

# Effectiveness of Intelligent Financial Transformation on Cost Control of Construction Companies in Shandong, China

Xue Cao, John Carlo De Leon

University of the Cordilleras, Baguio City, Benguet, Philippines

## ABSTRACT

This study investigates the effectiveness of intelligent financial transformation in enhancing cost control among construction companies in Shandong, China. Using a qualitative research design, data were gathered through semi-structured interviews with fifteen financial managers, project accountants, and executives from various construction firms actively utilizing intelligent financial systems. Thematic analysis of the interview responses identified five themes: real-time cost monitoring and control, error reduction and financial accuracy, improved financial reporting and forecasting, enhanced transparency and compliance, and process automation and efficiency. The findings reveal that the integration of intelligent financial systems significantly contributes to proactive cost control, reduces manual errors, improves financial oversight, and enhances operational efficiency. These systems not only support more accurate financial decision-making but also strengthen the companies' competitive advantage in a complex construction market. The study concludes that intelligent financial transformation is a critical factor in modernizing cost control practices and ensuring financial sustainability within the construction industry.

## KEYWORDS

Intelligent Financial Transformation; Cost Control; Construction Industry; Financial Management Systems

## 1. INTRODUCTION

The construction industry, particularly in regions experiencing rapid economic development like Shandong, China, faces constant pressure to optimize cost control while maintaining project quality and delivery timelines. Traditional financial management practices, often reliant on manual processes and fragmented systems, have proven insufficient in addressing the complexities and financial risks inherent in large-scale construction projects (Boris, 2023) [1]. As a result, the industry has increasingly turned to intelligent financial transformation—leveraging advanced digital technologies and financial information systems—to enhance efficiency, transparency, and cost control.

The integration of financial informatization and intelligent management systems in the construction sector has introduced innovative applications that improve financial oversight, streamline budgeting, and support data-driven decision-making (Wang, 2024) [2]. Intelligent systems facilitate real-time monitoring of project costs and financial performance, offering construction companies the ability to proactively address financial challenges and optimize resource allocation. This technological shift aligns with broader efforts to optimize work programs and financial management subsystems within construction organizations, promoting more effective financial control and project efficiency (Voitovych & Chupryna, 2023) [3].

Moreover, intelligent financial tools have been instrumental in redefining cost control strategies and enhancing economic benefits in construction engineering projects. Through enabling more precise

cost tracking and facilitating dynamic financial adjustments, these tools help construction firms navigate fluctuating project variables and market conditions (Chen & Tang, 2024) [4]. In the context of intelligent construction, where digital platforms and automation are increasingly prevalent, the role of engineering cost management becomes even more critical (Shen & Qi, 2023) [5].

Digital transformation is also recognized as a key factor in boosting the investment attractiveness of construction companies. Intelligent financial systems not only enhance internal financial management but also improve external perceptions of corporate governance and financial reliability, thereby strengthening competitive advantage (Zainutdinov & Romanova, 2025) [6]. Despite these advancements, large-scale construction projects continue to face financial calculation challenges, emphasizing the need for comprehensive financial management frameworks that integrate intelligent solutions (Hou, 2024) [7]. The application of intelligent management technologies in construction engineering further supports this evolution, facilitating a shift toward smarter, more controlled financial practices (Jiang, 2024) [8].

Given these developments, this study aims to examine the effectiveness of intelligent financial transformation on cost control among construction companies in Shandong, China. By analyzing how digital financial management systems influence cost control practices, this research seeks to provide insights into their practical benefits and strategic implications for construction firms operating in a highly competitive and dynamic market environment.

Although numerous studies have addressed financial management and cost control in the construction industry, most have concentrated on traditional budgeting techniques, risk control measures, or generalized digital transformation initiatives. Existing research highlights the importance of budgeting and cost management in capital construction projects (Boris, 2023) [1] and recognizes the growing role of financial informatization and intelligent systems in enhancing financial control and operational efficiency (Wang, 2024) [2]. Furthermore, scholars have explored the optimization of financial management subsystems within construction organizations (Voitovych & Chupryna, 2023) [3] and discussed various pathways to improve cost control and economic benefits in engineering projects (Chen & Tang, 2024) [4].

