати. Ефективне управління будівельними матеріалами та оптимізація робочої сили можуть значно скоротити витрати на проект.

Ключові слова: підприємство, бізнес-процес, інноваційна діяльність, інновація, інноваційні технології, реалізація, будівельна компанія, виробництво.

Problem statement. The purpose of this article is to determine the strategy and approaches to optimize the use of innovative technologies for the implementation of innovative projects in the activities of construction enterprises in order to increase their competitiveness and ensure sustainable development.

Analysis of recent research and publications. The issues of implementation of innovative projects and the use of innovative technologies in the business processes of construction enterprises were repeatedly raised at all-Ukrainian and international scientific and practical conferences, studied by both domestic and foreign scientists. Khodyreva O. O. [1] believes that the analysis of innovations at the project level is an important aspect. It offers a framework for exploring the various components of innovation, including drivers, inputs, drivers, barriers, innovation activities, benefits, and impacts. Bukhar N. V. [2] focuses on the strategy and mechanisms for increasing the efficiency of green innovations at construction enterprises with the help of a newly created theoretical framework. Yevtushenko Y. V. [3], Zamula I. V., Chyzhevska L. V., Grabchuk I. L. [4] consider the use of innovative technologies in business processes in the construction industry. Sak T. V. and Shepelyuk N. P. [5] prove that in today's conditions the use of innovative technologies and information and technical solutions is comprehensive, which gives the most effective results. Automation and robotics are used in a variety of construction tasks, such as bricklaying, earthworks, and concrete pouring. These technologies can improve accuracy and speed while reducing labor costs.

Selection of previously unresolved parts of the general problem. When analyzing the innovation process, it is necessary to take into account the peculiarities of the industry under study. There are several stakeholders in construction, so innovations are developed at the project level. However, innovation is due to a large number of factors that can be distinguished at the industry, firm and project level. In view of this, it is necessary to pay more attention to the issue of drivers of innovation processes in construction. Factors related to the project, with the firm and the industry in stimulating innovation in construction projects. Which, in turn, has a direct impact on the aspects of the implementation of innovative projects in the business processes of construction companies that use innovative technologies.

Formulation of the objectives of the article (statement of the task). The purpose of the study is to highlight the essence of the use of innovative technologies in the company's business processes and aspects of the implementation of innovative projects and the use of innovative technologies in the business processes of construction companies in today's conditions.

Presentation of the main material of the study. The construction industry strives to remain competitive by using different approaches, and attracting structured initiatives related to proven innovative concepts, methods. Even in markets such as the architecture, engineering and construction sector, where business behavior is generally considered risk-averse, it is becoming increasingly important to innovate into core business practices. An important part of improving the implementation of innovative projects is the research of the latest technologies, such as new building materials and technologies, construction management systems, automation and robotics, which helps enterprises increase productivity and reduce costs.

In addition to the latest technologies, the success of the project implementation is influenced by the competent management of this project. The development of best practices

in the field of construction project management, including the implementation of methods, reduce the time for project implementation, as well as prevent budget overruns [5, p. 37]. Project management also includes process improvement, namely optimization of processes at the design and construction stages and improvement of interaction between different project participants. We should not forget about the advanced training and training of employees who should be involved in an innovative project for the better implementation of this project. There are a considerable number of factors (Table 1) that affect the implementation of innovative projects in the activities of construction enterprises.

The main driver for improvement is technological factors.

The development of new construction technologies and materials, the emergence of automated systems and information technologies in construction contribute to the development of these studies.

Economic factors are also important, since innovative technologies can reduce the cost of project implementation.

We should also not forget about new trends in architecture, as well as the increase in demand for energy-efficient and environmentally friendly building solutions.

Ukrainian experience in the field of research and improvement of the implementation of innovative projects in the activities of construction enterprises does not lag behind the international one. Ukraine is actively adopting Europe's experience in the introduction of green technologies and sustainable building practices.

