Leveraging AI to Build Competitive Advantage in Finance Industries: Lessons for Green Construction Project Management

Maranatha Wijayaningtyas[1,*], Kukuh Lukiyanto[2], Afifatus Subehi[3], Trisna Seftiana[4]

[1] *Architectural Department, National Institute of Technology, Indonesia*
[2] *Entrepreneurship Department, BBS Undergraduate Program, Bina Nusantara University, Indonesia.*
[3] *Civil Engineering Department, National Institute of Technology, Indonesia*
[4] *Management Department, State University of Malang, Indonesia*
[*]*Corresponding author. Email:* maranatha@lecturer.itn.ac.id

ABSTRACT

Technological developments have a significant impact, including the application of artificial intelligence (AI), which then changes competitive strategies in various sectors, especially finance and construction services. Employing data-driven systems, artificial intelligence (AI) has transformed the competitive strategy of the financial industry, empowering companies to enhance efficiency, agility, and decision-making. This paper investigates the possibility of using AI skills acquired in finance in the Indonesian green building industry, which struggles to control project budgets, expenses, and sustainability performance. Expert interviews with Surabaya and Jakarta practitioners from financial institutions and green building companies using a qualitative descriptive approach. The results show how artificial intelligence governance models, automated decision systems, and predictive analytics in finance might improve construction's environmental monitoring, resource management, and project planning. The paper presents suggestions for future research, industry policy alignment, and an integrated framework to direct AI acceptance in green building projects.

Keywords: Artificial Intelligence, Competitive Advantage, Financial Industry, Green Construction, Project Management.

1. INTRODUCTION

In the past decade, Indonesia's financial industry has implemented artificial intelligence (AI), significantly influencing changes in the company's business model, including process automation, predictive insight acquisition, and personalisation of consumer services. Stakeholders in the financial industry have many choices with AI technology. This progress improves several aspects, such as service efficiency, operational effectiveness, excellence, and accuracy in business strategies. The complexity of the financial sector is also faced in the construction services sector, especially green construction. Green construction project management faces demands and pressures to improve efficiency, performance, and sustainable goals. So, it is hoped that there will be increasingly open opportunities to adopt AI as a strategic driver in this sector.

The President of the Republic of Indonesia provided direction regarding the utilisation and anticipation of challenges in using artificial intelligence (AI) technology to realise the vision of "Together Indonesia Progressing Towards Indonesia Emas 2045" with the "Asta Cita" mission. It was also added that the Ministry of Public Works (Kemen PU) encourages using AI technology to support effective, efficient, and sustainable infrastructure development. The Minister of Public Works, Ir. Dody Hanggodo, M.PE., stated that AI has been used in implementing construction projects in Indonesia but is still limited. The construction service business in Indonesia lags in adopting digital and AI technology compared to the financial sector (Isneini and Luthfianto, 2025). This condition may be supported by the perception that the use of AI can have adverse effects, such as the spread of false information (hoaxes) and even use in autonomous weapons, so that it can endanger security and social stability. Therefore, the application of AI in green construction project management still has challenges related to managing costs, time, efficient use of resources, and data integration to support decision-making.

Thus, this study aims to investigate and explore the perceptions of stakeholders in the financial sector and construction service businesses regarding the follow-up of AI implementation in the financial sector to be developed and applied to the management of green construction projects to improve project performance. This study aims to bring

new ideas to project management using AI from different fields to help with sustainability, efficiency, and gaining an edge in construction.

2. LITERATURE REVIEW

2.1. AI in the Financial Industry

The financial industry now uses artificial intelligence technologies—including machine learning, natural language processing (NLP), robotic process automation (RPA), and predictive analytics—as tools to control risk, improve customer experience, and raise compliance. Using large datasets, fraud detection systems and artificial intelligence consultants—robo-advisors—manage to support real-time decisions and improve operational effectiveness (Zhang et al., 2015).