However, there remains a significant gap in focused empirical studies that specifically investigate how intelligent financial transformation—particularly the integration of smart financial management systems—directly influences cost control practices within construction companies operating in distinct regional markets such as Shandong, China. While research has discussed the theoretical importance of digital transformation and intelligent management in construction (Shen & Qi, 2023) [5]; (Zainutdinov & Romanova, 2025) [6], limited studies have assessed its practical effectiveness in real-world financial operations and cost control strategies of construction enterprises at the regional level.

## **2. METHODOLOGY**

This study adopts a qualitative research design to explore the effectiveness of intelligent financial transformation on cost control practices in construction companies based in Shandong, China. A qualitative approach is suitable for this research as it enables a deeper understanding of the experiences, perceptions, and strategies of industry practitioners regarding the integration of intelligent financial systems into construction cost control processes.

Data are collected through semi-structured interviews with 5 financial managers, 5 project accountants, and 5 senior executives from selected construction companies operating in Shandong. These participants are chosen through purposive sampling to ensure that they possess direct experience in financial management and cost control within the context of intelligent financial systems. A total of ten participants are selected, representing both medium-sized and large-scale

construction firms with ongoing or completed projects that have adopted intelligent financial management tools.

The interview guide is designed to capture key aspects of the study, including participants' views on the role of intelligent financial systems in cost control, their experiences with implementation, perceived benefits and challenges, and the impact of these systems on financial decision-making and project cost efficiency. The semi-structured format allows flexibility, enabling respondents to elaborate on their insights while ensuring the consistency of core topics across interviews.

Interviews are conducted face-to-face or via online platforms, depending on the participants' availability. All interviews are audio-recorded with the participants' consent and transcribed verbatim for analysis. Thematic analysis is used to identify patterns, themes, and significant insights from the data. This method involves coding the data, categorizing emerging themes, and interpreting the findings in relation to the study's objectives.

Ethical considerations are strictly upheld throughout the research process. Participants are informed about the purpose of the study, assured of the confidentiality of their responses, and reminded of their right to withdraw at any stage without any negative consequences. The collected data are used solely for academic purposes.

### 3. RESULTS AND DISCUSSION

**Table 1.** Thematic Analysis of Intelligent Financial Transformation

| Theme                                        | Freq | Sample Responses                                                                                     |
|----------------------------------------------|------|------------------------------------------------------------------------------------------------------|
| Real-Time Cost Monitoring and Control        | 5    | Real-time dashboards and system alerts help prevent overspending and improve proactive cost control. |
| Error Reduction and Financial Accuracy       | 3    | Reduction of manual errors and improved accuracy in financial records through intelligent systems.   |
| Improved Financial Reporting and Forecasting | 3    | Automated reports and improved budget forecasting streamline financial planning.                     |
| Enhanced Transparency and Compliance         | 2    | Financial transparency and audit compliance improved, boosting investor confidence.                  |
| Process Automation and Efficiency            | 2    | Automation of financial tracking minimized manual work and administrative time.                      |

The thematic analysis of the interview responses revealed five dominant themes that characterize how intelligent financial transformation contributes to cost control in construction companies in Shandong, China. These themes reflect the practical experiences of industry professionals and highlight the multifaceted impact of intelligent financial systems on project financial management.

The most prominent theme is Real-Time Cost Monitoring and Control, which emerged in five responses. Participants emphasized that intelligent financial systems provide immediate visibility into project expenses, allowing companies to detect potential overspending and financial risks before they escalate. Real-time dashboards, automated alerts, and continuous expenditure tracking enable proactive cost control, empowering management to make timely adjustments and avoid financial discrepancies. This immediacy supports more dynamic and responsive financial oversight, particularly in complex, multi-site construction projects.

The second theme, Error Reduction and Financial Accuracy, cited by three respondents, highlights how the implementation of intelligent financial tools minimizes manual errors in financial reporting and data entry. Respondents noted that smart systems enhance the accuracy of financial records, reduce the risk of reporting discrepancies, and ensure consistency in financial statements. This

improvement in financial accuracy directly contributes to better cost control by eliminating common sources of accounting mistakes that can lead to budget overruns.

