Construction Project Management and its Control Measures

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Abstract

With the rapid growth of China's economy, people's living standard has been improved significantly, and urban development appearance has also been refreshed; people have higher requirements for the quality of living environment, and at the same time, the urbanization development also puts forward higher requirements on construction projects. The construction project management is difficult due to various reasons such as technology, environment, economy, and construction project management chaos phenomenon occurs frequently, which leads to construction project management problems, such as construction cost being out of control, decrease of construction quality, uncertainty of construction safety; the construction risks of construction project will also be significantly increased, which is not conducive to the healthy development of construction industry and is unfavorable to the unity of social stability. Based on the analysis of the current situation of construction project management, this paper identified the shortcomings existing in the construction project management, analyzed various risks generated in construction project management with the risk control model to explore the importance of risk control of construction management, and put forward related control measures to improve the construction project management in China.

Keywords: Construction Project, Current Management Situation, Problem Analysis, Control Measures.

1. RESEARCH BACKGROUND

1.1 Research overview

In recent years, China's exchange with other countries was on the increase, and many advanced construction concept and technology were introduced into China, presenting a flourishing situation of development in just 30 years development of the construction industry. However, the prosperous development covered the existing problems and defects of the current construction project management in China, such as security of construction projects, wage of migrant workers, quality of construction projects, which aggravated the social contradictions and brought adverse effects to people's life and property security. These problems are fundamentally due to improper construction project management and indifference of the management staff to the quality, safety, and cost of construction projects, causing frequent occurrence of construction project management problems and series management disorder (Lu and Sun, 2013). Therefore, it is necessary to make an in-depth analysis of the present condition of the construction project management, in order to find out the existing shortcomings and eliminate these problems through the targeted control method to reduce the existing risks of construction project management. It is of important practical significance for promoting the development of construction projects, maintaining social stability and unity, and promoting social and economic growth (Yan et al., 2013).

1.2 Research purposes

The purpose of this study was to find out the deficiencies and problems by analyzing the current situation of construction project management, make in-depth discussion of these deficiencies and problems, and use the risk control model to identify the loss and impact incurred by these problems and deficiency to the construction project management, so as to find out the root cause of the disorder of construction project management, eliminate the adverse effect by the corresponding control measures, reduce the risks in construction project management, improve the level of construction project management, and implement smooth operation of the management of construction projects.
2. ANALYSIS OF CURRENT SITUATION OF CONSTRUCTION PROJECT MANAGEMENT

2.1 Unscientific construction project design and material management

The continuous emergence of advanced construction ideas and construction technology have enriched the construction structure type in China, which makes the design, construction and management of construction management much more difficult; in the process of designing the drawings of construction projects, however, designers only apply the drawings mechanically in the construction projects, causing the inconsistency of the construction of architectural structure and its design, making the stress of the construction projects complicated and uneven, and significantly affecting the safety and quality of construction projects (Shi and Li, 2013). In addition, the overall atmosphere of China's construction market is weak, and the market supervision is not strict enough; this is why many material suppliers reduce their costs and gain greater profits by adulteration and some construction enterprises choose low-quality building materials or cheat on workmanship and materials; some other factors still exist, such as unreasonable design drawings used in construction projects, limitation of the construction level of constructors, loose management on construction sites, etc., causing great safety risks in the process of construction, significantly reducing the quality and service life of buildings, leaving hidden dangers in the production and life of people, and seriously threatening the safety of people's life and property (Liu and Jiang, 2013).

2.2 Unreasonable allocation of construction project labor force

The biggest bottleneck of for construction projects does not lie in their construction standard, design standard and acceptance standard, but in the unreasonable allocation of labor force, which makes it impossible for construction projects to meets each relevant standard and makes the development of construction projects seriously restricted (Xu and Fan, 2016). The unreasonable allocation of labor force is the core problem of construction project management in that labor force is the performer of construction projects and acted by constructors, whose operation level directly determines the quality of construction projects. Therefore, the quality of construction projects is determined not only by the design standard but the good quality of labor force of constructors. At present, how to make the construction personnel have good labor quality to guarantee the construction quality has become a big problem in China's construction project management. Most of the construction enterprises in China are not reasonable in the allocation of labor force, leading to the disorder and illegal operation in the management process, which greatly affect the quality of construction projects or event cause safety accidents and huge economic losses to construction projects. To ensure the reasonable allocation of labor force in construction projects, it is necessary to make strict compilation of the construction organization schemes according to the relevant standards of the state, and for some certain special procedures and key processes, it is a must to conduct the third level training and technical disclosure, reasonably connect each procedures based on the construction organization design scheme, operate strictly according to the corresponding standard process, so as to continuously enhance the construction quality of the projects and improve the construction quality of construction projects (Li and Li, 2016).