By raising strategic planning in its basic domains and enhancing operational efficiency and decision-making accuracy, artificial intelligence (AI) has transformed the financial industry. Artificial intelligence (AI) enables financial companies to extract value from complex and unstructured data through algorithmic trading, credit scoring, and fraud detection programs. Cao et al. claim that AI-driven tools using alternative data sources have become indispensable in market volatility to produce better insights than conventional financial models. Ahmed et al. (2022) demonstrated how machine learning (ML) combined with deep learning has enabled mass-automated complex decision-making operations.

Financial institutions have improved customer service using NLP-based chatbots, robo-advisors, and real-time customer analytics. These technologies allow financial companies to provide customised financial services and help lower costs (Mohsen et al., 2025). Modern economic institutions have included artificial intelligence in their digital transformation strategies so they may become more agile and interact with consumers actively. As Bahoo et al. (2024) described, AI-driven decision systems have improved operational risk prediction capabilities and raised regulatory reporting and compliance monitoring efficacy, enhancing operational risk reduction capability.

Implementing artificial intelligence, meanwhile, is not without difficulties. Adopting artificial intelligence requires addressing algorithmic bias, data privacy issues, and systematic risks connected with using homogeneous AI models. Goodell et al. (2021) showed how uncontrolled AI adoption might cause financial agents to cluster, aggravating the risk of financial contagion. Maintaining stability in the economic system over the long run depends critically on robust AI governance systems and algorithmic transparency and interpretability.

2.2. Competitive Advantage Through AI

Artificial intelligence (AI) is now a leading force behind competitive advantage in the financial sector. Utilising real-time analysis of enormous volumes of data, AI helps financial institutions spot market prospects, streamline operations, and maximise investment portfolios. Mohsen et al. (2025) research indicates that the financial industry's adoption of AI has dramatically improved operational efficiency and strategic decision-making.

Furthermore, AI has transformed customer service in the financial industry. Financial institutions can offer more tailored and responsive services by employing intelligent recommendation systems and natural language processing (NLP)-based chatbots. This approach raises consumer satisfaction and strengthens financial institution loyalty simultaneously. Polireddi (2024) conducted research showing that using artificial intelligence in customer service has given a sustainable competitive advantage and raised client retention.

Conversely, artificial intelligence is also significant for regulatory compliance and risk management. AI enables financial institutions to proactively spot and reduce risks by detecting unusual trends and possible fraud. Bahoo et al. (2024) claim that using artificial intelligence in risk management has strengthened financial institutions' capacity to withstand other external hazards and market volatility.

Adopting artificial intelligence also brings difficulties, including the need for suitable regulation and ethical risk reduction. Emphasising the need to create a moral and regulatory framework that can balance technological innovation with consumer protection and financial system stability, research by Maple et al. (2023) underlined that financial institutions have to combine technology strategies with strong governance policies to maximise the competitive advantages given by artificial intelligence.

2.3. Project Performance in Green Construction

In green buildings, project performance encompasses not only the accomplishment of environmental sustainability, resource economy, and positive social impacts but also the success of completing the project on time and within budget. According to a 2025 study by Iga Istri et al.(2025), green building has a major influence on project cost performance

and a modest impact on time, quality, and occupational safety and health (OHS). Although energy economy and efficiency had less impact, project documentation indicators were the most important determinant of green buildings.

The performance of green building projects also depends on elements, including the Project Development System (PDS). Research by Iga Istri et al. (2024) revealed that PDS traits, including leadership, communication, and teamwork, influence project performance. While Design-Build (DB) is better in terms of OHS, Design-Build (DB) excels in terms of cost, and the Construction Management (CM) method shines in terms of time, quality, and green building performance.

Performance criteria, including social, economic, and environmental sustainability in green building projects, also interact. According to a 2020 Al-Sabouni et al. study on how cost and schedule performance interact favorably, cost performance positively influences financial sustainability. This indicates that a complete approach is required to attain ideal project performance.

Furthermore, project management is vital for the success of green buildings. According to Abdelkhalik and Azmy (2022) study, the implementation of green buildings is hampered by the dearth of management techniques particularly targeted at sustainable building projects. This study underlines the need to use project management best practices to remove these obstacles and improve the performance of green building initiatives (Porter et al., 2014).

