

UDC 657.6:004

JEL classification: M40, M41, D24

DOI: 10.35774/visnyk2025.04.82

Specifics of Smart Construction and its Impact on the Digitalization of Accounting and Control

Anton Lupiichuk¹

Abstract.

Introduction. Construction as a sector of economic activity is characterized by unique features influencing both the theory and practice of accounting and control. In the context of smart construction development as an element of the digital economy, the traditional industry-specific characteristics evolve through the digitalization of accounting and control processes in construction activities.

Purpose. The article aims to identify and systematize the specific features of smart construction as a type of economic activity and to substantiate their impact on the digitalization of accounting and control within the digital economy.

Results. The characteristic features of smart construction are summarized in three groups: environmental impact, uniqueness of accounting objects, and methodological individuality of the industry. Emphasis is placed on the necessity to consider these features in the practical implementation of the smart construction concept. The study substantiates that the digitalization of accounting and control in smart construction ensures automation of data collection and processing, storage in unified databases, the use of cloud services and smart contracts, the development of electronic design, and the transition to full electronic document management.

Conclusions and prospects. A comprehensive consideration of digital trends in the influence of smart construction features on the transformation of accounting and control can ensure positive outcomes in managing the functioning of construction enterprises in the digital economy. However, each transformational trend in the construction industry requires the application of advanced computer and communication technologies in accounting and control, which defines the direction of further scientific inquiry.

Keywords: accounting, control, smart construction, construction activity, construction enterprises, information technologies

Received: 8 October 2025 | **Revised:** 10 October 2025 | **Accepted:** 23 October 2025 | **Published:** 30 November 2025

Suggested Citation

Lupiichuk, A. I. (2025). Specifics of Smart Construction and its Impact on the Digitalization of Accounting and Control. *Herald of Economics*, 4, 82-90. DOI: 10.35774/visnyk2025.04.82.



This is an open access article under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<http://www.creativecommons.org/licenses/by-nc/4.0/>), which permits use and distribution in any medium, provided the original work is properly cited and the use is non-commercial.

2025 The Author(s).

¹Anton Lupiichuk, West Ukrainian National University, Ternopil, Ukraine.

ORCID ID: 0009-0001-5402-0539

E-mail: lupiichukanton@gmail.com

Специфіка смартбудівництва та її вплив на цифровізацію обліку і контролю

Антон Лупійчук¹

Західноукраїнський національний університет, м. Тернопіль, Україна

Анотація.

Вступ. Будівництво як галузь економічної діяльності характеризується унікальними рисами, що впливають на теорію та практику обліку й контролю. В умовах розвитку смартбудівництва, що є елементом становлення цифрової економіки, відбувається еволюційне доповнення традиційних галузевих ознак у частині цифровізації обліку і контролю будівельної діяльності.

Мета статті полягає в ідентифікації та систематизації специфічних особливостей смартбудівництва як виду економічної діяльності з обґрунтуванням їхнього впливу на цифровізацію обліку і контролю у цифровій економіці.

Результати. Узагальнено характерні риси смартбудівництва за трьома групами: вплив навколишнього середовища, унікальність об'єктів обліку та методична індивідуальність галузі. Наголошено на потребі врахування цих особливостей у процесі прикладного втілення концепції розумного будівництва. Обґрунтовано, що цифровізація обліку і контролю в умовах смартбудівництва забезпечує автоматизацію збору та обробки інформації, її збереження в єдиних базах даних, застосування хмарних сервісів і смартконтрактів, розвиток електронного проектування та перехід до повного електронного документообігу.

Висновки та перспективи подальших досліджень. Комплексне врахування цифрових тенденцій у впливі характерних ознак смартбудівництва на трансформацію обліку і контролю здатне забезпечити позитивний результат в управлінні функціонуванням будівельних підприємств у цифровій економіці. Проте кожна з трансформаційних тенденцій у галузі будівництва потребує використання новітніх комп'ютерно-комунікаційних технологій в обліку та контролі, що є предметом наступних наукових пошуків.

Ключові слова: облік, контроль, смартбудівництво, будівельна діяльність, будівельні підприємства, інформаційні технології.

Introduction. The construction sector is rapidly evolving under the influence of globalization and the digital transformation of the economy. The integration of advanced information and communication technologies significantly enhances the management of construction processes, improving the efficiency of design activities, the precision of construction and installation works, and the visualization of project outcomes. These developments stimulate market demand and create a superior consumer experience for potential clients in the real estate sector.