This includes the use of energy-efficient materials, the installation of solar panels, the insulation of buildings, the reduction of CO2 emissions and the use of alternative energy sources. Increasingly, design companies are beginning to use BIM technologies in the design of buildings and structures. It allows you to create virtual building models that facilitate project management, improve collaboration between project participants, and reduce errors.

On the example of QUANTORSTEP LLC, the strategy for the implementation of BIM technologies in a construction company is considered. Currently,

BIM technologies are actively used only by design companies in the design of buildings and structures. But to reveal all the advantages of BIM technologies, their application at all stages of construction is required. In order to be able to use these technologies throughout the entire construction, it is not enough just to create a 3D model of the building, but a 5D model is needed. A 5D model includes directly a 3D model of a

Table 1

Factors influencing the implementation of innovative projects in the activities of construction enterprises

Group of factors	Factors
By areas of study:	Technological innovations (research of new building materials and technologies, introduction of automation and robotization in construction); Strategic innovation management (development of strategies for the introduction of innovations into the activities of the enterprise, selection of optimal innovation projects); Financing of innovations (search for sources of funding for innovation projects, management of the innovation budget)
By according to the goals of innovation:	Increased productivity (improvement of construction processes to reduce project turnaround time, use of new technologies to increase productivity); Improving quality and safety (ensuring high quality construction works and products, reducing risks and hazards for workers and users of buildings); Sustainable construction and environmental responsibility (introduction of green technologies and construction methods, reducing the environmental impact of construction.
By implementation rate:	Strategic innovations (long-term strategic projects that can change the scope of activity of the enterprise); Operational innovation (specific changes in construction processes and methods to improve efficiency); Process innovations (changes in project management aimed at improving the implementation of innovative projects).

Source.: grouped by [1; 3; 5]

building or structure, time (4D) and money (5D). The introduction of BIM technologies in a construction company can be divided into 7 main stages (Figure 1):

A common mistake is to have too high expectations for BIM technology, especially from the start. Therefore, it is important to set specific goals for yourself, which should be clear and understandable. They can be specified using the S.M.A.R.T. method (Specific, Measurable, Achievable, Relevant, Time- bound – specific, measurable, achievable, relevant, time-bound). The pilot project should be neither too difficult nor too large, because it will be necessary to solve new tasks and learn without risking extra money and time. You can select an object or section from the entire project and run it in BIM. It is also necessary to take into account that the project can be delayed and affect the progress of construction. Therefore, it is very important to specify the expected time for obtaining completed and approved project drawings, including the time required for internal control of documentation, ordering and delivery of materials. It is also necessary to take into account the stage of personnel training. Human resources are the greatest asset of any organization. It is the employees who create the company and influence its functioning. The duties of employees should include not only the work itself, but also the quality of the work and the time required to complete it. To improve mutual understanding, it is advisable to agree on how progress will be checked and how the results will be communicated. The status of the work should be checked throughout the project so that in case of deviations or problems, corrective action can be taken in time. Communication is one of the most important elements. Understanding the expectations, responsibilities, and requirements of all participants in the construction process is vital for the success of BIM implementation and the achievement of planned levels. Each project needs to be approached individually. Some only require basic documentation (such as a BEP or BIM manual), while others require more documentation. Given the specifics of work in the construction industry and the fact that almost every project is essentially unique, the main thing to remember is that the copy-paste method does not work in this case. Therefore, when creating documentation, it is necessary to adhere to the following rules (Figure 2.)

The last and perhaps the most difficult stage in the implementation of BIM technologies is the involvement of all participants in the construction. The transition to BIM is a complex process not only for contractors, but also for designers, subcontractors, suppliers, and customers. Therefore, it is important to correctly formulate expectations and clarify the responsibilities of each participant in the process. BIM and documentation requirements – must be included