2.4. Leveraging Financial AI Applications in Construction Project Management

The financial sector's competitive advantage, gained through artificial intelligence, can be deliberately applied to construction project management, especially in green building projects requiring excellent efficiency and sustainable resource management. One example is predictive analytics based on artificial intelligence; it is used for credit scoring and market trend prediction in the financial industry. The same technologies can be modified to forecast delays, cost overruns, and environmental risk assessments in building projects (Wijayaningtyas et al.,2025).

Furthermore, automated decision-making systems, applicable at the vendor selection stage, resource allocation, and project schedule adjustments, are widely used in loan approval systems or financial portfolio management (Wijayaningtyas et al.,2022). A machine learning-based system will let project managers automatically change plans depending on site conditions, material availability, and weather. Such an approach is consistent with the dynamic needs of green construction, which call for great adaptability (Lukiyanto et al., 2024).

Regarding documentation and compliance, Natural Language Processing (NLP), which is applied in the financial sector to handle legal contracts and audit reports, can help analyse tender documents, building contracts, and environmental laws. NLP can reduce administrative mistakes and speed document approvals in big-scale building projects. Therefore, artificial intelligence in finance is crucial for the service industry and offers a strategic toolkit with great potential for modification in Indonesian sustainable construction project management (Wijayaningtyas et al., 2023).

3. RESEARCH METHODS

This paper employs a descriptive qualitative approach to investigate how artificial intelligence (AI) technologies and strategies applied in the financial sector might be modified to enhance the performance of green building projects in Indonesia. This method was selected, particularly in cross-sector integration between finance and construction, since it enables a thorough knowledge of complicated and contextual events. Purposive sampling—the intentional choosing of respondents depending on specific criteria pertinent to the study goals—was the method of choice. Along with direct participation in AI-based projects (for the financial sector) and green construction management (for the building sector), these criteria call for a minimum of five years of work experience in the financial or construction industries. Considering the degree of digitalisation and the significant expansion of green projects, respondents were chosen from two main Indonesian cities—Surabaya and Jakarta. There are supposed to be six to ten informants, three to five from the building industry and three to five from the financial sector.

4. RESULTS AND DISCUSSIONS

4.1. Expert Interview Results

Eight informants were interviewed—four financial sector experts (two from Surabaya and two from Jakarta) and four construction professionals (two each from Surabaya and Jakarta). Semi-structured interviews were carried out and then subjected to thematic analysis. Four primary themes turned out:

1. First theme: Application of Artificial Intelligence in Operational Strategy
    Financial industry informants clarified that artificial intelligence has been applied to automate loan approval procedures, detect fraud, and enhance customer experience through chatbots and personalisation. In projects, artificial intelligence can guide material management, resource allocation, and vendor choice automation.

2. Second Theme: Advantage in Competitiveness with Prediction and Analytics
    The capacity of artificial intelligence to forecast market trends and hazards explains most of its benefits in the financial industry. Similarly applied in construction, these tools help forecast project delays, cost overruns, and possible technical problems.

3. Third theme: difficulties implementing technology
    Data integration, human resource readiness, and opposition to change define the financial and construction sectors' challenges.

4. Fourth theme: efficiency and sustainability of projects
    Construction professionals claim that artificial intelligence has great promise in real-time energy and water monitoring and resource-efficient planning.

4.2. Discussion

Particularly in terms of automation, prediction, and data-based decision-making, the interview results reveal that the ideas of artificial intelligence application are similar in the financial and construction sectors (Brynjolfsson et al., 2017). While the building industry is still in the early adoption stage, the financial sector is more developed in including artificial intelligence into a complete corporate strategy (Oesterreich et al., 2016). Considering best practices from finance, construction can create an AI-driven Project Monitoring System with energy/material use efficiency, early field risk detection, and dynamic project schedule replanning enabled through which. Durdyev et al. (2022) clearly show that the success of green projects depends critically on resource control and energy efficiency.