Innovative technologies in building design, material production, and structural engineering are reshaping traditional approaches to construction as an economic activity. The emergence of unique, client-oriented market offerings challenges the application of standardized management approaches to construction projects and enterprises. The complex network of market participants – design studios, contractors, developers, outsourcing firms, material and component manufacturers, investors, and real estate agencies – complicates the financial and operational processes within the industry. These factors define construction as a specific and complex field of economic activity.

The inherent characteristics of construction differ substantially from those of other industries, directly influencing its management, accounting, and control systems. The unique features of the construction economy and the dynamic transformation of internal and external conditions for each project determine the necessity of adapting accounting and control mechanisms to support managerial decision-making and operational efficiency.

Analysis of research and publications. Since the construction industry is characterized by distinctive features that fundamentally differentiate it from other sectors of economic activity, a growing body of research has emerged addressing its sectoral impact on accounting and control. The influence of construction-specific characteristics on the theory and practice of accounting and control support in management processes constitutes a core area of academic inquiry. For instance, H. Ilnytska-Hykavchuk conceptualized the construction sphere as a complex of inherent features

analyzed through the prism of accounting improvement prospects [1]. M. Khomenko, N. Cherevyk, and O. Nesterenko generalized the specific attributes of accounting and control, taking into account both the economic and regulatory characteristics of construction [2]. K. Pinchuk argued that environmental factors exert the strongest influence on accounting and control in construction, thereby shaping the distinctive traits of the industry [3]. A. Korenga and S. Pryimak classified construction features based on the need to adapt accounting systems to the immobility, diversity, scale, material intensity, and labor intensity of construction operations [4].

Another line of research on accounting and control specificity in construction is represented by studies addressing various institutional levels and subsystems of accounting, control, and management. A. Yasinska and V. Reka systematized operational characteristics of construction enterprises that affect the efficiency of management accounting, cost control, and pricing mechanisms [5]. Z.-M. Zadorozhnyi and V. Muravskiy examined the legal regulation of construction in the context of management accounting transformation and refinement of accounting terminology [6]. Yang Yanxue explained how the specific features of the construction industry drive the integration of financial and managerial accounting [7]. Khalid Maizatul, Abd-Mutalib Hafizah, and Mohamed Rapih supplemented this discourse by proposing a methodology for developing a strategic management system based on the implementation of managerial accounting adapted to the unique internal and external operating conditions of construction enterprises [8].

O. Pavelko, I. Vlasuk, and D. Popchuk distinguished methodological and organizational aspects of accounting in construction from those of other economic sectors [9]. L. Shevchenko and T. Kozhukhova focused on the future evolution of accounting in the construction industry, emphasizing its prospective transformation directions [10]. O. Lemishovska and V. Fedak explored the industry-specific organization of auditing in construction enterprises, explaining its impact on control functions and methods [11]. Agbata Amaka, Okafor Gloria, and Okonewa Onyinyechukwu analyzed the relationship between accounting-information and corporate systems in construction companies [12].

Regardless of the research focus, most studies addressing the specificity of construction in the context of accounting and control pay insufficient attention to digital transformation processes. Scholarly works rarely consider the prospects for digitalization of accounting and control systems in construction enterprises, taking into account the characteristic features of construction as an economic activity. The emergence of the smart construction concept calls for a reassessment of traditional approaches to understanding the influence of economic and operational characteristics of construction enterprises on the theory and practice of accounting and control [13].

The purpose of this research is to identify and systematize the specific features of smart construction as a form of economic activity and to substantiate their impact on the digitalization of accounting and control in the digital economy.

Results. All specific features of construction activity can be grouped into three key factors, each serving as a distinct classification category. The first group includes environmental and economic determinants that shape the operating conditions of construction enterprises. External factors define the territorial dispersion of projects and the extended duration of construction processes. The second group comprises features related to accounting objects inherent in construction. These include the immobility of construction output, the temporary nature of fixed assets, and the extensive presence of auxiliary and servicing units. The third group – methodological characteristics – distinguishes construction from other economic activities. It encompasses the involvement of multiple subcontractors and contractors, the use of specific primary documentation and document flows, and variable cost structures in project-based accounting.

All characteristic features of construction, classified by their influence on accounting and control, are summarized in Figure 1.

Temporariness of fixed assets. Only in construction are temporary (titled and non-titled) facilities widely used – structures essential for the building process but dismantled afterward. Smart construction employs modern, reusable materials and modular components, yet temporary facilities remain vulnerable to theft or damage due to limited monitoring. Hence, a reliable security system is an integral element of smart construction. Most sites are equipped with video surveillance, access control systems, motion sensors, and facial recognition technologies. These security tools, often treated as temporary accounting assets, can later be reused at other sites, enhancing both safety and cost-efficiency.