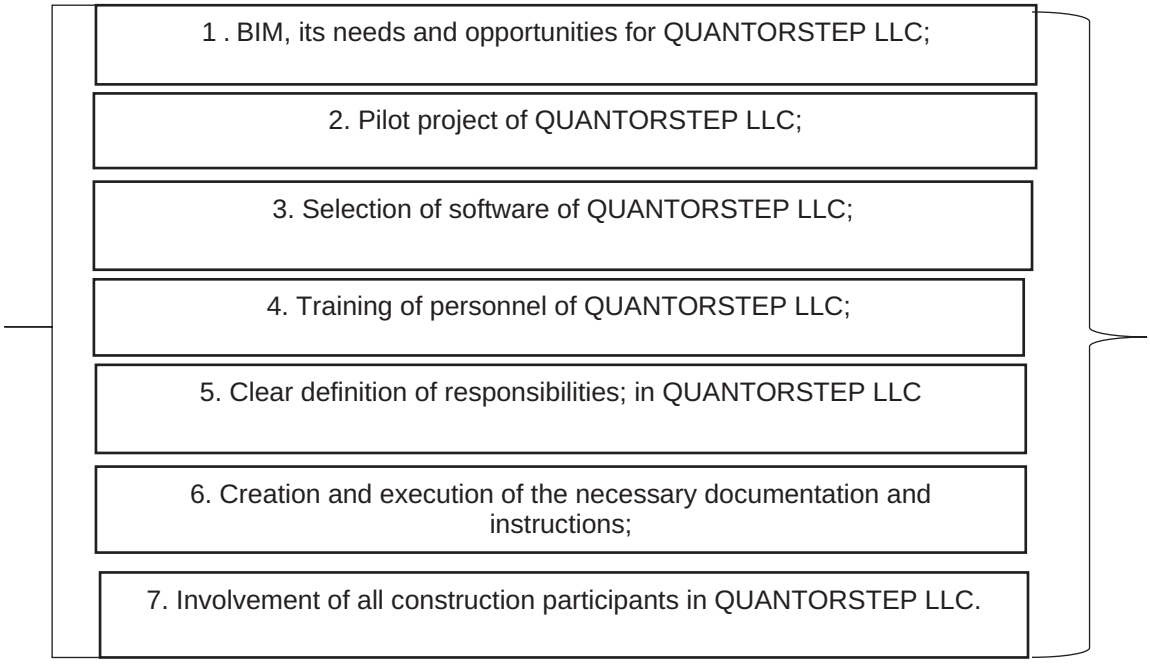

Figure 1. Stages of implementation of BIM technologies in a construction company

Source: formed by the authors according to QUANTORSTEP LLC

- Simplify descriptions and leave only what is necessary and relevant in the document;
- Remember that these methods are used by people with different experiences;
- Don't do what you don't have to! Minimize the number of documents to the required minimum.
- Documents and processes should be "live", i.e. regularly reviewed according to needs and potential improvements.

Figure 2. Rules for creating and executing the necessary documentation in a construction company

Source: grouped by [2; 4]

in a pre-prepared BIM implementation plan (BEP) or BIM manual. The requirements should be as clear as possible, along with the description of the project. When implementing BIM technologies, the main thing is to remember about common goals and proper communication. Therefore, project stakeholders (or simply organizations and individuals who directly or indirectly influence the project) can be divided into internal (people inside the organization), external (people outside the organization) and customers. Understanding common goals and motivating others to achieve them is directly related to the overall success of the project. Therefore, it is important to provide the right information to the right people at the right time.

Conclusions. Analyzing the current state of implementation of innovative projects in the activities of construction enterprises, we reveal the essence of improving the implementation of innovative projects in the activities of construction enterprises, in particular for QUANTORSTEP LLC. The analysis showed that the main factors influencing improvements are technological factors and the growing demand for energy-efficient construction. Based on the information obtained, the improvement of the implementation of innovative projects in the activities of construction enterprises can be classified into three main groups: by areas of research; by innovation goals; by the level of application. To improve the implementation of innovative projects in the activities of construction enterprises, it is proposed to introduce BIM technologies in a construction company. Through the implementation of BIM, companies can significantly improve the design, construction and management of their facilities. This results in cost optimization, reduced risk of errors, and faster project implementation; improving the accuracy and accessibility of the information provided by BIM can help to avoid conflicts, rationalize resources, and reduce the cost of correcting errors.

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