3. RESEARCH ON RISK CONTROL OF CONSTRUCTION PROJECT MANAGEMENT

Based on the above analysis, the root cause of the current situation of China's construction project management lies in the fact that the design of construction project and materials management is not scientific and the allocation of labor force is not reasonable, which greatly increase the risks for the construction project management and bring various problems to the management, such as disorder management, improper material storage, illegal operation, insufficient safety awareness of constructors, etc.; if no corresponding measures are taken to solve the problems, adverse influences will be brought to the construction quality and safety of construction projects. Therefore, corresponding measures must be formulated to reduce the risks for construction projects (Hu et al., 2014). To this end, the discussion of this paper was based on the establishment of risk loss assessment model of construction project management.

3.1 Overview on risk control theory of construction project management

In the process of construction project management, it is necessary to identify all risk factors before analyzing and evaluating them; then quantified mode shall be adopted to evaluate the degree of influence and probability of occurrence of these risks to the construction projects, and targeted preventive measures shall be developed based on the categories of the risks, so as to prevent or alleviate the adverse influence of the risks to the
construction projects. These are the most important control measures in construction project management. The management level of construction projects can be significantly improved through controlling various risks in construction projects, to solve the above problems radically. In construction project management, risk factor is the cause of management problems; some risks are typical risk factors, such as risk of the allocation of labor force, material risk, design change risk; risk events are a series of uncertainty events which may be induced by risk factors, while risk loss refers to the impact brought by the risk event to construction projects (Liu et al., 2017). The formation mechanism of risks can be inferred as shown in Figure 1.

![Figure 1. Formation Mechanism of Construction Project Management Risk](image)

Management staff can effectively identify risks based on the analysis of risks and specify the function channel, rules and internal relationship of various risks; the analysis of construction project management risks has the following characteristics: objectivity, universality, inevitability, variability, diversity, hierarchy, relativity and testability; the management of construction project risks requires formulating management strategy, implementation decision, examination and other relative work of the potential risks in the management process (Zhang and Liang, 2017). Figure 2 shows the construction project management risk control process.

![Figure 2. Construction Project Management Risk Control Process](image)

The management of risks requires formulating a management plan with high feasibility, which should include management main body, management objectives, management scope, management organization system and cost effectiveness. Before managing the risks of construction projects, it is necessary to identify the risks with such methods as verification method, expert investigation method, decomposition analysis and graphic method and compile the identified risks into a risk identification list.

### 3.2 Establishment of construction project management risk model

After risk identification, it is necessary to make necessary analysis and evaluation of the risks to help designers make objective evaluation of the influence degree and probability of occurrence of the risks to the construction project in a quantitative way and formulate targeted measures to prevent and control the risks (Zhang et al., 2017). The establishment of risk model is an important part of risk assessment. Risk model includes risk probability model and risk loss model. The establishment of risk probability model can be carried out by inquiring about historical data and related data, and the main evaluation methods include equally likely method, statistical estimation method and expert evaluation method. The establishment of risk loss model can be carried out through the loss expectation method, and the calculation formula of loss expectation \( Q_w = Q_0 F_w \) can be used.
for evaluating the loss of single factor risks. In the calculation formula, \( Q_n \) represents the loss expectation, \( F_w \) represents the probability of a single risk factor, and \( Q_t \) represents the loss of the investigation target. For the loss assessment of multifactor risks, it is necessary to calculate the correlation probability \( R_{ab} \) of multiple risks, assuming that there are \( n \) risks in a construction project, namely 1, 2, 3, 4, 5, ..., \( n \). \( R_a \) represents the occurrence probability of these risk factors, namely \( 0 \leq R_a \leq 1 \). Assuming the risk \( a \) in \( R_a \) occurs, then the probability of occurrence of risk \( b \) is \( 0 \leq R_{ab} \leq 1 \); if \( R_{ab} = 0 \), then risk \( a \) and risk \( b \) are not necessarily associated; if \( R_{ab} = 1 \), then in the case that risk \( a \) occurs, risk \( b \) will occur inevitably. Then, calculate the conditional probability of the occurrence of the risk based on \( R \left( \frac{n}{b} \right) = R_a \cdot R_{ab} \), and calculate the loss of the multi-risk \( K_a \) based on \( K_a = C_n \cdot C_{original} \); in the formula, \( C_n \) represents the cost of the project after the occurrence of risk \( n \), and \( C_{original} \) represents the original cost of the project. Then the expected value of \( n \) risks is calculated, which can be calculated according to the formula \( Q_n = \left( \begin{array}{c} R_1 \\ \frac{1}{2} \\ \vdots \\ \frac{1}{n} \end{array} \right) \left( \begin{array}{c} R_{1/2} \\ R_{2/2} \\ \vdots \\ R_{n/2} \end{array} \right) \left( \begin{array}{c} K_1 \\ K_2 \\ K_3 \end{array} \right) = \left( \begin{array}{c} Q_1 \\ Q_2 \\ Q_3 \end{array} \right) \), where \( Q_n = \sum r(m/n) \cdot K_n \). Finally, arrange the calculated expectation values of loss according to their sizes, and calculate the percentages of the values in the total expectation value of loss; then classify the main risks and general risks and adopt pertinent measures for prevention according to the categories, so as to achieve the goal of enhancing the construction project management level (Cai and Zhan, 2017).