Auxiliary production and total costs. Construction has a complex organizational structure. Besides direct building work, companies may produce materials, provide services to external or internal clients, or lease assets. This horizontal integration complicates cost accounting across multiple activities. Automated accounting systems simplify cost allocation and redistribution between projects and departments.

Due to the spatial nature of construction, administrative and sales functions are often decentralized and located on-site. Tracking all operational expenses – production, administrative, and sales – by each project ensures accurate calculation of full construction costs. In smart construction, most costs are treated as direct and automatically assigned to specific projects. Indirect costs can be distributed according to predefined allocation bases, allowing accurate determination of total production costs and profitability.

Duration and seasonality. Construction projects are long-term and weather-dependent. Some may last several years, requiring periodic reporting and accurate measurement of project completion. Automated accounting of costs and revenues allows objective evaluation of construction progress based on planned versus actual results or project completion percentage. Modern digital systems can automatically calculate revenues according to profitability ratios or project milestones defined in electronic building models. They also include cost estimates, allowing developers to monitor expenses before project completion and adjust planned versus actual costs automatically. This helps form interim financial results and improve overall cost control.

Object uniqueness. Every construction project is unique – its location, design, conditions, and stakeholders differ. Therefore, accounting must be project-based. Modern smart construction systems treat each construction site as a responsibility center that accumulates all operational and financial data. These systems record and analyze material use, labor, energy, and depreciation automatically. Each project can be managed as a separate business unit, producing its own internal reports and efficiency indicators, which helps optimize pricing and management decisions.

Numerous participants. Construction involves many actors – subcontractors, suppliers, authorities, insurers, investors, and realtors. Effective coordination is essential since work stages follow a strict sequence. Delays in communication or coordination can halt the entire process.

Smart construction promotes digital interaction among all participants. Developing an integrated electronic communication platform for construction would streamline permits, documentation, and contracts. Ukraine's public service portal «Diia» already supports digital permits and registration, demonstrating the feasibility of full electronic interaction. Such a portal, based on accounting and control systems, would enable direct communication, data synchronization, remote contract signing, and corruption prevention.

Documentation and workflow. Construction uses specific primary documents such as contracts and work completion certificates (forms KB-2v, KB-3). These confirm the scope and cost of completed work and serve as the basis for recording income and expenses. However, traditional paper forms with manual signatures are outdated.

Smart construction requires electronic document management with digital signatures from contractors and clients. Electronic primary documents can form the basis for implementing «smart contracts», where payments are automatically released after completion verification in the accounting system. The use of smart contracts ensures transparency, accountability, and automation in construction accounting and control.

The summarized impact of construction industry features on accounting and control in smart construction is presented in Table 1.

Table 1

Characteristics of construction and their impact on smart construction accounting and control

№	Characteristic feature of construction	Impact on accounting and control	Implementation in smart construction
1.	Immobility of construction products.	Moving production, management and accounting and management functions closer to construction sites	Using modular infrastructure to adapt to the construction conditions of each construction site
2.	Territorial distribution of construction sites.	Decentralization of accounting with the formation of centralized accounting databases	Cloud services are able to function at construction sites. Monitoring the location of cargo and construction vehicles.
3.	Temporality of non-current assets.	Temporary title and non-title structures, which are unique accounting objects for construction. Such objects also include security systems of construction facilities.	Temporary facilities are subject to malicious internal and external attacks, which requires the use of automated control and security systems.
4.	Object uniqueness.	Construction facilities are characterized by a unique set of internal and external conditions that require consideration through the introduction of object-specific accounting.	An individual electronic project is formed for each construction site, which allows taking into account all characteristics in the accounting and control system.
5.	Auxiliary production and full costs.	Significant horizontal integration of the construction process requires the use of a system of internal and intra-economic calculations. All types of costs can be accumulated in the context of construction facilities.	Automated calculation of all operating costs for each construction site with their automatic redistribution to form the full cost of construction.
6.	Significant duration and seasonality of construction.	The construction process can last a significant period of time, which requires the determination of interim financial results in the reporting period. The pace of construction is affected by the environment, which requires planning activities.	Automated calculation of costs or identification of the state of completion of construction to determine the income of the construction company. Budgeting and forecasting of activities for future periods.
7.	A significant number of participants in the construction process.	The need for business communications with various stakeholders.	Formation of an integrated electronic environment of business communications.
8.	Specific documentation and document flow.	The use of certain types of primary documents and their circulation in construction.	Transition to exclusively electronic documentation and document flow.

