

Factors Influencing Quality Performance of Construction Enterprises

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Abstract: At present, while constantly pursuing technological innovation and management innovation, construction enterprises have been seeking new breakthroughs in quality. How to deal with new quality problems to ensure the steady improvement of quality is an important problem to be solved by construction enterprises. Based in fact that many enterprises try to achieve the optimization of enterprise performance by improving the quality performance of enterprises, this study explores the connotation and composition of quality performance, analyzes the quality performance evaluation index of construction enterprises, and summarizes the factors affecting the quality performance of construction enterprises, so as to provide reference for the improvement of enterprise performance in the future.

1. Introduction

Construction enterprises have always been concerned by people from all walks of life. Whether it is urban construction, urban and rural transportation and other livelihood construction or the production and operation of major enterprises, they will involve construction projects. Therefore, ensuring the stability of construction quality and promoting the improvement of quality performance has always been a major national and social issue. On the other hand, for the construction enterprise itself, quality performance is an important guarantee of enterprise market share, by improving quality performance to reduce the cost of product defects, and then improve enterprise performance to enhance the competitiveness of enterprises. All the purpose of quality management is to improve enterprise performance. Related research shows that enterprise performance is affected by product quality performance and other factors. Improving enterprise performance can be further refined to improve quality performance. Therefore, it is of great significance to study the influencing factors of quality performance of construction enterprises.

At present, more academics research on quality performance is based on the improvement path of enterprise performance. Jiang and Su^[1] proposed that in order to achieve the accuracy of quality management strategic plan, we should improve enterprise performance. Enterprise's quality is the result of comprehensive management, staff is the main body of quality management practice^[2]. Song et al.^[3] found that quality performance has a mediating effect before enterprise quality management

practice and enterprise performance. Prajogo and Brown^[4] found through empirical analysis that organizations adopting formal quality management practice plan will not open a large gap with other organizations without specific implementation of quality management practice. For enterprises, it is important to adopt quality practice rather than plan itself.

Although there are many researches on improving the quality performance of enterprises, most of them are based on the relationship between quality management practice and enterprise quality. There are few literatures dedicated to quality performance, and fewer literatures on quality performance of construction enterprises. Therefore, on the basis of existing literature, this study traces the source of quality performance, determines the connotation and composition of quality performance of construction enterprises, secondly, through literature review summarizes the construction enterprise quality performance structure and measurement methods, again, explore the construction enterprise quality performance influencing factors and effects, finally, it puts forward the reference direction for the research on the quality performance of construction enterprises.

2. Sources and connotations of quality performance

2.1. Connotation of Quality Performance in Construction Enterprises

Jiang et al.^[1] elaborated the concept of quality performance, the quality performance is understood as the organization's quality performance, describes the quality performance including external quality performance, internal quality performance, project quality performance and process quality performance. Since quality performance will be improved with the effective implementation of quality management practice, enterprise performance can be divided from the perspective of quality, operation and innovation. Among them, quality performance includes customer satisfaction, cost quality, quality pass rate, delivery quality and other indicators. The process of improving quality performance for enterprises through the effective implementation of quality management practice, pays close attention to customer satisfaction and market demand at the same time with the lowest defect cost and the highest production efficiency to ensure the highest product quality performance, maximize the competitiveness of enterprises and market share^[5].

For the quality performance of construction enterprises, the implementation of ISO9000 standards is the basic requirement of enterprises^[6]. Scientific engineering quality assurance system is the fundamental guarantee to achieve high-quality project performance^[7]. Only by strengthening the construction site management can we ensure the stability of engineering quality with appropriate cost and duration, improve the quality performance of construction enterprises and enhance their competitiveness^[8]. Based on the above, this study defines the quality performance of construction enterprises as: the results of the construction enterprises to establish a sound quality assurance system is an important way to improve the performance of construction enterprises.

2.2. Composition of quality performance

Lu and Zhou^[9] divided quality performance into process quality performance and result quality performance, constructed quality performance model including: profitability, productivity, external quality, internal quality and other quality five indicators. Song^[3] and Yi et al.^[10] divided quality performance from internal and external perspectives. Among them, external quality performance includes product quality and customer satisfaction, quality internal performance includes product quality standard, design quality and consistency quality. According to the relevant literature, the composition of quality performance of construction enterprises can be understood as core quality performance and basic quality performance. Among them, the core quality performance includes design quality and construction quality management standardization, basic quality performance

includes customer satisfaction and qualified rate of project acceptance. It influences core quality performance and basic quality performance through core quality management practice and basic quality management practice.