4. RESEARCH ON CONTROL MEASURES FOR CONSTRUCTION PROJECT MANAGEMENT

4.1 Strengthening construction project management mechanism establishment

To improve the management level of construction projects, it is a must to strengthen the construction management mechanism establishment; only by taking the construction project quality and safety as a priority can the construction project management level be improved significantly. Construction project participation units shall establish a responsibility system to comprehensively specify and implement the management content and responsibilities, enable it to be implemented in each link and management personnel of the construction project, conduct high standard project management in accordance with the specific rules and relevant standards of the management mechanism, strengthen the supervision and inspection of the construction project management, and deal with those responsible timely in case of any quality and safety problems (Xie and Luo, 2014). At the same time, corresponding measures should be taken to make up for the problems that occurred in the construction process, and the management personnel with outstanding management ability should be appropriately rewarded. In addition, management staff should also strengthen the safety education system and do a good job in the third level safety education and technical disclosure; they should also strengthen the learning of knowledge of project construction management, establish detailed management systems with high feasibility, such as visa approval system, civilized construction system, etc., to constantly improve the standardized management of construction project in China and fundamentally solve the problems existing in the construction project management.

4.2 Enhancing the supervision of construction project management

Construction market in China at the present stage mainly takes the form of bidding for project construction; if there is no strict supervision and management of construction project, the architectural engineering construction quality will be difficult to secure, and the occurrence probability and the impact degree of all kinds of risks of construction projects will increase dramatically. Therefore, it is necessary to increase the effect of regulation of construction project, and the management staff must make thorough investigation and inspection of the construction sites, identify the construction goals and relevant requirements of the construction projects, specify various risks and influence factors of construction projects, formulate detailed supervision and management rules for specific tasks and each link, such details of relevant contents in acceptance standard, acceptance content and quality assessment in the acceptance of construction project, so as to ensure that there are laws to abide by and records to track in management (Zhu and Wang, 2015). In addition, construction enterprises should also clarify the responsibilities and obligations of supervisory personnel at all levels and strengthen supervision to ensure that no violations will occur in the process of project management.

4.3 Strictly following the management procedure in the implementation of construction
In the process of project construction, all participating parties must conduct thorough analysis of laws and regulations of the state as well as relevant documents, and formulate higher design standard to regulate the construction projects based on the current construction environment. For example, as for the design, construction and acceptance of a construction project, it is strictly forbidden to carry out follow-up construction until the last construction task is completed guaranteeing both quality and quantity. All participating enterprises should establish strict design approval system, and implement strict acceptance and quality evaluation of all details of construction projects (Liu and Peng, 2017). At the same time, professional managers should also be employed to make objective evaluation of the construction quality and management level of the construction project, various opinions should also be solicited extensively, and problems in the project should get feedback and be dealt with timely, so that quality guarantee should be made in every detail to ensure the quality of the construction project and the project is enabled to carry out in strict accordance with the stipulated management procedure.

5. CONCLUSIONS

Construction project management needs to involve multiple links, which puts forward high requirements for the systematicness of the management work. With the rapid development of China's economy and the construction industry, a large number of private construction enterprises have been entering the construction market, intensifying the competition of the market and increasing the management difficult of construction projects. Through the analysis of the defects and problems of the construction project management in China, it is found that there is still a long way to go for the development of China's construction project management, which needs the joint efforts of all participating parties of each project.

REFERENCES

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