Source: generated by the author.

All the characteristic features of construction activity are closely interconnected under the conditions of implementing the advantages of smart construction, which is part of the further development of the digital economy. Considering the prospects of smart construction within the accounting and control

system shapes a set of digital transformation changes in their theory and practice. Ignoring any of the features of construction as an economic sector may lead to incomplete implementation of intelligent management within a construction company.

The digitalization of accounting and control processes in construction activity involves full automation of data collection, its automatic processing, accumulation in unified databases, the use of cloud services, the formation of integrated electronic environments for business communications with smart contract support, electronic design of construction processes, and the transition to fully electronic document management, among others. Each transformational trend in the construction industry requires the use of advanced computer and communication technologies. The comprehensive implementation of modern technologies for processing accounting information, considering the impact of the specific features of construction on accounting and control, is the key to successful management of construction enterprises' operations.

Conclusions and recommendations. The construction industry of the economy fundamentally differs from other types of economic activity. Construction has specific industry features that significantly influence the accounting and control of construction operations. The characteristic features of construction can be summarized into three groups: Environment (territorial dispersion and long duration of construction of buildings or structures); Uniqueness of accounting objects (immobility of products (works, services), temporariness of non-current assets, the presence of auxiliary and servicing production units); Methodological individuality (a large number of subcontractors and other counterparties, variability of costs in project-based accounting, and the specificity of electronic documentation and document flow).

The development of smart construction requires clarification of the specifics of construction activities, taking into account the prospects for the digitalization of accounting and taxation. Digitalization of accounting and control based on the principles of smart construction, considering its industry-specific features, presupposes full automation of information collection, automatic data processing, accumulation in unified databases, the use of cloud services, the creation of integrated electronic business communication environments with smart contract support, electronic design of construction processes, and the transition to fully electronic document management, among others.

Only a comprehensive consideration of digital trends in the impact of the characteristic features of smart construction on the transformation of accounting and control can ensure a positive outcome in managing the operation of construction enterprises within the digital economy.

References

1. Ilnytska-Hykavchuk, H. Y. (2012). Peculiarities of accounting in construction. *Scientific Bulletin of the NLTU of Ukraine*, 22 (2), 137–142. [in Ukrainian].
2. Khomenko, M. M., Cherevyk, N. V., Nesterenko, O. V. (2014). Peculiarities of accounting for construction projects in Ukraine. *Bulletin of the Mykhailo Ostrohradskyi Kremenchug National University*, 6 (89), part 2, 106-110. [in Ukrainian].
3. Pinchuk, K. S. (2019). Organization of accounting and control at construction enterprises. *Business Inform*, 12, 282–289. <https://doi.org/10.32983/2222-4459-2019-12-282-289>. [in Ukrainian].
4. Korenha, A., Pryimak, S. (2023). Accounting and analytical support of modern trends in the development of the construction industry in Ukraine. *Scientific Papers of the Higher Technical School in Katowice*, 17, 75–84. <https://doi.org/10.54264/0076>. [in Ukrainian].
5. Yasinska, A., Reka, V. (2024). The influence of the specifics of construction organizations on the construction of a management accounting system. *Economy and Society*, 61). <https://doi.org/10.32782/2524-0072/2024-61-163>. [in Ukrainian].

-
6. Zadorozhnyi, Z.-M., Muravskiy, V. (2025). Problemni pyannia normatyvno-pravovoho rehulivannia ta upravlinskoho obliku u budivnytstvi. *Herald of Economics*, 1, 256–270. <https://doi.org/10.35774/visnyk2025.01.256>. [in Ukrainian].
 7. Yang, Yanxue. (2024). Research on the Integration Path of Enterprise Management Accounting and Financial Accounting: Taking Construction Enterprises as an Example. *Proceedings of Business and Economic Studies*, 7, 119-124. <https://doi.org/10.26689/pbes.v7i6.9112>. [in English].
 8. Khalid, Maizatul, Abd-Mutalib, Hafizah, Mohamed, Rapih. (2025). The Impact of Strategic Management Accounting on Environmental Sustainability: A Study in Malaysian Construction Industry. *PaperASIA*, 41, 142-154. <https://doi.org/10.59953/paperasia.v41i2b.430> [in English].
 9. Pavelko, O.V., Vlasiuk, I.I., Popchuk, D.O. (2022). Management accounting of construction enterprises: characteristic features of organization and management. *Bulletin of the NUWMN*, 2 (98), 200-217. <https://doi.org/10.31713/ve2202219>. [in Ukrainian].
 10. Shevchenko, L., Kozhukhova, T. (2023). Features of accounting and ways of its improvement at enterprises in the construction industry. *Economics, finance and management review*, 68-73. <https://doi.org/10.36690/2674-5208-2023-1-68> [in English].
 11. Lemishovska, O., Fedak, V. (2024). Industry-specific features of accounting and auditing organization in a construction enterprise. *Economy and Society*, 68. <https://doi.org/10.32782/2524-0072/2024-68-204> [in Ukrainian].
 12. Agbata, Amaka, Okafor, Gloria, Okonewa, Onyinyechukwu. (2025). Relationship between accounting information system and corporate performance of quoted construction companies in Nigeria. *African Banking and Finance Review*. Vol. 20, Issue, 156-171. https://www.researchgate.net/publication/391771581_RELATIONSHIP_BETWEEN_ACCOUNTING_INFORMATION_SYSTEM_AND_CORPORATE_PERFORMANCE_OF_QUOTED_CONSTRUCTION_COMPANIES_IN_NIGERIA. [in English].
 13. Muravskiy, V. (2023). Accounting and cybersecurity: monograph. Ternopil: WUNU, 200. [in Ukrainian].

