Journal of Architectural Research and Development, 2025, Volume 9, Issue 3
https://ojs.bbwpublisher.com/index.php/JARD
Online ISSN: 2208-3537
Print ISSN: 2208-3529

Research on Project Quality Management Mechanism of IT SMEs

Rixin Luo, Xiaoyang Wang*

Guangxi University of Finance and Economics, Nanning 530003, Guangxi, China

**Author to whom correspondence should be addressed.*

Abstract: IT SMEs as an important force can promote scientific and technological innovation and economic development, the effectiveness of project quality management mechanism is directly related to the survival and development of IT SMEs. This paper take IT SMEs as the research object, which deeply discusses the situation, existing problems and improvement strategies of the project quality management mechanism, and combines agile management and total quality management (TQM) theories to build a dynamic and adaptive project quality management mechanism. Through deeply analysis, the effectiveness of the mechanism is proposed, and the optimization path is proposed, aiming at providing theoretical support and practical guidance for enterprises to improve project delivery quality and enhance market competitiveness.

Keywords: IT SMEs; Project quality management; Mechanism study; Agile management; TQM theories

Online publication: June 4, 2025

1. Introduction

With the acceleration of digital transformation and the rapid development of information technologies, such as artificial intelligence, cloud computing, and Internet of Things, IT SMEs are playing an increasingly important role in promoting global economic development [1]. According to the data of China's Ministry of Industry and Information Technology, the income scale of China's information technology service industry exceeded 12 trillion yuan in 2023, with an annual growth rate of 15%, and SMEs will account for more than 70%, becoming an important force for technological innovation. However, the speed of technology iteration, such as the rapid update of software development frameworks, has led to a surge in project complexity and higher requirements for quality management [2]. As the core carrier of enterprise development, the quality management level of the project directly affects the market competitiveness and sustainable development ability of the enterprise. The information technology industry has the characteristics of rapid technology iteration and high demand uncertainty, and SMEs often face the risk of quality loss due to resource constraints [3]. Traditional quality management model, like the waterfall model, is difficult to meet the needs of agile development, and it is urgent to explore a lightweight and flexible management mechanism [4]. Therefore, it is of great practical significance to deeply study the project quality management mechanism of IT SMEs.

2. Literature review

Total Quality Management (TQM) is a management concept proposed by American quality management experts in the late 1950s, aiming to improve product quality and enterprise efficiency through full participation and whole-process control. After decades of development, total quality management has become an important part of modern enterprise management, which has a profound impact on the competitiveness of enterprises and sustainable development [5]. Edwards is one of the founders of total quality management and is known as the "pioneer of quality management" [6]. He developed the famous "Deming Cycle" (PDCA cycle) and the "Fourteen points". The PDCA cycle includes four stages: Plan, Conduction, Check and Act. It is a management method that continuously cycles and gradually improves. Juran, an important promoter of total quality management, proposed the "Juran three steps", namely quality planning, quality control, and quality improvement [7]. Quality planning refers to the determination of quality objectives and the formulation of plans to achieve the objectives; Quality control refers to the monitoring of the production process to ensure that the product quality meets the standards; Quality improvement refers to increasing the level of quality through continuous improvement of products and processes. Juran also put forward the "20 to 80 rule", that is, 80% of quality problems are caused by 20% of the key reasons, emphasizing the identification and solution of key problems [7].

Crosby who is the author of the "Zero defect" quality management philosophy, emphasizes "doing things right the first time" and he believes that quality is compliance, prevention is better than inspection, and the standard must be "zero defects" and measured in terms of "the cost of substandard products [8]." Crosby also proposed the four basic principles of quality management: the definition of quality, the system of quality, the standard of work, and the measurement of quality. Feigenbaum propose the total quality control, advocated a systematic approach to quality management that involved all functional departments, not just production [9]. He emphasizes establishing quality early in the formation of a product, rather than inspecting and controlling it after it is finished. Juran's quality management concept has been widely disseminated and applied in China. Many Chinese quality management experts and scholars have put forward quality management methods and tools suitable for China's national conditions combined with the actual situation of Chinese enterprises [10].

