

Research on Industrial Building Quality Management System Based on Lean Construction

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Abstract: As an advanced project management mode, lean construction cannot only guarantee the project quality, but also reduce the cost caused by unnecessary rework and resource waste through the change of development organization and the improvement of quality control activities, so as to effectively shorten the project duration. This paper expounds the concept of lean construction, analyzes the disadvantages of industrial building quality management under lean construction, points out the key points of the implementation of industrial building quality management based on lean construction concept, and puts forward the supporting measures of lean quality management activities.

Keywords: Lean construction; Industrial buildings; Quality management

1. Concept of Lean Construction

The combination of lean construction system and construction management can obviously improve the efficiency of construction project management and realize the sustainable development of the construction industry. At present, lean construction is a relatively advanced construction industrialization mode in the world, which can effectively solve the problem of large production scale and low efficiency in the construction industry. It applies the theory and method of lean production to the construction process. By paying attention to the value stream, identifying and eliminating waste links, enterprises can maximize their benefits. From the perspective of embodiment, it is to produce various steel structures and concrete components for building structures according to the similar production mode of automobiles. This is the product of the deep integration of lean management and industrial construction, which makes building parts flow on the assembly line.

Introducing the idea of lean production into enterprise management can effectively improve production efficiency, shorten production time and ensure product quality. Lean construction system has been recognized by construction enterprises due to its unique advantages, and it has improved the importance of lean construction system in the construction management process, thus achieving significant results [1]. Therefore, based on the concept of lean production, lean construction system should fully and comprehensively consider the actual situation of construction engineering, skillfully combine the two effectively, and comprehensively adopt a variety of modern methods to gradually adapt to the actual de-

mand and market. In the lean construction system, we pay full attention to the creativity of people, constantly optimize the lean construction mode, realize the maximization of resource allocation, improve the standardization, rationalization and scientific degree of construction management, and realize the maximization of economic benefits. The basic principle of lean construction is to avoid excessive waste and maximize value.

2. Potential Problems of Industrial Construction Quality Management

2.1. The quality management system of construction enterprises is not perfect

The development level of the construction industry is not high, the institutional system of many construction enterprises are not perfect, the construction of quality management system requirements are relatively low.

2.2. Backward construction quality management of civil engineering projects

Quality control of construction materials on site is not strict enough, and quality management problems caused by the supply of raw materials are relatively common, which makes construction difficult. Quality inspectors of construction projects failed to follow up the quality control status in time and found unqualified problems as early as possible. Overlapping projects before and after does not do any good to the company's image building and brand building.

2.3. The quality awareness of the personnel involved in the construction project is poor

On the one hand, there is a lack of specific plans for the demand for labor and the staffing is unreasonable. From the perspective of corporate culture and personnel quality, leaders at all levels of the company pay little attention to quality management, have weak quality awareness and poor comprehensive quality.

2.4. Serious potential quality accidents

Many residents' safety awareness is weak, due to quality problems, it may lead to the occurrence of subsequent dangerous accidents, causing irreparable losses to personnel and property, which is also a disaster for the enterprise. In the construction process, the quality management is not strict enough, there is no quality supervision of the construction project in various aspects, and the control of the whole process is not careful enough, resulting in the irremediable defects of the project.

3. Analysis of The Necessity of Optimizing the Quality Management of Construction Projects

3.1. Manage customer needs

The setting of quality objectives shall meet the requirements of customers on the basis of meeting the relevant provisions of laws, regulations, technical specifications and standards, and strive to provide them with high-quality construction products and high-level services. Customer needs are not static, different target markets have different customer needs. Customer needs change over time. In addition to the physical performance requirements for durability, reliability, and safety of construction products, the services available during construction of engineering projects and the additional functions provided by construction products have also become a focus in recent years. The development enterprise must discover these changes in a timely manner, pay attention to the concerns of target customers, formulate quality management points, and accurately translate customer requirements into design quality and design standards. QFD (quality function deployment) is used as an effective tool for design quality formulation. Through the analysis and transformation of quality in the four stages of waterfall decomposition model, customer requirements are successively transformed into product rules, part rules, process rules, and finally design quality [2].

3.2. Combination of design and construction

In terms of managing and improving the design quality of development projects, lean construction advocates the integration of design and construction and the transformation of design patterns using concurrent engineering as a tool. Design pattern changes include the following two aspects: first, in the design of building products by

adopting the method of concurrent engineering, choosing the whole life cycle of the project development as the object, and consider the customer satisfaction, quality assurance, construction and other factors, establishing good information communication mechanism, it should not only consider the characteristics of the product during the product design and listen opinions from the sales, plan and technical personnel. Secondly, the design part, the contract part and the construction part are carried out in parallel. The construction unit shall timely feedback to the construction unit the problems encountered in the construction process, the irrationality between the design and the construction as well as the unpredictable natural factors and other changes in external conditions, so that the design unit can carry out design changes in a timely manner according to the requirements of the construction unit. The actual situation of the project, establishing a smooth channel for information exchange and feedback for the design, construction and quality control to reduce the design changes and the inconvenience to the quality control work.

3.3. Pay attention to the quality of the construction process

Unlike traditional project management in lean construction, quality should be generated during construction, not acquired through inspection. Each builder is not only the producer of the product, but also the manager of the quality of the product, as well as the people for checking the previous process. Therefore, the separate quality inspection work for each stage is transformed into a continuous quality creation activity. During the construction of the project entity, self-inspection, self-grading, self-recording and self-control activities are adopted to cultivate the quality awareness of everyone. All employees are required to participate in the quality control work. While doing a good job in quality control, unqualified products will not be delivered or received. Quality problems will be controlled in the early stage to prevent greater impact on the whole project, thus changing the plan-driven project construction method.

