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Assessment of the Economic Efficiency of Construction Project Management: The Impact of Modern Methods on Business Performance and Investment Attractiveness

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Abstract: This article examines the economic efficiency of implementing modern project management methods in the construction industry, including the use of digital technologies (BIM, CDE) and flexible approaches (Agile). Practical cases are analyzed to demonstrate the impact of these methods on project delivery timelines, cost management, and the reduction of transaction costs. It is emphasized that economic effectiveness is achieved through the integration of digital tools with formalized control mechanisms, which enhances the predictability of project execution. The study also highlights the role of project management in increasing investment attractiveness by improving process transparency, risk controllability, and investor confidence. The article concludes that a comprehensive transformation of project management is necessary to ensure the sustainable growth of construction companies and strengthen their competitiveness in the investment market.

Keywords: project management, construction, BIM, Agile, investment attractiveness of companies, digitalization.

I. Introduction

The contemporary construction industry faces the challenge of improving project execution efficiency amid intensifying competition and growing investment risks. In this context, the application of modern project management methods aimed at optimizing project timelines, costs, and quality becomes increasingly important. The adoption of digital technologies, such as Building Information Modeling (BIM) and Agile methodologies, has the potential to enhance project performance by improving coordination, transparency, and decision-making throughout the project lifecycle.

The aim of this study is to assess the economic efficiency of applying modern project management methods in construction and to analyze their impact on the business performance of construction companies and their investment attractiveness. The scientific novelty of the article lies in the systematic examination of the effects of contemporary project management approaches on the economic outcomes of construction projects and in the development of an integrated view of how these methods influence corporate reputation, operational resilience, and attractiveness to potential investors.

II. Methods

The methodological framework of the study is based on a combination of comparative analysis and a descriptive synthesis approach applied to the assessment of modern project management methods in the construction industry. The empirical basis includes publicly available thematic case studies reflecting the implementation of BIM tools, Agile practices, and related approaches in the context of construction project delivery. Information sources were selected from open-access materials, including analytical articles, company reports, and specialized professional publications. The analysis focused on interpreting the impact of the selected management practices on general project characteristics, such as project duration, cost levels, and organizational flexibility, without calculating formalized efficiency metrics. In summarizing the data, attention was given to the stated objectives of implementation and to the qualitative effects reported in public descriptions of project initiatives.

III. Results

Within the framework of this study, selected examples of the application of modern project management methods in construction were analyzed in order to identify their influence on organizational and economic parameters of projects. The cases considered illustrate the general nature of transformations in management practices, as well as the expected impact of such changes on time performance, cost characteristics, and investment-related indicators of company activity.

Integration of BIM technologies and digital platforms into construction project management

Building Information Modeling (BIM) represents a methodology for information modeling of capital construction assets based on the creation and maintenance of a digital model in which the geometric representation of an object is linked to attribute data, including materials, quantities, specifications, costs, schedules, and operational parameters, as well as to regulated collaborative workflows among project participants [1]. Unlike traditional design approaches, BIM is not treated merely as a "3D drawing," but rather as a managed information environment that ensures consistency of design decisions, traceability of changes, and integration of data across the design, construction, and operation phases. This positions BIM not only as a tool for engineering coordination, but also as an instrument of managerial control over quality, time, and cost throughout the asset life cycle.

According to Fortune Business Insights, the global BIM market is estimated at $ 9.12 billion in 2025, reflecting sustained growth in demand for information modeling technologies in the construction industry (fig. 1).

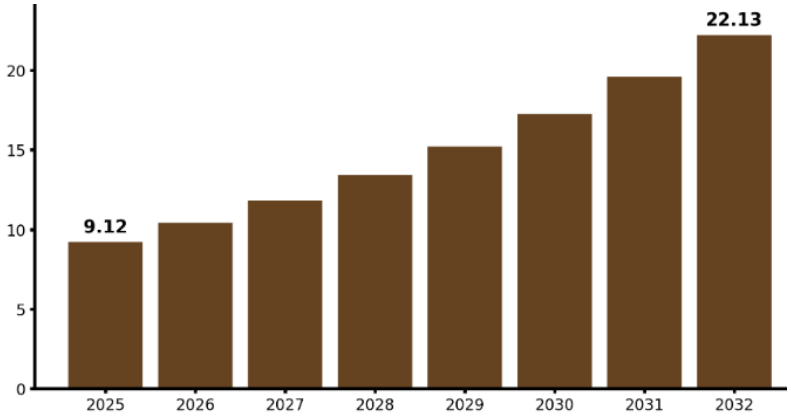

Figure 1: Forecast of the global BIM market dynamics in 2025–2032, billion dollars [2]

The application of BIM in combination with digital project data management platforms, primarily the Common Data Environment (CDE), forms an integrated framework for planning, coordination, and control of construction projects [3]. The economic effect within this framework is driven by a reduction in managerial transaction costs, a decrease in the volume of rework, and shorter decision-making cycles. Within this logic, BIM serves as a source of a consistent information model (3D/4D/5D), while digital platforms ensure version control, regulated approval workflows, and status tracking, thereby reducing the likelihood of data inconsistencies and enhancing execution discipline across the entire chain of "design – procurement – construction execution – handover" [4]. As a result, cost predictability increases and financial losses associated with design changes and information errors are reduced.

