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Research on Engineering Quality Management Based on PDCA Cycle

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Research on Engineering Quality Management Based on PDCA Cycle

Yan Chen^{1,*}, haoqi Li²

¹School of Management Engineering, Qingdao University of Technology, Qingdao, China

²School of Management Engineering, Qingdao University of Technology, Qingdao, China

Corresponding author e-mail: 1017710702@qq.com

Abstract: With the increase in the number of construction companies and construction personnel, the occurrence of engineering quality accidents has also increased. Therefore, the management of project quality is very important. This article mainly introduces the connotation of construction quality and construction quality management, analyzes the factors influencing construction quality and the characteristics of construction quality control, and applies PDCA circulation principles to project quality management, hoping to help improve the level of project management.

1. Introduction

With the gradual deepening and development of reform and opening up, our country has also continuously improved the overall level of construction project quality and service quality^[1]. However, since China's accession to the World Trade Organization, foreign construction has entered the domestic market, and the domestic construction market has faced severe challenges. In the global market competition, whether China's construction industry can be in line with international standards, occupy a seat in it, and succeed in project management, the key lies in whether there is an advanced management concept and it is well implemented^[2].

The quality of construction projects not only relates to the practicality, reliability, durability, and investment benefits of construction projects, but also directly relates to the safety of people's lives and property. It is one of the main tasks of construction project management to effectively strengthen the construction quality management of construction projects, prevent and correctly handle the quality accidents that may occur, and ensure that the project quality achieves the desired objectives.

According to the 2017 China Statistical Yearbook, as of 2016, the number of construction enterprises in China has reached 83,017, an increase of 2,106 from 2015, with 51,845,000 employees, an increase of 908,000 from 2015. Figure.1 reflects the line graph of the relationship between the



number of construction enterprises and the year in China in the past 10 years, and Figure.2 reflects the line graph of the relationship between the number of employees in the construction industry and the year. This shows that the construction industry occupies an important position in our country. However, with the continuous construction of a large number of construction industry, construction quality problems are also emerging. Therefore, it is necessary to strengthen construction management.

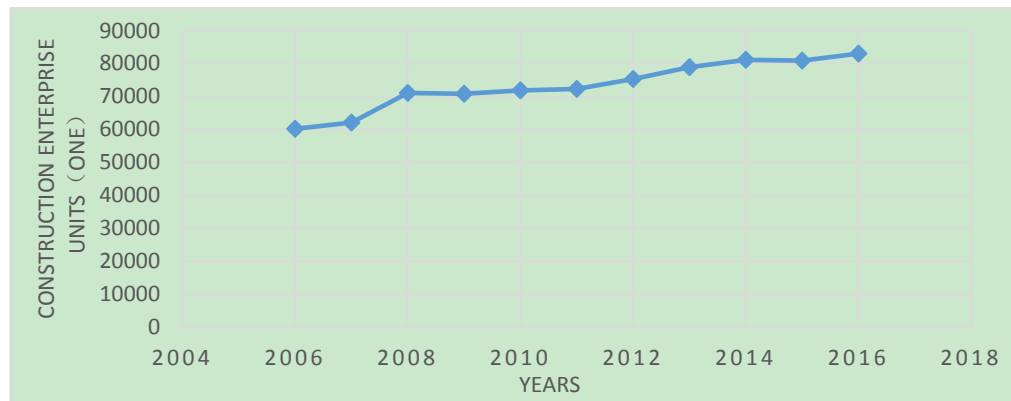


Figure.1 Line chart of the number of units and years of construction companies

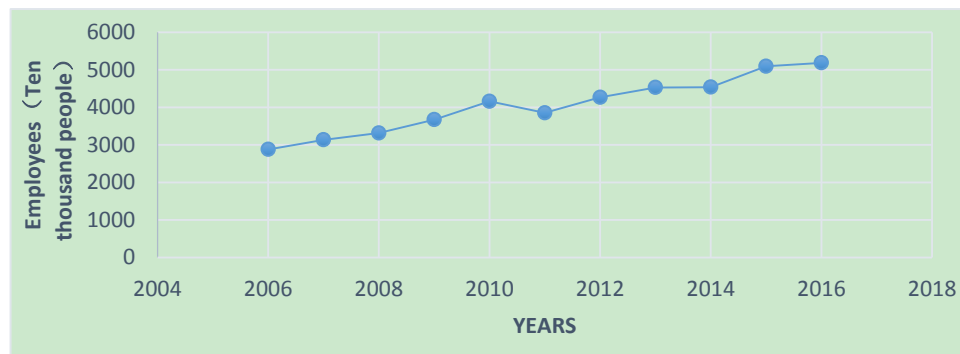


Figure.2 Relationship between the number of employees in the construction industry and the year

2. Construction Quality and Construction Quality Management

2.1 The connotation of construction quality

Construction quality refers to construction project construction activities and the quality of their products, that is, through the construction of the project to make the project's inherent characteristics meet the needs of the construction unit and in line with national laws, administrative regulations and technical standards, specifications, its quality characteristics are mainly reflected in the construction The six aspects of the applicability, safety, durability, reliability, economy, and coordination with the environment of the construction project.