3. Measurement of Quality Performance of Construction Enterprises

3.1. Measurement of basic quality performance

3.1.1. Customer satisfaction

Song et al.^[3] according to the internal and external division of quality performance, select product acceptance qualified rate, product durability and product reliability three indicators to measure internal quality performance, the three indicators of product use, customer satisfaction and product delivery quality are selected to measure external quality performance. Yi et al.^[10] measured internal quality performance through the standard, design and consistency of project products, measure external quality performance by customer satisfaction. Jiang and Xiong^[5] through the qualified rate of products, quality stability, quality assurance costs and similar enterprise product defective level four indicators to measure quality performance.

Based on the relevant literature, this study divides the two dimensions of customer satisfaction and project acceptance qualification rate to measure the basic quality performance. Among them, customer satisfaction is the difference between the customer's actual feelings of the current construction results and services and the customer's expectation of the project results. Customer satisfaction means that the actual evaluation is higher than the expected demand, and customer dissatisfaction means that the actual evaluation is lower than the expected value. According to the level of products, customer satisfaction can be divided into five levels: core construction result satisfaction, formal construction result satisfaction, expected construction result satisfaction, additional construction result satisfaction and potential construction result satisfaction. There are also scholars believe that corporate customers from both external and internal perspectives that consumer groups and employees within the enterprise^[11]. Employees satisfaction of construction enterprises will directly affect consumer satisfaction. Therefore, considering internal customer satisfaction can increase employee job satisfaction as a customer satisfaction index. Therefore, customer satisfaction measurement indicators are as follows:

(1) Core construction results satisfaction, namely customer satisfaction for the core value of the construction results can provide.

(2) Form construction result satisfaction, namely customer satisfaction with external forms such as packaging and construction of construction results.

(3) Expected construction results satisfaction, namely customer satisfaction for the additional value of the construction results can bring.

(4) Additional construction results satisfaction, namely customer satisfaction with construction results related services.

(5) Potential construction results satisfaction, namely customer satisfaction for the social value of the construction results can bring intangible value.

(6) Employee job satisfaction is the labor satisfaction of internal employees in construction enterprises in the production process.

3.1.2. Project acceptance rate and cost control

Acceptance qualification rate refers to the proportion of qualified products produced by enterprises in the total production during a fixed period, which is the core indicator to measure the level of

production quality of enterprises^[12]. Therefore, the establishment of product qualification rate in the early stage of production is conducive to ensuring quality performance of enterprises. However, at the same time, the product qualification rate is closely related to the product cost. If the product qualification rate is too high, it will exceed the predetermined cost, causing unnecessary production pressure to enterprises. If the product qualification rate is too low, it will waste production resources and cannot bring economic benefits conducive to development for enterprises. Therefore, it is very necessary for enterprises to improve the product qualification rate and consider the production cost.

In the construction project, to improve the acceptance rate of the project, it is necessary to implement a series of measures such as strengthening quality supervision, maintaining the construction environment, improving the quality of construction materials, strengthening the maintenance of construction equipment, and improving the technical level of construction personnel. Behind these behaviors, enterprises need to bear additional construction costs. In order to better achieve business objectives, enterprises need to strengthen cost control. Compared with other enterprises, construction enterprises pay more attention to the cost control in the production process. Liu and Lu^[13] pointed out that the cost control of enterprises includes four links : cost planning and forecasting, control implementation, assessment and statistical analysis. The whole control process strives to achieve greater economic benefits with relatively less cost.

Therefore, this study evaluates the cost control level of construction enterprises from the following four perspectives:

- (1) Scientific cost prediction.
- (2) Cost control effectiveness.
- (3) Cost data completeness.
- (4) Cost analysis timeliness.