The success of AI adaptation in construction relies not only on technology but also on changes in organisational culture and digital governance that control ethics, data privacy, and responsibility for automated decisions. This is consistent with the results of Maple et al. (2023), who underlined the need for AI governance in the financial sector to guarantee sustainability and justice, ensuring fairness. These results lead to a framework model that shows an integrated process between managerial needs in green construction projects in Indonesia and financial sector technological input (Cao et al., 2024). Figure 1 presents a conceptual framework illustrating how AI capabilities from the financial industry can be applied to green construction project management in Indonesia.
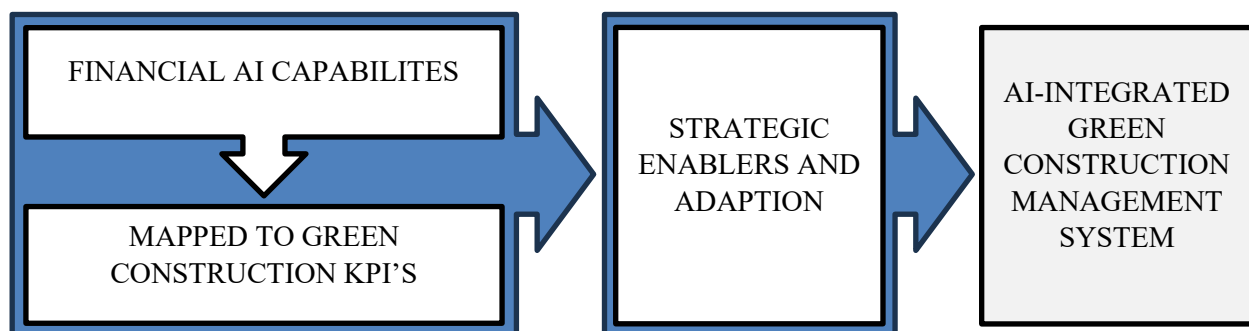
Figure 1 Framework of Integrated Financial AI in Green Construction Management System.

5. CONCLUSION

This research reveals how financial sector AI methods and approaches might be modified to enhance the performance of Indonesian green building projects. Construction projects can acquire the accuracy of schedule and cost and efficiency in resource use by using prediction, automation, and real-time monitoring techniques. This research has consequences for the development of building industry policies and data-based risk management, as well as for the technical level of the project. Academics, industry players, and legislators can use the framework created as a first guide to integrate artificial intelligence into the green building process. Future research must include quantitative studies and implementation experiments of this framework on actual construction projects, as well as the development of AI-based tools such as monitoring dashboards, project early warning systems, and integration with Building Information Modelling (BIM).

REFERENCES

Abdelkhalik, H. F., & Azmy, H. H. (2022). The role of project management in the success of green building projects: Egypt as a case study. *Journal of Engineering and Applied Science*, 69(1), 61. https://doi.org/10.1186/s44147-022-00112-5SpringerOpen

Ahmed, S., Alshater, M. M., El Ammari, A., & Hammami, H. (2022). Artificial intelligence and machine learning in finance: A bibliometric review. Research in International Business and Finance, 61, 101646. https://doi.org/10.1016/j.ribaf.2022.101646

Al-Sabouni, A., Zayed, T., & AbouRizk, S. (2020). Investigating associations among performance criteria in Green Building projects. *Journal of Cleaner Production*, 258, 120668. https://doi.org/10.1016/j.jclepro.2020.120668 ScienceDirect

Bahoo, S., Cucculelli, M., Goga, X., & Mondolo, J. (2024). Artificial intelligence in Finance: a comprehensive review through bibliometric and content analysis. SN Business & Economics, 4 (23), 1-46. https://doi.org/10.1007/s43546-023-00618-x

Brynjolfsson, E. , & M. A. (2017). Machine, Platform, Crowd: Harnessing Our Digital Future. *W. W. Norton & Company.*

Cao, L., Jiang, W., Wang, J., & Yang, X. (2024). Applied AI for finance and accounting: Alternative data and opportunities. Pacific-Basin Finance Journal, 84, 102307. https://doi.org/10.1016/j.pacfin.2024.102307

Durdyev, S. , O. M. , & I. S. (2022). Green construction project performance: Evidence from Southeast Asia. *Journal of Cleaner Production*.