2.2 The connotation of construction quality management

The construction quality management refers to the coordination and coordination of the construction organization's quality control during the construction and installation and completion

acceptance of the project. It is the planning, organization, and planning of the project that revolves around the construction product quality to meet the quality requirements. The sum of all management activities such as implementation, inspection, supervision, and auditing. It is the common responsibility of the leaders of the functional departments at all levels of the project construction, and the top leader of the project construction, that is, the construction project manager, should take full responsibility. The construction project manager must mobilize the enthusiasm of all personnel involved in the quality of construction and work together to do their own work in order to complete the task of construction quality management.

2.3 Factors Affecting Construction Quality and Characteristics of Construction Quality Control

The factors that affect construction quality are various, but they are mainly divided into five major aspects: people, materials, machinery, methods, and environment, namely 4M1E. Figure.3 details the factors that affect the quality of construction.

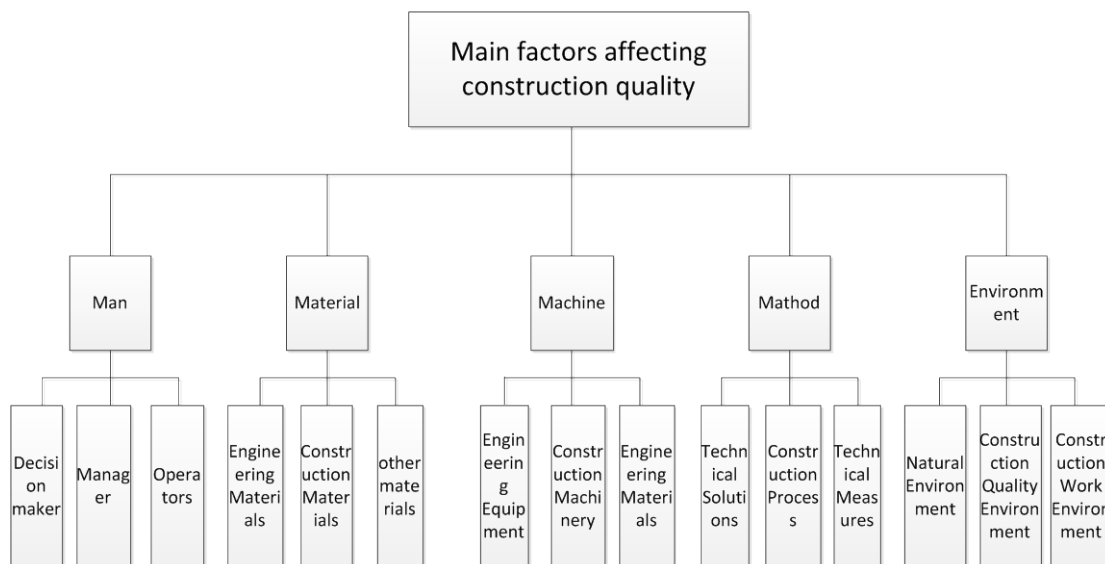


Figure.3 Factors Affecting Construction Quality

It is precisely because of these factors that the construction quality is not easy to control, construction quality control has the following characteristics. (1) The need to control more. In addition to people, materials, machinery, methods, and the environment, it also includes human technical management factors such as surveys, design, construction processes, technical measures, management systems, and methods. (2) It is difficult to control. Because the construction product has a single piece and the flow of construction production, it does not have a fixed production line, a standardized production process, perfect detection technology, a complete set of production equipment, and a stable production environment, which are common in the production of general industrial products. The construction of standardization makes it easy to fluctuate construction quality. Moreover, the construction scene is large, the number of personnel is large, the processes are numerous, the relationship is complex, and the operating environment is poor. This has increased the difficulty of quality control. (3) High process control requirements. The construction process of the project has many process convergences, multiple intermediate handovers, and many hidden projects. The construction quality has a certain degree of process and concealment. The quality of the previous process often affects the quality of the next process. The quality of the next process often masks the

quality of the previous process. Therefore, in the construction quality control work, we must emphasize process control, strengthen the quality inspection of the construction process, and promptly discover and rectify existing quality problems. (4) The final inspection limit is large. The completion acceptance of the project can only be checked from the surface, and it is difficult to find hidden quality problems that are generated in the construction process and hidden. This has great limitations. If serious quality problems are discovered during the final inspection, it will be difficult to rectify them. If we have to push down reconstruction, it will inevitably lead to major losses.

