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INFORMATION TECHNOLOGY IN CONSTRUCTION MANAGEMENT

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Abstract. *The article discusses the relevance and necessity of using modern information technologies in construction management. The author cites several areas of application of IT in the area under study, as well as the advantages and disadvantages of the use of information technologies in the management of construction processes identified during the study.*

Key words: *Construction, information technology, construction process management.*

Construction, of course, is one of the most important areas of the economy, because it is here that the foundations for the development of society and the well-being of citizens are formed. Construction production volumes, being a barometer of economic stability, always reflect the current state of affairs in the construction industry.

Information technologies are penetrating all areas of life, including construction. It started with simple solutions to calculation problems, but over time, IT has evolved into highly complex management systems capable of effectively coordinating and controlling the most large-scale and complex construction projects. Today's technologies can significantly increase construction efficiency, improve control over deadlines and budgets, and also minimize the risks of possible errors and omissions.

Information technology has a significant impact on construction management, and the introduction of new digital tools and methods helps improve the efficiency, manageability and quality of projects. Here are several areas where information technology is used in construction management:

1. Digital Twins of Construction Projects: A study of the use of digital models (BIM) to create virtual twins of construction projects, their application in design, planning, construction and life cycle management of the facility.

2. Integration of information systems in construction: Assessing the integration of various information systems such as ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), CAD (Computer-Aided Design) and others, for managing projects, resources and communications.

3. Mobile technologies and cloud computing: Analysis of the use of mobile applications, cloud platforms and IoT technologies (Internet of Things) for collecting data on construction sites, monitoring processes and exchanging information between project participants.

4. Automation of construction processes: Research of robotic systems, automated machines and control algorithms to optimize construction operations, improve occupational safety and reduce work completion times.

5. Big Data and analytics in construction: The role of big data and analytical tools in forecasting demand for building materials, optimizing procurement and managing risks in construction projects.

6. Virtual and augmented reality in construction: Evaluation of the use of VR (Virtual Reality) and AR (Augmented Reality) for project visualization, staff training, quality control and improving interaction between process participants.

7. Cybersecurity in the construction industry: Study of methods for protecting information and critical infrastructure in the context of digitalization of construction processes, the threat of cyber attacks and measures to prevent incidents.

The use of information technology (IT) in construction management has a number of benefits that significantly improve the efficiency and effectiveness of processes in the industry. Table 1 lists the main benefits of using IT in construction management.

Table 1.

Advantages and disadvantages of using information technology in construction management.

Advantages	Flaws
Improved Project Management: IT allows you to more effectively plan, control and manage all aspects of a construction project, including budgeting, work schedules, resources and tasks.	**High implementation costs:** Implementing and maintaining IT systems requires significant investment, especially for small and medium-sized enterprises, which can be a barrier to their widespread use.
Greater accuracy and reduced errors: Automation systems and digital technologies help reduce the likelihood of errors in calculations, design and execution of work, which leads to improved quality and reduced risk.	**Difficulties in training and adaptation of personnel**: The introduction of new technologies requires training of personnel and getting used to new work processes, which can require time and resources.

Resource Optimization: The use of IT allows for more efficient allocation and use of resources such as materials, equipment and labor, which helps reduce costs and improve the economic efficiency of the project.	**Compatibility and Integration Issues**: Different IT systems may have compatibility and integration issues with each other, making it difficult for different project participants to share data and collaborate.
Improved Communication and Collaboration: Project management systems, electronic document management systems, cloud platforms and other IT solutions improve communication between project participants, allowing for more effective collaboration and information sharing.	**Cybersecurity risks:** Connecting to the Internet and using cloud technologies increases the risk of cyber attacks and data leaks, requiring additional measures to ensure information security.
Faster decision making: IT provides access to up-to-date project data, analytical reports and forecasts, which helps you make informed decisions based on factual information and the current status of the project.	**Need for constant updating and support:** IT systems require constant updating, support and maintenance to keep them operational and compliant with modern requirements and standards.
Improved Safety and Control: IT solutions can be used to improve construction site safety, monitor work processes, control access and prevent accidents.	**Technology and vendor dependency**: Businesses may face dependency on specific technologies and IT service providers, which can create risks and limitations in decision-making.
Greater level of transparency: The use of IT provides a higher level of transparency in project management, which is important for all stakeholders, including clients, contractors and regulators.	**Limited availability and reliability of communications:** The need for constant access to the Internet and high reliability of communications can be a problem in remote or sparsely populated areas where communications infrastructure is limited.
Opportunity for innovation: IT allows the introduction of innovative technologies, such as digital twins of construction sites, robotic systems, analytical tools, etc., which contributes to the development of the industry and increases its competitiveness.	**Risk of Data Loss:** Inadequate data backup and disaster protection can result in the loss of critical information, which can negatively impact the progress of construction projects.

Overall, the application of information technology in construction management enables more efficient, transparent and safe project execution, which is key to success in today's construction industry.

Although the application of information technology (IT) in construction management has many advantages, it also comes with some disadvantages and challenges (Table 1). But these shortcomings are not insurmountable obstacles, and

many of them can be successfully overcome with proper planning, staff training, the use of reliable IT solutions and enhanced security measures.

Overall, the use of information technology in construction management can significantly improve management processes and project performance, but requires a comprehensive approach to implementation, staff training and data security. Before making a decision to implement IT, it is necessary to carefully evaluate all the pros and cons, taking into account the specifics of a particular project and company.

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