3.4. Management based on supply chain

The implementation of industrial building development projects is based on the construction supply chain. In order to ensure the smooth flow of value chain and transfer of quality in the supply chain, project developers should ensure that every subject should participate in quality management activities in the supply chain, and to ensure them can solve the quality problem, such as materials procurement, equipment leasing, and providing design plan, etc., to strengthen the quality control of all suppliers [3]. When selecting a supplier, we should not only consider the qualification and cost of the supplier, but also consider whether the raw materials, equipment,

design and other production factors meet the quality requirements of the developed product and the quality management awareness of the supplier, which are the main factors in the evaluation of the supplier.

4. Key Points for Implementation of Building Quality Management based on Lean Construction

The quality management concept under the lean construction was originated from the total quality management of manufacturing management techniques, which started from the determination of the quality requirements from customers, and finished with the final delivery of products as well as the satisfaction level of customers, this is the whole process of quality management, which is not only the management of the construction process, but also is whole the management process from the design, procurement to sales and after-sales service, and through the process management to ensure the final quality. All employees must focus on quality and participate in customer value creation activities.

The concept of customer value first in lean construction is embodied in the business process, and the response speed is improved through simple standardized process design. Establish a flexible enterprise organization, break through the strict boundaries of division of labor, in order to achieve the goal of lean project management with high quality and low waste, reorganize functions, establish cross-functional mobile team, and create conditions for the enterprise. At the same time, improve the quality efficiency. Site managers focus on the formulation of quality plans and spot checks of quality control points to clarify responsibilities and rights. Establish perfect information system, record all quality information accurately, realize the sharing among all departments of project development, and provide basis for quality improvement. With the support of the information system, improve the information exchange mechanism among project participants, and ensure that all participants exchange information during the concurrent engineering implementation process, as well as develop enterprises' need to establish partnership with all parties in the supply chain.

5. Measures to Optimize the Quality Management of Construction Projects

5.1. Optimization measures in the construction preparation stage of the construction project

Construction project quality management is a dynamic process, rather than simple documentation and system settings. From the beginning of the construction preparation, mainly including the following three points: the first is the construction quality management system. In terms of quality inspection, the project department

should take the lead in recording the real-time measurement of construction data through three levels of inspection: self-inspection by the construction team, professional inspection and handover inspection by various departments. In terms of quality evaluation, the frequency of quality evaluation should be once a month. If the construction team obtains low scores three times in a row, it should conduct professional training and change jobs. In terms of quality supervision, construction complaint boxes should be set up, construction complaints should be made anonymously, and strict investigation system and perfect rewards and punishment measures should be established [4]. Second, the quality objective management system, the implementation of the quality objective management system. Third, the construction schedule planning system. In the preparation stage, the construction period shall be determined according to the requirements of the owner and the developer, and the production and operation mode shall be established to determine the earliest and latest start date and completion date, which shall be combined with the actual situation.

5.2. Construction project quality measurement standard and quality control optimization measures

Construction project quality measurement specification and quality control optimization is a part of quality management process control, which is the implementation at system level. Quality control measures, which includes project quality control and process quality control, and requires detailed control points for each department. The key point of quality control is the key link of quality control in the project. The key points of quality control involve departments such as quality department, construction team, safety department, procurement department and design department.

5.3. Optimize the implementation rules for quality management of construction projects

This section can be used in the actual construction process and specifies the quality requirements and organizational measures for each process and level. It mainly includes the following two points: first, the organizational measures of quality assurance. Pay attention to the integration and allocation of resources, combine the enterprise strategy and quality objectives for the integration and allocation of resources, actively allocate advanced technical backbone to participate in the design and construction work. To pay attention to the organization and coordination, during the construction to pay attention to the unified coordination of the construction site, the implementation of a unified arrangement and action mechanism, pay attention to the supply of materials and funds guarantee. The enterprise and the project

department shall organize the financial department to control the cost mainly on the basis of quality.

5.4. Optimization support system for construction project quality management

The implementation of quality management needs a scientific training system, and the construction personnel and related personnel need professional training before construction. If the training is not done well and the construction personnel do not understand the quality management, it will hinder the promotion. The attention from senior leaders plays a role in promoting the implementation of the new quality management system. The attention and participation of construction personnel can make the optimization of quality management proceed smoothly and also contribute to the practical application. Scientific and effective performance management mechanism, as a check and guarantee system for optimizing quality management, can implement quality management mechanism accurately through specific standards.

6. Conclusion

The significance of lean construction system is to continuously enhance the quality and ability level of construction management. Therefore, it is necessary for construction enterprises to realize the importance of lean construction system as soon as possible, and give full play to its unique advantages, so as to protect the development and progress of construction enterprises. Practice has proved that the implementation efficiency of lean construction enterprises has been greatly improved.

At present, in order to promote the rapid development of lean construction and construction industrialization, we need to pay special attention to the following aspects: using lean construction to realize the industrialization of the whole industry chain of the construction industry. The whole industrial chain, while ensuring the realization of the quality, construction period and other objectives, improves the enterprise income and realizes the industrialization of the whole industrial chain of the construction industry. Lean construction promotes the green development of the construction industry.

7.Acknowledgment

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