

# **SCIENTIFIC RESEARCH: MODERN CHALLENGES AND FUTURE PROSPECTS**

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# IMPLEMENTATION OF DIGITAL TECHNOLOGIES IN THE CONSTRUCTION INDUSTRY: CURRENT STATUS AND PROSPECTS

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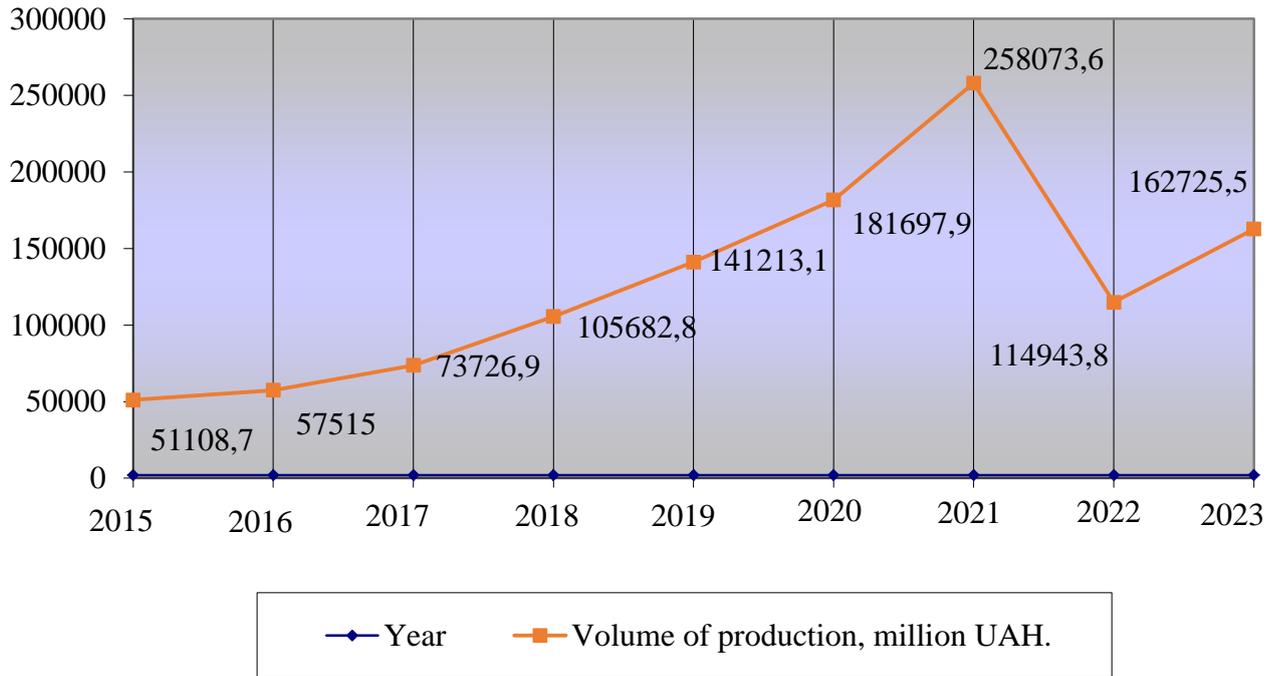
**Introductions.** In the context of European integration and future large-scale reconstruction, digitalization should become a key direction in the development of Ukraine's construction industry. Its implementation allows increasing the economic efficiency of construction enterprises and the quality of construction and installation works.

**Aim.** The purpose of the work is to determine the current state of implementation of information technologies in the construction industry and the prospects for their use in the future.

**Materials and methods.** The study is based on the analysis of statistical data characterizing the activities of enterprises in the construction industry of Ukraine.

**Results and discussion.** The construction industry of Ukraine, despite the difficulties associated with the conduct of hostilities, is gradually increasing the volume of activity, which significantly decreased in the first months of the war. According to data from the State Statistics Service of Ukraine [1], in 2023, the volume of construction products produced compared to 2022 increased by 47781.7 million UAH, or by 41.6% (Figure 1).

The growth in volumes in all segments of construction is positive, namely: – in residential construction by 11.1%, to UAH 2.24 billion, – in non-residential construction – by 38.1%, to UAH 11.48 billion, – in the category of engineering structures – by 52.6%, to UAH 34.07 billion. The share of new construction in the total volume of construction work performed was 36.3%, repairs – 42.9%, reconstruction and other works – 20.8% [1].



**Fig. 1. Dynamics of volumes of manufactured construction products in Ukraine in 2015-2023, million UAH.**

*Source: developed by the author based on data from the State Statistics Service of Ukraine [1]*

Further expansion of construction capacity significantly depends on the effectiveness of implementing digital technologies in the activities of construction companies and the industry as a whole.

Today, the Ukrainian construction industry, according to general expert assessments, has a relatively low level of digitalization compared to European countries. Most construction processes are performed using traditional methods.

A prominent place among such technologies belongs to Building Information Modeling, which allows you to create a model of an object, plans and sketches of its main elements, establish a sequence of work, and ensure control over construction participants. This helps reduce material costs, increase project profitability, accelerate the development of necessary design documentation, shorten construction times, and minimize inventory [2].

However, building information modeling, which is the basis of digitalization in

construction, is currently not used enough in Ukraine, but is actively developing. This is due to the fact that its use is beneficial only during the implementation of large, typical or foreign projects, for small projects the cost of such software packages and personnel training is too high.

Progressive international construction companies, in addition to BIM, are actively using 3D printers in their work to manufacture construction elements. There are already several houses in the world built exclusively using a 3D printer.

The use of drones in construction companies is effective for determining the scope of construction, problem areas, assessing the environment surrounding the facility, and organizing its security.

The use of virtual and augmented reality in construction is gaining momentum, allowing you to view a model of an object while in the office, and the augmented reality function makes it possible to evaluate a full-scale model in a landscape environment.

In martial law, the role of cloud technologies is growing, as they provide flexibility, availability, and data security.

Cloud services (Google Drive, Dropbox, Microsoft SharePoint/OneDrive) provide secure storage of large volumes of construction documentation (drawings, estimates, contracts, photos from facilities), as well as convenient access to it from any device and location. Cloud ERP systems (e.g., SAP S/4HANA Cloud, Microsoft Dynamics 365) or specialized construction finance programs allow you to manage project budgets, settlements with suppliers and contractors, record keeping, cost control, and financial reporting.

The increased efficiency of the construction industry is facilitated by the use of the Unified State Electronic System in Construction (USESEC), which processes and stores all data related to permits, urban planning documentation, and registers of construction participants. Its cloud-based nature ensures accessibility, scalability, and transparency.

It is worth noting that, despite the unequivocal usefulness of digital technologies for the development of the construction industry, their implementation is

associated with certain problems and challenges.

Firstly, it requires significant investments in software, equipment and personnel training, which is problematic, especially for small and medium-sized construction companies.

Secondly, Ukraine lacks specialists familiar with working with BIM, AI and other digital tools.

Thirdly, the implementation of digital technologies often encounters resistance within companies.

Fourthly, there is no clear strategy for the implementation of BIM at the state level, the regulatory framework is not aligned with European requirements, which slows down the digitalization process.

Fifth, the spread of digital technologies increases the risks of cyberattacks, which is critically important in wartime.

**Conclusions.** The Ukrainian construction industry has high potential and is able to overcome these challenges. The introduction of progressive digital technologies will reduce the estimated cost of facilities, increase investment efficiency, and reduce costs, which will contribute to the sustainable development of the construction industry.

## ДІЯЧІСТЬ

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