Agile quality management is an important management concept to adapt to rapidly changing market demands and enhance enterprise competitiveness [11]. It takes iterative delivery and continuous feedback as the core to adapt to rapidly changing demands. The development of agile quality management can be traced back to the early 1990s, with the rise of agile methods in the field of software development and gradually attracted attention [12]. In 1991, Jeff Sutherland and Ken Schwaber developed the Scrum framework, an iterative and incremental software development process that emphasizes team collaboration and rapid delivery [13]. Then, the Agile Software Development Manifesto marked the formal formation of the Agile approach, which set forth the values of individuality and interaction, software that works, customer collaboration, and responsiveness to change. Since then, the concept of agile quality management has gradually expanded from the field of software development to other industries, such as manufacturing and service industries [14].

Poppendieck focuses on Lean Agile and quality management, proposing Value stream-driven quality optimization, identifying waste in the development process (e.g., repeated testing, waiting for approval), and shortening the quality feedback loop through Value Stream Mapping [15]. Farley, who has studied continuous delivery and quality engineering for a long time, proposed that automated testing should cover functional, performance, and safety dimensions, and be linked to monitoring systems to achieve a "production-as-test environment [16]." The modular design and low coupling architecture support continuous quality optimization and avoid large-scale refactoring costs. Shi *et al.* proposed agile quality management methods and tools tailored to China's national context, aligning closely with the practical conditions of Chinese enterprises [17]. She emphasized

that in agile project management, it is necessary to pay attention to team collaboration, customer demand orientation and continuous delivery, and improve the quality and efficiency of projects by establishing efficient communication and feedback mechanisms [17]. In the research and practice of agile quality management, Xing *et al.* put forward the agile quality management system based on value stream [18]. The system is customer-oriented and optimizes processes through value stream analysis to reduce waste and improve value creation efficiency. At the same time, he emphasized building a quality culture in Agile teams, cultivating employees' quality awareness and responsibility, and promoting the participation of all employees in quality management. The difference between Agile project management and traditional quality management is shown in **Table 1**.

Table 1. The difference between Agile project management and traditional quality management

Field	Traditional quality management (e.g. TQM)	Agile quality management
Process focus	Phased control (e.g. demand freezing)	Dynamic adjustment (embrace change)
Document dependencies	Highly documented (e.g. test case library)	Light documentation (code is documentation)
Defect treatment	Centralized repair (late test phase)	Instant repair (daily build)

3. The current situation of the project quality management mechanism of IT SMEs

3.1. The establishment of the quality management system

Some IT SMEs have initially established quality management systems, such as ISO 9001 and other standards; however, there are issues in practical implementation, including a disconnect between documented procedures and actual operations. Although some enterprises have developed quality manuals and procedural documents, in actual project implementation, time, cost, and other constraints often lead to the simplification or omission of key quality control processes, resulting in a superficial or ineffective quality management system.

3.2. Application of quality management methods

Common quality management methods such as total quality management (TQM), Six Sigma, etc. are not widely and deeply applied in IT SMEs. Some enterprises still mainly rely on traditional quality inspection and testing means, and lack of quality control and preventive measures for the whole process of the project. This allows quality problems to be discovered late in the project, increasing rework costs and the risk of project delays.

3.3. Quality awareness and cultural construction

The quality awareness of employees in IT SMEs is uneven; some employees do not know enough about the importance of quality management, and lack the enthusiasm to actively participate in quality management. At the same time, the quality culture within the enterprise has not yet formed, causing the lack of quality environment to encourage innovation and pursue excellence, which has a negative impact on the continuous improvement of project quality management.

4. Problems existing in the project quality management mechanism of IT SMEs

4.1. Weak quality awareness

The management and employees of some IT SMEs do not know enough about the importance of quality management, and focus on the progress and cost control of the project, while ignoring the improvement of quality. This short-sighted behavior leads to the continuous reduction of quality requirements in the process of project

execution, which ultimately affects the overall quality of the project.

4.2. Lack of quality management personnel

IT SMEs often face the problem of talent shortage, especially the lack of professional quality management talents. This makes the enterprise lack of professional guidance and supervision in project quality management, difficult to effectively implement quality control measures, resulting in frequent quality problems.

4.3. The quality management system is not perfect

There are many defects in the quality management system of some IT SMEs, such as unclear quality objectives, unclear division of quality responsibilities, and incomplete quality records. These problems cause the quality management system to not operate effectively, and affects the ability to effectively monitor and improve the quality of the project.

4.4. Backward means of quality control

IT SMEs often adopt more traditional and backward means in project quality control, and lack of advanced quality detection tools and technologies. This makes it difficult to find and solve potential quality problems in time during the implementation of the project, which increases the risk of the project.