According to the NBS Digital Construction Report 2025, based on responses from more than 550 industry professionals, the level of BIM adoption remains stable. This indicates a transition from the initial implementation phase toward a stage focused on extracting economic value from already established information management processes (fig. 2).

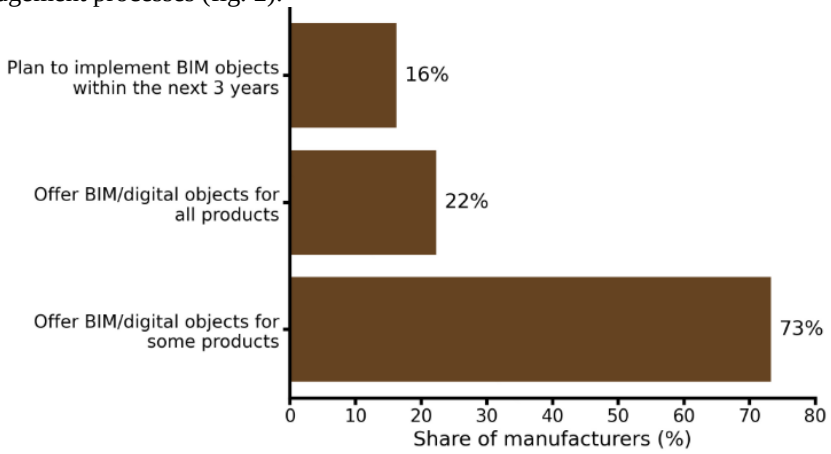

Figure 2: Share of respondents using BIM [5]

According to the same study, nearly one in three respondents believe that BIM complies with the BS EN ISO 19650 standard, compared with approximately one in five respondents in 2023. This indicates that an increasing number of professionals perceive BIM as a comprehensive collaborative information management process covering the entire life cycle of a built asset. Slightly more than one quarter of respondents identified BIM as the foundation of digital transformation, and this proportion has remained largely unchanged since the publication of the previous NBS report in 2023.

Taken together, these findings support the conclusion that the primary effect of digitalization is achieved not through an isolated "3D model," but through the standardized circulation of reliable data between design, procurement, and construction execution, which creates the conditions for reducing losses caused by information errors and for increasing cost predictability.

This conclusion is further supported by the systematic review conducted by Gharaibeh et al. (2025) [6]. The economic efficiency of BIM is examined through the lens of investment feasibility and measurable benefits compared with implementation costs. The authors apply a bibliometric and systematic review methodology based on the Scopus database, using an iterative keyword selection process related to return on investment, life-cycle costs, rework, and BIM adoption. The final sample comprises 75 studies published between 2004 and 2023, for which a unified data extraction framework was employed, including research method, project phase, and measured performance indicators.

The quantitative results demonstrate substantial variability. Reported ROI values in the literature range from 16 % to 1654 %, with several intermediate estimates (including ranges of 22–97 %, and individual values of 34.5 %, 94.21 %, 145 %, and 350 %), depending on the cost components considered and the analytical time horizon. With regard to managerial inefficiencies, the review identifies reductions in rework costs of up to 49 %, a decrease in change orders of approximately 32 %, and a reduction in requests for information of up to about 90 % (more commonly 30–68 %), which confirms the role of BIM in lowering transaction costs and the financial impact of information-related errors. At the same time, the authors emphasize the absence of a unified standard for calculating BIM-related ROI, highlighting the need for cautious interpretation and normalization of results when transferring them across projects and organizational contexts.

It should be noted that the economic efficiency of digitalizing management in construction becomes most evident when combined with formalized project control methods that enable the interpretation of BIM model data and digital platform outputs in terms of time and cost. In this context, BIM and Common Data Environments serve as an informational foundation for the application of project management tools focused on the quantitative assessment of deviations and the forecasting of economic outcomes [7].

Thus, in a study by Elsaid, Nassar, Alqahtani et al. (2025), a comparative analysis of the Earned Duration, Earned Schedule, and Planned Value methods was conducted on a sample of 30 heterogeneous construction projects implemented between 2015 and 2023. The assessment of performance was carried out at different stages of project completion using the CPI, SPI, and the composite Schedule Cost Index (SCI), while forecast accuracy was determined by comparing the predicted project completion values with the actual outcomes. The results show that time-oriented methods – Earned Schedule and Earned Duration – provide, on average, higher forecasting accuracy than the traditional Planned Value approach, with the differences becoming more pronounced as projects progress toward later stages. These findings confirm that integrating formalized project management methods into the digital construction management framework creates a quantitatively measurable basis for reducing cost overrun risks and improving the predictability of economic outcomes (table 1).

