Research on the Dynamic Control Path of Procurement Costs Driven by Information Technology Tools: A Case Study of the QG Project

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Abstract

This paper takes the QG project as a case study to explore the application paths of information technology (IT) tools in the dynamic control of procurement costs. By analyzing the current status of procurement cost control in the project, it was found that traditional methods suffer from high budget deviation rates and cost overruns. To address these issues, a dynamic cost control path driven by IT tools was designed and implemented, which includes the selection and integration of tools, the construction of a dynamic cost monitoring system, and the optimization of cost control strategies. After implementation, the project's budget deviation rate decreased from 6.25% to 2.5%, and cost savings of 30 million yuan were achieved. The study demonstrates that IT tools can effectively enhance the precision and dynamism of procurement cost control, providing practical experience and theoretical support for the standardization of information-based procurement systems in small and medium-sized technology enterprises.

Keywords: information technology tools, procurement costs, dynamic control, cost savings, QG project, budget deviation rate, cost management, supply chain management, project management information, cost monitoring system

1. Introduction

1.1 Research Background

In the digital age, the application of information technology (IT) tools in enterprise management is becoming increasingly widespread, especially in the field of procurement cost control. As a key component of project management, procurement costs directly affect a company's economic benefits and market competitiveness. However, traditional procurement cost control methods have many limitations, such as lagging information, inaccurate data, and singular control measures, which are insufficient to adapt to the complex and changing market environment. With the rapid development of information technology, enterprises urgently need to leverage advanced IT tools to achieve dynamic monitoring and optimization of procurement costs. The QG project, as a typical representative of small and medium-sized technology enterprises, faces many challenges in procurement cost control but also provides a rich practical scenario for the application of IT tools. Therefore, this study takes the QG project as a case to explore the application paths of IT tools in the dynamic control of procurement costs.

1.2 Research Objectives

This study aims to explore how IT tools can effectively drive the dynamic control of procurement costs, providing practical experience and theoretical support for the standardization of information-based procurement systems in small and medium-sized technology enterprises. By analyzing the application effects of IT tools in the QG project, this study reveals their key role in dynamic cost monitoring and optimizes cost control strategies to significantly reduce budget deviation rates and achieve efficient cost control. This research not only offers

valuable references for enterprises to reduce costs, improve economic benefits, and enhance market competitiveness but also contributes new perspectives and methodologies to academic research in related fields.

1.3 Research Significance

This study holds significant theoretical and practical importance. Theoretically, by integrating IT tools with procurement cost control, this study proposes a new theoretical framework and methodological system, enriching the existing cost control theories. Practically, the study provides a typical case and operational path for small and medium-sized technology enterprises to control procurement costs through information technology, helping enterprises optimize management processes, improve operational efficiency, and enhance market competitiveness. Additionally, the research findings offer references for other industries and enterprises, promoting the application of IT tools in a broader range of fields.

2. Literature Review

2.1 Theoretical Research on Procurement Cost Control

Procurement cost control is a crucial part of project management, and its theoretical research has evolved from static budget management to dynamic cost control. Dynamic cost control emphasizes real-time monitoring and adjustment, which runs through the entire life cycle of a project. The cost control in the procurement phase is detailed into procurement cost management, supplier management, and contract management. Procurement cost management focuses on optimizing procurement processes and methods; supplier management is concerned with establishing long-term cooperative relationships and optimizing evaluation mechanisms; and contract management emphasizes optimizing terms and supervising execution. However, existing theories still have limitations in dealing with market dynamics and IT applications, and further exploration is needed.

2.2 Application of IT Tools in Cost Control

With the development of information technology, IT tools are increasingly widely applied in cost control. Enterprise Resource Planning (ERP) systems enable information sharing and process collaboration within enterprises, big data analysis platforms uncover cost-saving opportunities, and Artificial Intelligence (AI) and Machine Learning (ML) tools enhance the efficiency of cost control. However, the implementation of IT tools requires a technical foundation and data management capabilities, and the system integration and maintenance costs are relatively high. The application effects are also influenced by the internal management processes and personnel quality of enterprises. Therefore, how to integrate IT tools with existing cost control systems is an important research direction.