3.2. Measurement of core quality performance

3.2.1. Product design quality

The quality and characteristics of product design is gradually formed and clear in the process of product design, so the factors affecting the quality of product design are all over the whole design. With the gradual completion of the design, the design details eventually form a complete design quality. Specifically, in the stage of product design preparation, customer needs are refined into product quality characteristics, in the actual design of the product, the requirements of product quality characteristics are subdivided into core forms such as function and size of the product. Finally, the implementation of customer needs, product design quality^[14].

Compared with ordinary products, construction asset investment can bring more value returns to customers. Therefore, in the economic analysis of construction projects, people pay more attention to the life cycle cost of construction than the construction cost. For a project, the design quality in the early stage of the project greatly affects the cost and benefit in the middle and late stages of the project. Therefore, the improvement of architectural design quality is conducive to the development of the quality of construction enterprises^[15].

At present, the existing literature on enterprise design quality evaluation index design, divided into work quality, drawing quality, process quality and service quality four dimensions. Among them, through technical training, quality of work evaluation to measure the quality of work , measures the quality of drawings by drawing excellent rate , the quality of design process is measured by internal coordination system and compliance rate , measure service quality by external complaint rate^[16]. According to the design quality index (DQI) promoted by the British Construction Council, the design quality is evaluated from three dimensions: building quality, usability and effect. Among them, building quality is measured from building performance, technical equipment system and

construction quality , practicability is measured by customer satisfaction, actual number of residents and actual use space , the effect is measured by building appearance and materials, building internal environment, building characteristics and innovation and social evaluation^[15].

Referring to relevant literature, the quality of product design is evaluated from the perspectives of design preparation, design implementation and design effect. Specific measurement dimensions are as follows:

(1) Design preparation .Including the excellent rate of drawings and comprehensive customer satisfaction surveys.

(2) Design implementation. Including work quality evaluation, internal coordination system and compliance rate.

(3) Design effect. Including complaint rate and social evaluation indicators.

3.2.2. Standardization of construction quality management

The construction quality management standards mainly regulate the construction quality and construction safety. As an important part of the project, the construction quality greatly affects the construction quality of enterprises. At present, there are problems such as unscientific and insufficient quality control methods in the construction process. Construction safety has been paid attention to, and construction quality relative to construction safety needs to strengthen relevant research for the future. Wang^[15] pointed out that in the construction process, the importance of project quality control responsibility system should be emphasized, the model demonstration work should be comprehensively promoted, and the technical disclosure work should be strengthened, so as to strengthen the standardization of construction quality.

The influencing factors of construction quality management are throughout the whole construction process, such as materials, technology, environment, etc. The core of construction quality management standardization is to find out the general theories, methods and measures of engineering quality management, and then refine them into management standards to promote the improvement of engineering quality. It is considered to evaluate from four dimensions of management subject, content, method and management effect. Specifically, construction quality management standardization can be divided from the perspectives of subject, content, method and effect. Among them, subject standardization includes enterprise management personnel qualification, enterprise management organization setting standardization, subcontractor personnel qualification and supply unit management , content standardization includes quality technology management standardization and quality process management standardization , method standardization includes quality management system standardization, quality management system establishment and operation standardization, inspection standardization and information management standardization , quality effectiveness standardization includes quality objectives, assessment and rewards and penalties, complaints and accident handling, and excellence^[17].

Based on the relevant literature, this study considers the standardized evaluation from the construction subject, content and effect. The measurement indexes are as follows:

(1) Construction subject standardization, considering from the construction enterprise qualification, subcontracting unit qualification and supply unit qualification measurement.

(2) Construction process standardization, considering from the construction technology implementation, construction management system, construction management implementation, construction quality inspection, construction information management measurement.

(3) Construction effect standardization, considering from the construction quality target assessment, construction quality complaints and processing, construction quality breakthrough measurement.

4. Factors influencing quality performance of construction enterprises

Lu and Lin^[17] through exploratory factor analysis of management information, quality leadership, inspection, human resources, process control, improvement and innovation of 11 factors. Among them, quality inspection, human resources, geological exploration and design, construction technology and process control directly affects quality performance, resource assurance, quality leadership, information management, material supply, improvement and innovation, and qualification standards have indirect effects on quality performance through direct influencing factors. There are also literatures exploring the influencing factors of quality performance from the perspective of quality immune system, analyzing that organizational quality monitoring, organizational quality defense and organizational quality memory, as intermediary of other influencing factors such as organizational learning ability and self-examination, directly affect quality performance under the regulation of organizational culture, organizational structure, behavior control and result control^[18]. Some literature also pointed out that quality strategic plan affects quality performance through situational factors, human resource management has a positive impact on the operation, quality and performance of enterprises^[1].