Table 1: Comparative indicators of forecasting accuracy of Earned Value Management methods
(Compiled by the author based on data from source [8])

Method	PF = 1	PF = SPI	PF = SCI	Averageaccuracy
Earnedduration	83.0%	84.6%	83.2%	≈ 83.6%
Earnedschedule	82.9%	84.2%	83.3%	≈ 83.5%
Plannedvalue	76.2%	77.8%	77.4%	≈ 77.1%

The table presents average values of the Accuracy indicator calculated based on data from the original study. Overall, the analysis shows that the integration of BIM and digital platforms into construction project management frameworks provides a foundation for enhanced economic controllability through the standardization of data flows, the reduction of transaction costs, and improved cost predictability. Academic studies and industry reviews confirm that the greatest economic effect is achieved not by the digital model itself, but by its integration with formalized project control methods that translate the informational advantages of BIM into quantitatively measurable indicators of time, cost, and risk.

Implementation of the Agile approach in construction management

The Agile approach to project management represents a set of flexible management principles focused on iterative planning, adaptability to change, and continuous refinement of requirements throughout the project lifecycle [9]. In the context of the construction industry, Agile is considered an alternative to traditional waterfall management models, which often lack resilience to changes in design decisions, external conditions, and stakeholder requirements. In this article, the analysis of the Agile approach is included due to its potential to enhance managerial controllability and economic predictability of construction projects by reducing managerial delays, increasing transparency in decision-making, and enabling earlier identification of deviations in schedule and cost. The global market for Agile Project Management software is estimated at approximately $5,915.2 million in 2025 (fig. 3).

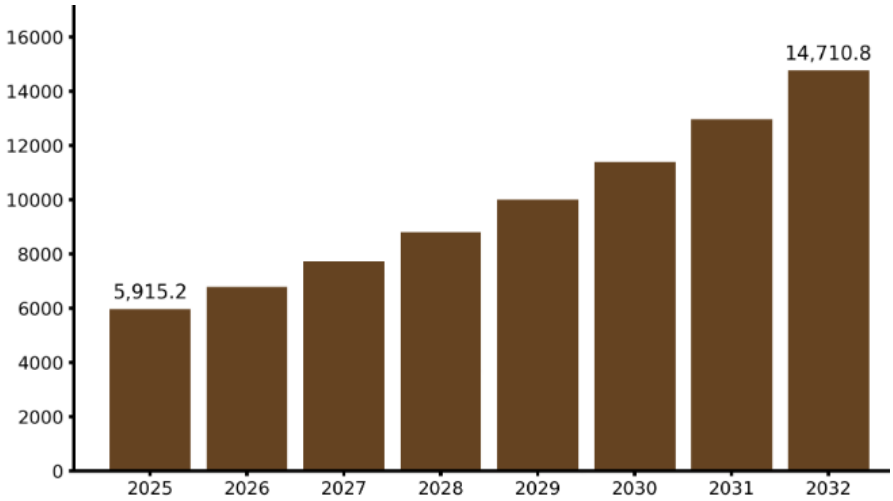

Figure 3: Forecast of the global market dynamics for Agile approaches and project management tools in 2025–2032, million dollars [10]

The growing adoption of Agile approaches in project management is driven by their ability to enhance the adaptability of managerial processes under conditions of high uncertainty and changing requirements, which are characteristic of the construction industry. Unlike rigid, highly regulated waterfall models, Agile approaches emphasize iterative plan refinement, shorter management cycles, and early detection of deviations, thereby enabling more timely decision-making and reducing the cost of changes [11]. In the context of construction project management, this is reflected in improved transparency of project execution, stronger control over schedules and costs, and the formation of more predictable financial outcomes. From the perspective of businesses and investors, the use of flexible management practices may be regarded as an indicator of managerial maturity and a company's capacity to respond effectively to risks, which can potentially enhance investment attractiveness and reduce the perceived level of project and financial risk [12].

As quantitative evidence of the relationship between Agile approaches and the economic controllability of construction projects, reference can be made to the empirical results reported by Moreno, Forcael, Romo, Orozco, Moroni, and Baesler (Buildings, 2024), in which Agile Scrum was applied in a pre-construction phase case study [13]. The authors describe work organization through weekly sprints and document measurable effects on the duration of specific managerial procedures: in particular, a process that "typically took two weeks" was completed in approximately three-quarters of a week, and at the end of a six-week work cycle all planned activities were finalized with a two-week time reserve (slack). From the perspective of economic efficiency, these outcomes are interpreted as a reduction in the length of managerial cycles (planning, approvals, and decision refinement) and a lower likelihood of late changes, which in construction are associated with high costs due to the accumulation of dependencies and the inertia of the supply chain.