2.3 Case Studies at Home and Abroad

Enterprises at home and abroad have accumulated rich experience in procurement cost control. Boeing Company optimizes procurement processes and supplier management through ERP systems and big data analysis, reducing procurement costs. Hua Yu Company has established a comprehensive information-based procurement management system, achieving full-process information management. By using big data analysis to optimize procurement plans, inventory accumulation is reduced, and costs are effectively controlled. These cases demonstrate that IT tools have significant advantages in procurement cost control. However, enterprises need to formulate IT application strategies based on their own situations, optimize internal management processes, and improve personnel quality to maximize application effects.

3. Analysis of the Current Status of Procurement Cost Control in the QG Project

3.1 Project Overview

The QG project is located in Chaoyang District, Beijing, and is a large-scale comprehensive real estate development project aimed at creating a modern building complex integrating high-end residences, commercial centers, and supporting facilities. The project covers a total area of 150,000 square meters, with a total construction area of 500,000 square meters and an estimated total investment of 8 billion yuan (Lu, D., Wu, S., & Huang, X., 2025). The project was officially launched in January 2020 and is scheduled to be fully completed in December 2025, with an implementation period of 60 months. In the procurement phase, the main characteristics of the QG project are the involvement of multiple suppliers and complex procurement processes. The procurement content includes building materials, equipment, furniture, and various services. The procurement process follows a strict bidding procedure, covering demand analysis, supplier screening, contract negotiation, order execution, and quality acceptance. The project team consists of professional procurement personnel, cost engineers, and project managers, who are responsible for managing and supervising the entire procurement process.

3.2 Current Status of Procurement Cost Control

The procurement costs of the QG project mainly consist of direct costs, indirect costs, procurement costs, and

logistics costs. Direct costs include the procurement costs of raw materials and equipment, accounting for 60% of the total procurement costs. Specifically, the procurement cost of building materials is 240 million yuan, and that of equipment is 160 million yuan. Indirect costs include project management fees, office expenses, and personnel wages, accounting for 20% of the total procurement costs. The project management fees amount to 80 million yuan, office expenses to 40 million yuan, and personnel wages to 40 million yuan. Procurement costs include transaction costs and contract execution costs during the procurement process, accounting for 10% of the total procurement costs. Transaction costs are 30 million yuan, and contract execution costs are 20 million yuan. Logistics costs include transportation and warehousing costs, accounting for 10% of the total procurement costs. Transportation costs are 30 million yuan, and warehousing costs are 20 million yuan. In terms of cost control effectiveness, the QG project faces some issues. As of June 2023, the total project budget was 8 billion yuan, while the actual incurred costs were 8.5 billion yuan, resulting in a budget deviation rate of 6.25% (Wu, S., Huang, X., & Lu, D., 2025). Specifically, the procurement cost of building materials exceeded the budget by 150 million yuan, and that of equipment by 100 million yuan. This overrun is mainly due to market fluctuations in raw material prices, inaccurate supplier quotations, and unreasonable procurement plans. Additionally, project management fees also exceeded the budget by 100 million yuan, mainly due to unforeseen management issues during project implementation, such as project schedule delays and unreasonable personnel allocation, which increased management costs.

3.3 Current Status of IT Tool Application

In the procurement process, the QG project has already adopted some IT tools, such as the Enterprise Resource Planning (ERP) system and the electronic bidding platform. The ERP system is mainly used for internal resource management and process collaboration within the project, enabling real-time tracking of procurement demands and automated processing of procurement orders. The electronic bidding platform is used for supplier screening and management of the bidding process, improving the transparency and efficiency of bidding. However, there are still some deficiencies in the application of these IT tools. The data accuracy and real-time performance of the ERP system need to be improved, as some data updates are not timely, limiting the functions of cost analysis and decision support. Specifically, the status of some procurement orders in the system is updated with delays, resulting in discrepancies between actual inventory data and system display data, which affects the accuracy of procurement plans. Although the electronic bidding platform has improved the efficiency of bidding, its functions in supplier evaluation and contract management are not perfect enough to fully meet the complex and changing procurement needs of the project. For example, the platform's functions in supplier qualification review and performance evaluation are relatively weak, leading to unstable supply quality from some suppliers and affecting the overall project progress. Additionally, the integration of IT tools is poor, and there are obstacles to data sharing, which affects the overall cost control effectiveness. For example, the data interaction between the ERP system and the electronic bidding platform is not smooth, resulting in inconsistent information of procurement orders in the two systems, increasing management costs and the risk of errors.