3. The PDCA cycle

The PDCA cycle, also known as the Deming Circle, was first proposed by W.E. Deming, a prominent American quality management expert. This cycle mainly includes four stages: planning, implementation, inspection and processing.

3.1. The concept of PDCA cycle

1.Plan: The plan is the primary link of quality management. Through the plan, it determines the quality management policy and objectives, as well as measures and action plans to achieve the goals and objectives. The plan includes quality management goals and quality assurance work plans. The determination of quality management objectives is based on the project's own characteristics, contrary to the quality problems that may occur, the quality of common diseases, and the gap between the quality standards and the provisions of national regulations, or users' updates, higher quality requirements, determine the quality standards that the project construction should achieve.

2.Do: The implementation includes two steps, that is, the completion of the plan of action plan and the technical activities of the construction operations that are required by the method and requirements specified in the plan. First of all, we must do a good job in planning and implementing the plan. Implementation includes the implementation of the organization, implementation of technology and materials. Secondly, in the construction activities carried out according to plan, we rely on the quality assurance work system to ensure the implementation of the quality plan. Specifically, it is necessary to rely on the ideological work system to do a good job of ideological education; rely on the organizational system, improve the organization, implement the responsibility system, rules and regulations, etc.; rely on the quality control system of the product formation process, do a good job in the quality control of the construction process etc.

3.Check: The inspection is to check the plan, check the implementation and effect of the implementation, and promptly detect the deviations and problems in the implementation of the plan. The inspection generally includes two aspects: First, check whether the planned action plan has been strictly implemented, check whether the actual conditions have changed, summarize the experience of successful implementation, and identify the reasons for failure to implement the plan; second, check the results of the implementation of the plan. That is, whether the quality of the construction meets the requirements of the standard, and it should be carefully evaluated and confirmed.

4.Action: Action is based on inspection, affirming successful experience and forming standards to facilitate the use of this as a basis for processing in future work, and consolidating the results; and taking measures to correct deviations in the implementation of plans, overcoming shortcomings,

correcting mistakes, for problems that cannot be solved, it can be recorded and left to be solved in the next cycle.

3.2 Application of PDCA cycle in project quality management

The quality management in the decision phase and the quality management before construction are equivalent to the first link P in the PDCA cycle. Their functions are equal and their purposes are the same. They are all collecting materials, formulating standards and plans, demonstrating feasibility, and making preparations. In the project, it is equivalent to the design stage. The designer should fully collect the data and communicate with the owner to provide high-quality drawings. The quality management in the construction process is equivalent to the second and third links in the PDCA cycle, D and C. In addition to the construction, the site control and inspection are also performed in this link. This is equivalent to the construction supervision. The main responsibility of the task and supervision is to check and avoid the occurrence of engineering quality problems. If quality accidents occur, on-site processing is also required. This content takes into account the functions of the second and third aspects of the PDCA cycle. The quality management after the completion of the project is equivalent to the last link A in the PDCA cycle. In this link, all parties involved in project quality management review and summarize the quality of the project and ask questions, which can be resolved through consultation. The problems that emerged can be an important part of future project quality management. Realizing the PDCA cycle in the project quality management content can better promote the continuous improvement of the project quality management [3].

It can be seen from this that the quality assurance system is running in accordance with the cycle of the PDCA cycle. Once it is run, the construction quality will be improved by one step. If any one of these links goes wrong, it will lead to deviations in the quality of the project. Therefore, these four links are interlocking.

4. Conclusion

Although the construction industry in our country continues to develop, quality accidents are also increasing. Engineering is a dynamic system. It does not have the same standardized features as the production line. Therefore, the difficulty of quality management and control is greatly increased, however, in order to minimize quality accidents, not only the construction party needs to strengthen the construction quality, but also all parties involved in the project must pay attention to quality management. For example, from the designer's start, it is necessary to pay attention to the quality of the design drawings. During the construction process, the supervisor must strengthen the quality supervision. Once a problem is found, it should be promptly resolved. The supplier should ensure the quality of the material. The construction party must ensure the quality of the construction. In short, regardless of the stage or the entire process, the principle of PDCA cycle should be applied to achieve the optimal level of project quality management.

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