4.5. The quality improvement mechanism is not sound

Some IT SMEs lack effective quality improvement mechanisms and fail to conduct in-depth analyses and summaries of quality problems during project implementation. This causes similar problems to recur in subsequent projects and prevents the achievement of continuous improvement in project quality.

5. IT SMEs project quality management dynamic mechanism model

The effective operation of the project quality management mechanism is very important for the survival and development of IT SMEs. Through in-depth analysis of the current situation and existing problems, and adopting corresponding improvement strategies, the project quality management level of enterprises can be effectively improved, and the market competitiveness and sustainable development ability of enterprises can be enhanced. Enterprises should attach great importance to quality management, constantly optimize the quality management mechanism, and lay a solid foundation for the long-term development of enterprises. The project quality management mechanism model is shown in **Figure 1**.

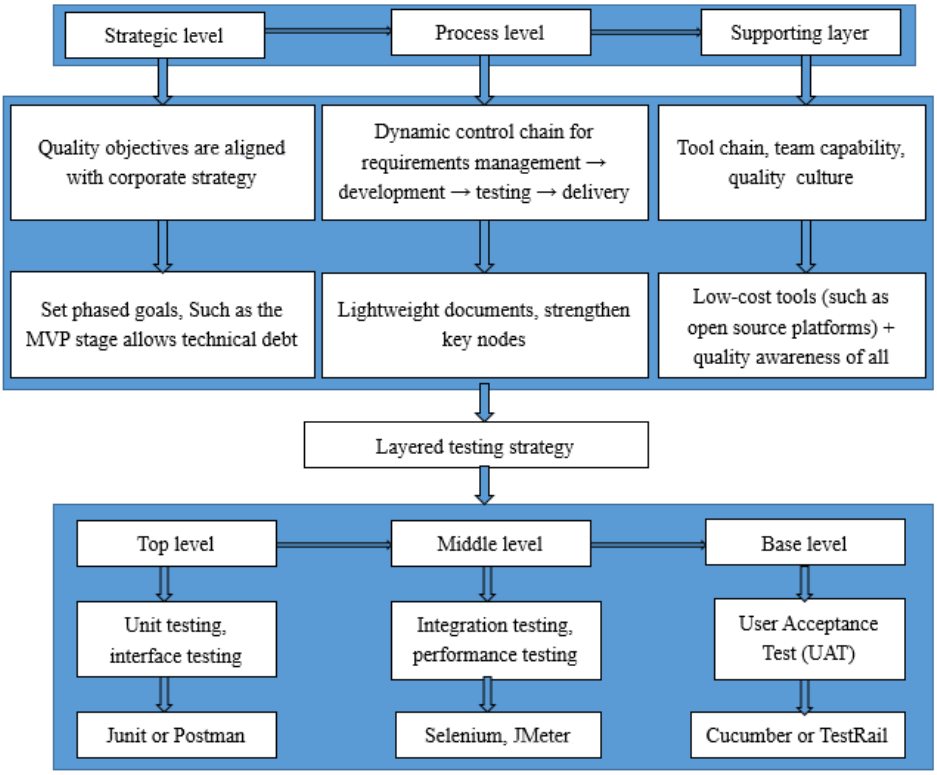

Figure 1. The project quality management mechanism model.

6. Conclusion

To better promote the long-term and stable development of enterprises, project quality management mechanism improvement strategy of IT SMEs is proposed.

6.1. Strengthen quality awareness training

Enterprises should strengthen the quality awareness education of all employees through quality training and publicity activities, so that they realize the importance of quality management for enterprise development. At the same time, the quality performance is included in the staff assessment system to encourage employees to actively participate in quality management and form a good atmosphere for all staff to pay attention to quality.

6.2. Strengthen the construction of quality management personnel

Enterprises should increase the introduction and training of quality management talents, and improve the overall quality of enterprise quality management team through recruitment of professional talents and internal training. In addition, employees can also be encouraged to participate in quality management related certification examinations to enhance their professional level and ability.

6.3. Improve the quality management system

Enterprises should establish a set of scientific, perfect and in line with the characteristics of information technology project quality management system based on their own actual conditions. Define quality objectives, quality responsibilities and quality processes to ensure the effective operation and continuous improvement of the quality management system. At the same time, strengthen the internal audit and management review of the quality management system to find and correct the existing problems in a timely manner.