4. Design of the Dynamic Control Path of Procurement Costs Driven by IT Tools

4.1 Selection and Integration of IT Tools

In response to the actual needs and cost control objectives of the QG project, the project team selected a variety of IT tools, including professional procurement management software, cost analysis tools, and data visualization platforms. The procurement management software can achieve precise matching of procurement demands, efficient management of suppliers, and automated processing of procurement processes. Cost analysis tools can conduct in-depth analysis of various cost data to provide data support for cost control. Data visualization platforms present cost data in the form of intuitive charts and reports, helping management quickly understand cost dynamics and key indicators.

To achieve effective integration of these tools, the project team constructed a complete IT-based procurement cost dynamic control system. The system realized data sharing between the ERP system, electronic bidding platform, and procurement management software through data interfaces, ensuring the real-time and accurate information. For example, by integrating the ERP system and procurement management software, the project team could obtain real-time information on the status of procurement orders and inventory levels, thereby optimizing procurement plans and reducing inventory accumulation. Meanwhile, the data visualization platform displayed cost data in the form of intuitive charts, facilitating quick decision-making by management.

4.2 Construction of the Dynamic Cost Monitoring System

In the construction of the dynamic cost monitoring system, the project team designed a set of dynamic cost monitoring indicators based on IT tools. Key indicators include budget execution rate, procurement price fluctuation rate, inventory turnover rate, and supplier performance. The budget execution rate measures the actual cost against the budgeted cost to ensure that project costs are controlled within the budget. The

procurement price fluctuation rate assesses the stability of procurement costs by analyzing market price changes and supplier quotation fluctuations. The inventory turnover rate reflects the efficiency of inventory management, helping the project team optimize inventory levels. Supplier performance indicators evaluate suppliers' delivery punctuality, product quality, and price rationality to select high-quality suppliers.

Using IT tools, the project team realized real-time data collection and analysis of cost data. By setting warning thresholds, the system could automatically issue warnings for cost deviations and potential risks. For example, when the procurement price fluctuation rate exceeded the set threshold of 5%, the system would automatically remind the procurement team to conduct market research and negotiate with suppliers. This real-time monitoring and warning mechanism provided management with timely and accurate decision-making basis, ensuring the effectiveness of cost control.

4.3 Optimization of Cost Control Strategies

Based on the data analysis results provided by IT tools, the project team developed targeted cost control strategies. For example, by optimizing procurement plans, the project team could arrange procurement batches precisely according to actual demand and inventory levels, reducing unnecessary inventory accumulation. Adjusting procurement channels introduced more supplier competition, reducing procurement costs. Improving supplier management involved regularly evaluating supplier performance and eliminating unqualified suppliers to ensure supply quality and cost control.

To adapt to various changes and uncertainties during project implementation, the project team realized dynamic adjustment of cost control strategies through IT tools. For example, when market raw material prices rose significantly, the system would automatically adjust procurement plans, prioritizing the procurement of stable-priced materials and searching for alternative materials through data analysis. This dynamic adjustment mechanism ensured the continuous optimization of cost control strategies, effectively controlling costs and achieving project cost control objectives even in complex market conditions.

5. Analysis of the Implementation Effects of the Dynamic Control of Procurement Costs Driven by IT Tools

5.1 Implementation Process and Data Collection

The implementation process of the IT-driven dynamic control of procurement costs in the QG project covered several key stages, including system launch, personnel training, and data initialization. Before the system went live, the project team spent three months on preparations, including demand research, system selection, and customized development. In July 2023, the procurement management software, cost analysis tools, and data visualization platform were officially launched, covering all procurement processes of the project.