Література

1. Ільницька-Гикавчук Г. Я. Особливості обліку в будівництві. Науковий вісник НЛТУ України. 2012. Вип. 22 (2). С. 137–142.
2. Хоменко М. М., Черевик Н. В., Нестеренко О. В. Особливості обліку об'єктів будівництва в Україні. Вісник Кременчуцького національного університету імені Михайла Остроградського. 2014. Вип. 6 (89), ч. 2. С. 106–110.
3. Пінчук К. С. Організація бухгалтерського обліку та контролю на будівельних підприємствах. Бізнес Інформ. 2019. № 12. С. 282–289. DOI: 10.32983/2222-4459-2019-12-282-289.
4. Коренга А., Приймак С. Обліково-аналітичне забезпечення сучасних тенденцій розвитку будівельної галузі в Україні. *Zeszyty Naukowe Wyższej Szkoły Technicznej w Katowicach*. 2023. № 17. Р. 75–84. DOI: 10.54264/0076.
5. Ясінська А., Река В. Вплив специфіки будівельних організацій на побудову системи управлінського обліку. Економіка та суспільство. 2024. № 61. DOI: 10.32782/2524-0072/2024-61-163.
6. Задорожний З.-М., Муравський В. Проблемні питання нормативно-правового регулювання та управлінського обліку у будівництві. *Вісник економіки*. 2025. № 1. С. 256–270. DOI: 10.35774/visnyk2025.01.256.

7. Yang Yanxue. Research on the Integration Path of Enterprise Management Accounting and Financial Accounting: Taking Construction Enterprises as an Example. *Proceedings of Business and Economic Studies*. 2024. № 7. P. 119–124. DOI: 10.26689/pbes.v7i6.9112.
8. Khalid Maizatul, Abd-Mutalib Hafizah, Mohamed Rapih. The Impact of Strategic Management Accounting on Environmental Sustainability: A Study in Malaysian Construction Industry. *PaperASIA*. 2025. № 41. P. 142–154. DOI: 10.59953/paperasia.v41i2b.430.
9. Павелко О. В., Власюк І. І., Попчук Д. О. Управлінський облік будівельних підприємств: характерні особливості організації та ведення. *Вісник НУБГП. Сер. : Економічні науки*. 2022. №2(98). С. 200–217. DOI: 10.31713/ve2202219.
10. Shevchenko L., Kozhukhova T. Features of accounting and ways of its improvement at enterprises in the construction industry. *Economics, finance and management review*. 2023. P. 68–73. DOI: 10.36690/2674-5208-2023-1-68.
11. Лемішовська О., Федак В. Галузеві особливості організації обліку та аудиту на будівельному підприємстві. *Економіка та суспільство*. 2024. № 68. DOI: 10.32782/2524-0072/2024-68-204.
12. Agbata Amaka, Okafor Gloria, Okonewa Onyinyechukwu. Relationship between accounting information system and corporate performance of quoted construction companies in Nigeria. *African Banking and Finance Review*. 2025. Vol. 20, Issue 4. P. 156–171. https://www.researchgate.net/publication/391771581_RELATIONSHIP_BETWEEN_ACCOUNTING_INFORMATION_SYSTEM_AND_CORPORATE_PERFORMANCE_OF_QUOTED_CONSTRUCTION_COMPANIES_IN_NIGERIA.
13. Муравський В. Облік та кібербезпека : моногр. Тернопіль : ЗУНУ, 2023. 200 с.