6.4. Introduce advanced quality management methods and tools

Enterprises can learn from and apply advanced quality management methods such as Total Quality Management (TQM) and Six Sigma, as well as advanced quality control tools such as project management software and automated testing tools. Through the application of these methods and tools, the whole process of project quality control can be realized, and the level and efficiency of project quality management can be improved.

6.5. Establish a quality improvement mechanism

Enterprises should establish a set of perfect quality improvement mechanisms to systematically analyze and summarize the quality problems in the process of project implementation. Corrective and preventive measures should be developed to continuously improve project quality and prevent similar problems from happening again. At the same time, employees should be encouraged to put forward quality improvement suggestions to form a quality culture of continuous improvement.

Funding

Young and Middle-aged Teachers' Basic Research Ability Improvement Project of Universities in Guangxi 2024. Research on Coordinated Development of Smart Tourism and Rural Revitalization in Southwest China (Project No.: 24KY0655)

Disclosure statement

The author declares no conflict of interest.

References

[1] Manzoor F, Wei L, Sahito N, 2021, The Role of SMEs in Rural Development: Access of SMEs to Finance as a Mediator. Plos One, 16(3): e0247598.

[2] Kirpitsas IK, Pachidis TP, 2022, Evolution Toward Hybrid Software Development Methods and Information Systems Audit Challenges. Software, 1(3): 316–363.

[3] Malik G, Sharma P, Kingshott R, et al., 2024, Technological Sensing and Response Capabilities as Drivers for Radical Innovation in the Context of Apocalyptic Uncertainty. R&D Management, 54(3): 525–541.

[4] Mokhtar R, Khayyat M, 2022, A Comparative Case Study of Waterfall and Agile Management. SAR Journal, 5(1): 52–62.

[5] Chen CK, Reyes L, Dahlgaard J, et al., 2022, From Quality Control to TQM, Service Quality and Service Sciences: A 30-Year Review of TQM Literature. International Journal of Quality and Service Sciences, 14(2): 217–237.

[6] Mayangsari M, Ulwiyah N, Qoyyimah U, 2023, William Edward Deming's Model Planning. Edusoshum: Journal of Islamic Education and Social Humanities, 3(3): 146–153.

[7] Ferreira ALC, Lustosa IA, Kogawa AC, 2023, Quality Management: History, Evolution and Aspects. International Journal of Productivity and Quality Management, 39(4): 554–566.

[8] Psarommatis F, Azamfirei V, 2024, Zero Defect Manufacturing: A Complete Guide for Advanced and Sustainable Quality Management. Journal of Manufacturing Systems, 77: 764–779.

[9] Abimbola BO, Ekpudu JE, Kuye OL, 2021, Contributions and Theoretical Approach to Total Quality Management. UNILAG Journal of Business, 7(2): 1–13.

[10] Zhu Y, Li J, Lan X, et al., 2022, Research on Evaluation Method of Digital Project Cloud Model Considering Weight

Sensitivity. Energies, 15(15): 5738.

[11] Amajuoyi P, Benjamin LB, Adeusi KB, 2024, Agile Methodologies: Adapting Product Management to Rapidly Changing Market Conditions. GSC Advanced Research and Reviews, 19(2): 249–267.

[12] Wen D, Sun X, Yan D, 2022, The Quality Movement: Where Are We Going? Past, Present, and Future. Total Quality Management & Business Excellence, 33(1–2): 92–112.

[13] Whiteley A, Pollack J, Matous P, 2021, The Origins of Agile and Iterative Methods. Journal of Modern Project Management, 2(5): 20–29.

[14] Kuhrmann M, Tell P, Hebig R, et al., 2021, What Makes Agile Software Development Agile? IEEE Transactions on Software Engineering, 48(9): 3523–3539.

[15] Brammer R, 2024, Exploring Lean–Agile Adoption in Publishing: MVBs, Porous Books and Feedback Loops, thesis, University of Westminster.

[16] Farley D, 2021, Modern Software Engineering: Doing What Works to Build Better Software Faster. Addison-Wesley Professional.

[17] Shi WW, Cao WCE, Xun JL, 2022, Impact of Agile Project Management on the Competitiveness of Chinese Software Development Organizations. Journal of Entrepreneurship & Project Management, 6(4): 1–13.

[18] Xing W, Hao JL, Qian L, et al., 2021, Implementing Lean Construction Techniques and Management Methods in Chinese Projects: A Case Study in Suzhou, China. Journal of Cleaner Production, 286: 124944.