Improved Financial Reporting and Forecasting is the third theme, also mentioned by three respondents. The integration of intelligent systems allows for automated financial reporting and more reliable budget forecasting. Construction companies benefit from the ability to generate timely and comprehensive financial reports, which support informed decision-making and strategic planning. Accurate forecasting based on real-time data enables project managers to anticipate financial needs and allocate resources effectively, reducing the likelihood of unforeseen cost overruns.

The fourth theme, Enhanced Transparency and Compliance, reflects the role of intelligent financial systems in promoting financial accountability and regulatory compliance. Two respondents pointed out that the transparency brought about by automated financial tracking fosters trust among stakeholders, including investors and auditors. Through maintaining clear and accessible financial records, construction companies improve their audit readiness and enhance their reputation for financial integrity.

Finally, Process Automation and Efficiency, highlighted by two respondents, underscores the operational benefits of automating routine financial tasks. Intelligent systems reduce the administrative burden on finance teams by minimizing manual data entry and automating report generation. This efficiency not only cuts down on labor costs but also frees up financial personnel to focus on strategic financial management activities, further contributing to overall cost control.

Collectively, these themes suggest that intelligent financial transformation provides a comprehensive advantage to construction companies by improving cost monitoring, enhancing financial accuracy, streamlining reporting processes, ensuring compliance, and boosting operational efficiency.

## 4. CONCLUSION AND RECOMMENDATIONS

The findings of this study show the significant role intelligent financial transformation plays in enhancing cost control among construction companies in Shandong, China. Through the integration of intelligent financial systems, companies experience improved real-time monitoring of project expenses, enabling proactive cost control and reducing financial risks. The adoption of these systems leads to a marked reduction in manual errors, enhanced financial reporting accuracy, and more reliable budget forecasting. Furthermore, intelligent systems promote transparency and regulatory compliance, which are critical for maintaining stakeholder trust and financial integrity. The automation of routine financial processes not only increases operational efficiency but also allows financial managers to focus on strategic cost control initiatives.

Based on the findings, it is recommended that construction companies in Shandong continue investing in and expanding the use of intelligent financial management systems to maximize cost control efficiency. Firms should prioritize the integration of real-time financial tracking tools, automated reporting systems, and intelligent forecasting platforms into their financial operations. Additionally, companies should provide continuous training for financial managers and project teams to ensure they are fully equipped to leverage these systems effectively. Collaboration with technology providers and industry partners can further enhance system customization and operational benefits.

## REFERENCES

- [1] Boris, P. (2023). Budgeting and Cost Control in Capital Construction Projects. *International Journal of Latest Engineering and Management Research (IJLEMR)*. <https://doi.org/10.56581/ijlemr.8.8.61-66>
- [2] Wang, G. (2024). Innovative Applications and Benefit Analysis of Financial Informationization and Intelligence in the Construction Industry. *Journal of Progress in Engineering and Physical Science*. <https://doi.org/10.56397/jpeps.2024.09.02>

- [3] Voitovych, V., & Chupryna, I. (2023). Optimization and control of the work program in the financial management subsystem of the construction organization. Ways to Improve Construction Efficiency. [https://doi.org/10.32347/2707-501x.2023.51\(1\).129-142](https://doi.org/10.32347/2707-501x.2023.51(1).129-142)
- [4] Chen, L., & Tang, Y. (2024). Research on the Path of Cost Control and Economic Benefit Enhancement in Construction Engineering Projects. Applied Mathematics and Nonlinear Sciences, 9. <https://doi.org/10.2478/amns-2024-2618>
- [5] Shen, X., & Qi, Y. (2023). Research on Engineering Cost Management in the Context of Intelligent Construction.
- [6] Zainutdinov, B., & Romanova, A. (2025). Digital Transformation as A Factor in Increasing The Investment Attractiveness Of Construction Companies. Scientific Review: Theory and Practice. <https://doi.org/10.35679/2226-0226-2025-15-2-173-177>
- [7] Hou, Q. (2024). Financial Calculation Problems and Countermeasure Analysis of Large-Scale Engineering Construction Projects. Proceedings of Business and Economic Studies. <https://doi.org/10.26689/pbes.v7i2.6607>
- [8] Jiang, Y. (2024). Research On the Application of Intelligent Management Technology in Construction Engineering. Highlights in Science, Engineering and Technology. <https://doi.org/10.54097/t17rdx47>