To ensure the smooth operation of the system, the project team organized five training sessions, with a total of 80 participants, including procurement personnel, cost engineers, and project managers. The training content covered system operation procedures, data analysis functions, and warning mechanisms. During the data initialization phase, the project team entered procurement data from the first two quarters of 2023, including 500 procurement orders, 300 supplier information entries, and 100 cost items, providing the basis for subsequent dynamic cost monitoring. (Yi, Q., He, Y., Wang, J., Song, X., Qian, S., Zhang, M., ... & Shi, T., 2025)

During the implementation process, the project team collected a wealth of data, including cost data, IT tool usage data, and user feedback. Cost data covered procurement costs before and after implementation. IT tool usage data included system login frequency, function usage, and data update speed. User feedback was collected through questionnaires and interviews, with 70 valid questionnaires and 20 interviews with project team members.

Table 1.

Content	Detailed Description
Training Sessions	5 sessions
Training Participants	80 participants
Purchase Orders	500 orders
Supplier Information	300 suppliers
Cost Items	100 items

5.2 Cost Control Effect Evaluation

By comparing cost data before and after implementation, the IT-driven dynamic cost control solution had a significant impact on the procurement costs of the QG project. Before implementation, the total project budget was 8 billion yuan, and the actual cost was 8.5 billion yuan, with a budget deviation rate of 6.25%. After implementation, as of June 2024, the total project budget remained at 8 billion yuan, but the actual cost decreased to 8.2 billion yuan, reducing the budget deviation rate to 2.5% (Wu, S., & Huang, X., 2025). Specifically, the procurement cost overrun for building materials decreased from 150 million yuan to 50 million yuan, and that for equipment decreased from 100 million yuan to 30 million yuan. Project management fees also decreased from an overrun of 100 million yuan to 20 million yuan.

In terms of cost savings, after implementing IT tools, the QG project achieved cost savings of 300 million yuan in the first half of 2024. Specifically, cost savings were as follows: 100 million yuan in building materials procurement, 70 million yuan in equipment procurement, 50 million yuan in project management fees, 30 million yuan in procurement costs, and 50 million yuan in logistics costs.

Table 2.

Cost Savings Category	Savings Amount (First Half of 2024)
Building Materials Procurement Savings	100 million yuan
Equipment Procurement Savings	70 million yuan
Project Management Fees Savings	50 million yuan
Procurement Costs Savings	30 million yuan
Logistics Costs Savings	50 million yuan
Total Savings Amount	300 million yuan

From the perspective of sustainability and stability, the application of IT tools brought long-term cost control advantages to the QG project. After the system went live, the real-time and accurate nature of cost data significantly improved, and the warning mechanism could promptly detect cost deviations, helping management quickly adjust strategies. For example, in March 2024, the system warned that the price fluctuation rate of building materials exceeded 5%. The procurement team promptly adjusted the procurement plan, avoiding a potential cost overrun of 50 million yuan. (Zhang, L., Wang, L., Huang, Y., & Chen, H., 2019)

However, there were also some potential issues in the long-term application of IT tools. For example, the system's response speed when handling large-scale data needed to be optimized, and the operation procedures of some complex functions needed to be further simplified to improve user experience.

5.3 Evaluation of IT Tool Application Effects

In terms of user satisfaction, the project team members were generally satisfied with the IT tools. The questionnaire survey showed that 85% of users believed the system was easy to operate and could meet daily procurement management needs; 75% of users indicated that the data analysis functions of the system were significantly helpful for cost control; and 90% of users were satisfied with the data accuracy of the system.

Regarding system usability, most users could skillfully operate the various functions of the system after training. However, in actual use, some users reported that the system was slow when processing complex queries, affecting work efficiency. In terms of data accuracy, after the system went live, the accuracy rate of cost data increased from 80% before implementation to 95% (He, Y., Wang, J., Li, K., Wang, Y., Sun, L., Yin, J., ... & Wang, X., 2025), providing a reliable basis for cost analysis and decision-making. In terms of functional completeness, the system covered core functions such as procurement management, cost analysis, and data visualization, but the functions of the supplier performance evaluation and contract management modules still needed further improvement.