Goodell, J. W., Kumar, S., Lim, W. M., & Pattnaik, D. (2021). Artificial intelligence and machine learning in finance: Identifying foundations, themes, and research clusters from bibliometric analysis. Journal of Behavioral and Experimental Finance, 32, 100577. https://doi.org/10.1016/j.jbef.2021.100577

Iga Istri, M. P., Zaika, Y., Negara, K. P., Solimun, & Wibowo, M. A. (2024). Identifying the influence of project delivery system (PDS) characteristics on green construction project performance. *Eastern-European Journal of Enterprise Technologies*. https://doi.org/10.15587/1729-4061.2024.318451Ukrainian Journals

Iga Istri, M. P., Zaika, Y., Negara, K. P., Solimun, & Wibowo, M. A. (2025). The Effect of Implementing Green Construction on Project Performance: A Comprehensive Study Using Structural Equation Models (S.E.M.). *Civil and Environmental Engineering*. https://doi.org/10.2478/cee-2025-0014Ukrainian Journals+2Sciendo+2Sciendo+2

Isneini, Martalia and Luthfianto, Fandy Pratama (2025, 12 February). Is Indonesia's Construction Sector Ready to Utilize AI? (Siapkah Sektor Konstruksi Indonesia Dalam Pemanfaatan AI?). https://binakonstruksi.pu.go.id/publikasi/karya-tulis/siapkah-sektor-konstruksi-indonesia-dalam-pemanfaatan-ai/

Lukiyanto, K., Trisilia, M., Vinanti, S., & Wijayaningtyas, M. (2024). Perception of the Role of Fintech on Formal Workers During the COVID-19 Pandemic (Study on Construction Workers). KnE Social Sciences, 52-60. https://doi.org/10.18502/kss.v9i10.15695

Maple, C., Szpruch, L., Epiphaniou, G., Staykova, K., Singh, S., Penwarden, W., ... & Avramovic, P. (2023). The ai revolution: opportunities and challenges for the finance sector. arXiv preprint arXiv:2308.16538. https://doi.org/10.48550/arXiv.2308.16538

Mohsen, S. E., Hamdan, A., & Shoaib, H. M. (2025). Digital transformation and integration of artificial intelligence in financial institutions. Journal of Financial Reporting and Accounting, 23(2), 680-699. https://doi.org/10.1108/JFRA-09-2023-0544

Oesterreich, T. D. , & T. F. (2016). Understanding the implications of digitization and automation in the context of Industry 4.0: A triangulation approach. . *Computers in Industry*, 121–139.

Polireddi, N. S. A. (2024). An effective role of artificial intelligence and machine learning in banking sector. Measurement: Sensors, 33, 101135. https://doi.org/10.1016/j.measen.2024.101135

Porter, M. E. , & H. J. E. (2014). How smart, connected products are transforming competition. *Harvard Business Review.*

Wijayaningtyas, M., Wijaya, L., Winanda, L. A. R., & Nursanti, E. (2022). The Impeding Factors on the Green Construction Management Application in New Building Projects. Journal of Architecture and Civil Engineering, 7(10), 01-11.

Wijayaningtyas, M., Hutama, R. P., Winanda, L. A. R., & Meliala, J. G. S. (2023, April). The Success Factors of Green Construction Management Implementation on Building Projects. In IOP Conference Series: Earth and Environmental Science (Vol. 1165, No. 1, p. 012003). IOP Publishing.

Wijayaningtyas, M., Lomi, A., Nursanti, E., Sebayang, N., & Istiqhoma, M. (2025). Artificial intelligence and the internet of things in environmentally building water consumption model: Bibliometric analysis. In BIO Web of Conferences (Vol. 155, p. 08004). EDP Sciences. https://doi.org/10.1051/bioconf/202515508004

Zhang, S. , T. J. , L. J.-K. , E. C. M. , & V. M. (2015). Building Information Modeling (BIM) and safety: Automatic safety checking of construction models. *Automation in Construction*, 183–195.