Additionally, Al-Zubaidi (2024) reports quantitative results based on a questionnaire survey of construction project professionals, with data processed using SPSS, and demonstrates statistically significant relationships between perceived Agile Project Management (APM) effects and key managerial control parameters directly linked to economic outcomes [14]. The study reveals a strong positive correlation between the APM Effect and overall project outcomes ($r = 0.79$), as well as substantial correlations with cost estimation accuracy ($r = 0.72$) and delay reduction ($r = 0.68$). The reliability of the measurement scales is confirmed by Cronbach's alpha values ($\alpha = 0.87$ for the project performance construct and $\alpha = 0.81$ for the project cost

construct), which allows the identified relationships to be interpreted as robust within the applied methodological framework.

Overall, the analysis of Agile approaches in construction project management indicates that their economic effect is primarily generated through shorter managerial cycles, increased adaptability of planning processes, and earlier identification of schedule and cost deviations. Quantitative evidence from recent studies confirms that the use of flexible management practices contributes to improved forecasting accuracy, reduced delays, and greater predictability of project outcomes, which collectively may be regarded as a factor enhancing business operational resilience and investment attractiveness under conditions of high uncertainty in the construction environment.

The role of project management in attracting investment

Under conditions of high capital intensity and long investment cycles, construction projects are characterized by elevated financial and managerial risks, which makes the quality of project management one of the key factors of investment attractiveness. For investors, project management functions not only as a tool of operational control but also as a mechanism for reducing uncertainty by ensuring transparency of project execution, predictability of schedules and costs, and effective change management. Additional importance in this context is attributed to the integration of project and financial management frameworks, including the use of digital and interoperable payment platforms, which enhance the transparency of cash flows, accelerate settlements, and reduce transaction risks in complex investment projects, thereby strengthening the overall resilience and investment reliability of construction initiatives [15]. The presence of formalized management procedures, digital control frameworks, and reproducible performance indicators forms an institutional basis of trust in the project and influences the terms of capital attraction (table 2).

Table 2: Impact of project management instruments on the investment attractiveness of construction projects

Project managementelement	Managerialeffect	Economic relevanceforinvestors
Formalized schedule and budget planning	Improved predictability of project execution.	Reduced risk of cost overruns and cash flow deviations.
Change andscopecontrol	Limitation of uncontrolled project modifications.	Stability of investment model and expected IRR.
Transparent reporting and KPI system	Increasedinformationtransparency.	Lower information asymmetry and transaction costs.
Digital control tools (BIM, CDE, EVM)	Real-time monitoring of deviations.	Early risk detection and loss prevention.
Agile practices and iterative management	Enhanced projectadaptability.	Reduced cost of changes under uncertainty.
Track record of successfully managed projects	Accumulation of organizational reputation.	Increased investor confidence and access to capital.

The relationship between project management quality and investment outcomes is also supported by industry reports. Analytical data indicate continued growth in investments in structured project management solutions: the global market for construction management systems and software is expected to increase from $10.64 billion in 2025 to $16.62 billion by 2030 [16]. This trend reflects the growing recognition of formalized project management as a key factor in improving the reliability of project delivery and enhancing investment attractiveness.

IV. Discussion

The effectiveness of adapting modern project management methods in construction is largely determined not by the mere adoption of digital or agile approaches, but by the degree of their integration into existing organizational and managerial frameworks. The analysis shows that BIM, digital platforms, and Agile practices can improve the predictability of schedules and costs only when supported by formalized control procedures, aligned performance indicators, and an adequate level of managerial competence. At the same time, common adaptation challenges are identified, including fragmented tool adoption, resistance to change, insufficient project management maturity, and the lack of unified methodologies for assessing economic effects, which limits the reproducibility of results. These constraints point to the need for a comprehensive approach to project management transformation that addresses not only technological solutions but also the institutional conditions governing their application.

V. Conclusion

The analysis demonstrates that the economic efficiency of project management in construction emerges from the purposeful integration of digital and managerial tools into a unified decision-making framework. BIM and digital platforms are best viewed as a foundation for data standardization and the reduction of transaction costs, while Agile approaches and formalized project control methods enable timely interpretation of these data in terms of time, cost, and risk. To enhance business performance and investment attractiveness, construction companies are advised to implement consistent deviation-control metrics, ensure end-to-end traceability of budgetary and schedule changes, and align managerial indicators with project financial models. Further prerequisites include the development of managerial competencies and the formalization of economic impact assessment processes, which together reduce delivery uncertainty, improve cash flow predictability, and strengthen investor confidence in projects and companies overall.

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