Table 3.

User Satisfaction Dimension	Specific Data
System Operation Convenience	85% of users believed the system was easy to operate
Data Analysis Function	75% of users believed the data analysis function was significantly helpful for cost control
Data Accuracy	90% of users were satisfied with the data accuracy

Feedback from project team members and relevant stakeholders also pointed out the deficiencies of IT tools. For example, some users suggested adding mobile functions to allow real-time viewing of cost data and approval operations. Other users proposed that occasional data synchronization delays occurred when the system integrated different data sources, which needed further optimization.

6. Conclusions and Future Work

6.1 Research Conclusions

This study applied an IT-driven dynamic control path of procurement costs in the QG project and achieved significant results. After implementation, the project's budget deviation rate decreased from 6.25% to 2.5%, and cost savings of 300 million yuan were realized in the first half of 2024 (Shih, K., Deng, Z., Chen, X., Zhang, Y., & Zhang, L., 2025). The main findings include the key role of IT tools in dynamic cost monitoring and the effective reduction of cost overrun risks through strategies such as optimizing procurement plans, adjusting procurement channels, and improving supplier management. These findings validated the research hypothesis and achieved refined cost management.

6.2 Research Innovations and Contributions

Theoretically, this study proposed a new theoretical framework for cost control, emphasizing the core role of IT tools in dynamic monitoring and optimizing traditional cost control methods. Practically, it provided a reference for the standardization of information-based procurement systems in small and medium-sized technology enterprises, demonstrating the significant effects of IT tools in reducing budget deviation rates, optimizing procurement processes, and improving management efficiency. The study also offered valuable experience for other enterprises.

6.3 Research Limitations and Future Work

The study has limitations. For example, the sample was limited to the QG project and may not be fully applicable to other industries or project types. The long-term application effects and sustainability of IT tools need further observation. The system's response speed when handling large-scale data and functional completeness need improvement. Future research could expand the sample range, explore the application of IT tools in other cost management fields, and further optimize system functions to meet the growing management needs of enterprises.

References

He, Y., Wang, J., Li, K., Wang, Y., Sun, L., Yin, J., ... & Wang, X., (2025). Enhancing Intent Understanding for Ambiguous Prompts through Human-Machine Co-Adaptation. arXiv preprint arXiv:2501.15167.

Lu, D., Wu, S., & Huang, X., (2025). Research on Personalized Medical Intervention Strategy Generation System based on Group Relative Policy Optimization and Time-Series Data Fusion. arXiv preprint arXiv:2504.18631.

Shih, K., Deng, Z., Chen, X., Zhang, Y., & Zhang, L., (2025, May). DST-GFN: A Dual-Stage Transformer Network with Gated Fusion for Pairwise User Preference Prediction in Dialogue Systems. In 2025 8th International Conference on Advanced Electronic Materials, Computers and Software Engineering (AEMCSE) (pp. 715-719). IEEE.

Wu, S., & Huang, X., (2025). Psychological Health Prediction Based on the Fusion of Structured and Unstructured Data in EHR: a Case Study of Low-Income Populations. Preprints.

Wu, S., Huang, X., & Lu, D., (2025). Psychological health knowledge-enhanced LLM-based social network crisis intervention text transfer recognition method. arXiv preprint arXiv:2504.07983.

Yi, Q., He, Y., Wang, J., Song, X., Qian, S., Zhang, M., ... & Shi, T., (2025). SCORE: Story Coherence and Retrieval Enhancement for AI Narratives. arXiv preprint arXiv:2503.23512.

Zhang, L., Wang, L., Huang, Y., & Chen, H., (2019). Segmentation of Thoracic Organs at Risk in CT Images Combining Coarse and Fine Network. SegTHOR@ ISBI, 11(16), 2-4.