Forker^[18] believes that quality performance is affected by internal operation practice and the relationship between enterprises and suppliers, among which internal operation practice is the practice of enterprise quality management. There are also scholars who identify leadership behavior support, customer product attention, employee motivation, quality statistical analysis, supplier management, production process management, continuous improvement as quality performance factors. Jha and Iyer^[19] identified leadership management ability, project participants enthusiasm, enterprise knowledge reserve, product competition market as the influencing factors of quality performance.

Based on relevant literature, the influencing factors of quality performance of construction enterprises are summarized as the core influencing factors and the basic influencing factors, among which the core influencing factors are:

(1) Human resources, that is, personnel management is the core to achieve high performance of enterprises. The core competitiveness of enterprises comes from the competitiveness of human resources. Zhang^[20] points out that enterprises should focus on performance appraisal and management in human resources management, and ensure that scientific performance appraisal indicators are set to ensure the reasonable implementation of assessment.

(2) Quality inspection. Inspection is the key for enterprises to control quality and the main task for quality inspection departments to participate in quality management. The general workflow includes defining standards, measuring products, standard comparison and quality feedback.

(3) The process control of construction can be divided into pre-control, process control and result control. The early stage of construction mainly focuses on construction design drawings and material preparation, the construction process pays attention to the construction personnel and construction technology implementation, the construction results focus on construction acceptance and customer service.

(4) Geological survey design, namely geological survey and design. The design of construction projects can be divided into three stages: project feasibility analysis, project design and construction drawing design. Geological survey can be divided into three parts: project feasibility survey, geological survey and comprehensive construction survey according to the design stage.

(5) Construction technology, that is, the construction organization should comply with the construction standards. During the construction process, the construction organization shall be strictly consistent with the construction contract and project requirements in order to reduce the mutual influence between the various systems.

(6) Organizational management practice is a collection of quality management optimization measures taken to improve the quality of construction projects, construction efficiency, customer satisfaction and competitiveness of enterprises^[21].

The basic influencing factors:

(1) Resource assurance, as part of cost assurance, is one of the media to obtain trust from internal managers and product customers, and it is also the basis for sustainable development of enterprises. Enterprises need to ensure the rationality of resource allocation while ensuring quality, so as to maximize the quality performance of enterprises.

(2) Qualification standard. Qualification standard determines the starting point of enterprise quality system, and compliance with qualification standard is the most basic quality requirement of enterprises. However, at the same time, relevant literature also points out that meeting the qualification standards is only the most basic requirement for enterprises. In the future, deepening innovation and pursuing higher performance are the value of enterprises.

(3) continuous improvement , at present, the quality loop, PDCA cycle, zero defect management theory, six sigma management theory, TQM theory is all existing research results. Through continuous inspection and improvement, enterprise quality can be effectively controlled and improved^[22]. However, some scholars put forward that it lacks creativity outside its norms, and it can be considered to increase its innovative attributes in the future.

(4) Strategic plan, that is, strategic approach specific action planning. Through the formulation of the strategic plan, the future development direction, objectives and measures of the enterprise is clarified. Therefore, the formulation of strategic plan affects the development trend of enterprise quality to a certain extent. Making scientific and reasonable strategic plan is the basis for achieving high quality performance of enterprises^[23].

5. Future research prospects

At present, the academic research on quality performance is mostly used as an intermediary in the influence of quality management practice on enterprise performance, and the research on quality performance itself is relatively less. The research in this field is mostly in supply chain enterprises, and there is less research on the quality performance of construction enterprises. Therefore, this study analyzes the evaluation index of quality performance of construction enterprises and summarizes the influencing factors by combing and combining the relevant literature of quality management and quality performance of construction enterprises. Based on the above, this study argues that the future can increase the path analysis of quality performance itself, and increase the quality performance evaluation and management of construction enterprises in the construction stage.

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