Influencing Factors and Control Measures of Construction and Installation Cost Management

Jianing Wang

Department of Civil Engineering, Qilu Institute of Technology University, Jinan, 250353, China

845190@hhu.edu.cn

Abstract. In the context of the current social and economic development, the cost management of the construction and installation project, as a highly complex project, is crucial. Project costs must be effectively controlled to realize the economic and social benefits of engineering construction. This paper summarizes the development overview of international construction and installation cost management, including the management characteristics of the United States, France, China and other countries. At the same time, it analyzes the factors affecting the cost of building installation projects, such as design, construction, management and materials and equipment. Finally, control measures to improve the cost management of construction and installation projects are proposed, including improving the quality of bidding management, comprehensively implementing cost control, enhancing the quality of the cost control team, and improving the management system. Through in-depth research and the implementation of effective measures, the sustainable development of the construction industry can be better promoted.

Keywords: Construction and installation projects; Installation cost; Economic efficiency; Cost management.

1. Introduction

Under the influence of the current social and economic development, the construction project has a high complexity project content. In the installation project, implementing the control management work is extremely important to realize the better development of the cost link. Therefore, relevant work units must strengthen the full study of its various influencing factors. The building installation project is the most important part of the construction process. It must be a full range of cost control and management to improve the project construction's efficiency. In the construction and installation project, it is necessary to control the influencing factors of the project cost promptly and establish a set of scientific and efficient cost control mechanisms to ensure the reasonableness and scientificity of the construction and installation project cost [1]. Based on saving cost, at the same time, the economic efficiency of the construction project is effectively improved [2].

2. Overview of International Construction and Installation Cost Management

In the 16th century, because of the development of socialized mass production, the common labor scale was expanding in the labor division of labor, and collaboration became more complex in the engineering construction consumption measurement and estimation needs and produced the engineering installation cost management. After more than 400 years of development and improvement, has formed a set of cost management personnel rely on a variety of ways to obtain project-related information, and according to the pricing basis, based on a reasonable price, the project cost assessment, to be closer to the actual market situation. The government usually carries out effective indirect regulation and control of project cost and implements market-centered dynamic control of cost in project execution [3].

2.1. Construction Cost Management in the United States

The United States is a more developed market economy under a project costing association, and its construction cost management has the following characteristics: the owner of the independent

responsibility, the investor proposed to build a project, there is a rough idea about the investment, and then outsourcing valuation, the owner of the audit identified. Relevant professionals to carry out an independent valuation, in the process of preparing the valuation, the realization of the form needs to be standardized, other things such as the preparation of the implementation of procedures, methods, reference price parameters and calculations, etc. by the valuer to decide, do not make uniform requirements. The whole process is monolithic, from the program selection optimization of design to the implementation of construction and other stages of cost control. The owner only needs to entrust the entire process to a company to complete so that the link between the front and back of the work of the various segments of the convergence of consistency and coordination of echo so that the responsibility for the failures can be easily delineated clearly. Has a strong social service function. In the community, there is professional preparation of cost information commercial companies, socialized computer information networks, and engaged in public welfare cost association.

2.2. Construction Cost Management in France

In France, such work as engineering costing is known as construction economics, and the practitioners are known as construction economists. In the 19th century, the government managed real estate and construction economics in France, and from 1950 onwards, by construction economists. In 1965, France introduced the qualification system for construction economists, and in 1972 and 1975, the French Federation of Construction Economists and the European Federation of Construction Economists were established, respectively. The Government is, therefore, only responsible for the qualification of construction economists. It does not intervene in their specific work, with the various bodies working within a larger area of responsibility.

2.3. Construction Cost Management in China

The construction industry is an important pillar of China's economic growth and has made outstanding contributions to national economic growth for a long time. With the development of society, the acceleration of urbanization, and the improvement of the technological level in the construction field, the competition in the market will become more intense, and the demand for the construction industry will also increase. However, construction project cost management, as an important part of the construction industry, will affect the construction of the whole project, which in turn puts higher requirements for construction project cost management. The management of construction project costs in China is gradually adapting to the market's requirements, but some things could still be improved in the actual operation [4]. There are still many problems in China's current construction project cost management. For example, the construction project cost management organization and system still need improvement, and there is a lack of supervision of the whole construction project cost management process, a lack of high-quality professional and technical personnel, etc. These are the main factors restricting the development of construction project cost management [3].

2.4. Construction Cost Management in Other Countries

In Australia, federal government agencies have authorized several non-governmental organizations to formulate and administer the relevant uniform regulations, and these rules are often derived from market practice. For work related to cost measurement, budget surveying companies can be commissioned to provide the relevant services. In Canada, there are unified rules for calculating the quantity of work, classifying and coding all projects, and the relevant departments regularly publish the prices of labor, materials and machinery, which are based on the construction industry associations or qualified companies to organize the completion of these prices. In Canada, the development of cost consultancy has been quite mature, which can make timely analyses and predictions of project costs and provide corresponding control measures for the relevant departments. In Germany, the base unit price of each project is based on the cost of previous projects, plus regional differences and differences arising from different construction periods to determine the new unit price.

The unit price is multiplied by the number of projects to obtain the total cost of the project, and the sum of the total cost of each project is the total cost.

3. Characteristics of Construction and Installation Cost Management

Construction and installation project cost management refers to the use of scientific and technological principles and methods to ensure the economic efficiency of the construction project and the economic interests of all parties concerned based on a unified goal, each responsible for a series of business behavior and organizational activities involving the whole process of the cost of the project, all-encompassing, and consistent with the policy and the objective law. The construction industry is characterized by a high complexity of implemented construction processes, variability of implementation conditions, diversity of facilities, applied technologies, and methods of work organization. The execution of construction projects is specific and difficult because each implementation is a unique, complex, and dynamic process consisting of several subprocesses related to each other in which various investment process participants take part [5]. Therefore, by effectively controlling the project cost, ensuring the rationality and scientificity of the project cost management, reducing the investment cost, and then optimizing the use of funds, rationally applying the limited resources, and enhancing the investment efficiency of fixed assets, it can play a more positive role. Project cost management must follow the objective laws and characteristics of the cost movement, the use of legal means, economic means and scientific means to solve all kinds of economic management problems encountered in the construction to ensure that all human, financial and material resources can be put to the best use, and to achieve the goal of the win-win situation [6].

4. Influencing Factors of Construction and Installation Cost Management

Through the questionnaire methodology, it is possible to understand that the most important factors agreed upon by the general manager, project manager, contractor, supervisor, and site engineer in the building construction projects are the level of specialization required of contractors, Consultant's level of construction sophistication, Importance for project to be delivered, Consultant experience with similar project, Communication among project team, Availability of management and finance plans, Uncertainty of taxes, Level of competition, Knowledge of client and consultant average, Availability of cost indexes [7]. Several of these important influences are detailed below.

4.1. Design Consideration

In the design phase in the implementation of construction and installation projects, the most critical cost impact factor, the investment, has a decisive role. Installation project in the implementation of cost control work is the key in the installation before the overall planning and program design in the project to determine the investment, for the project investment in cost control is the key to the control of the design factors [8]. Usually, in building construction, different designs should be made for different environments. In the process of project cost control,it should carry out planning and design of construction and installation projects to ensure the feasibility and scientific nature of various programs. At the same time, it should clarify the investment in construction and installation projects, laying an important foundation for subsequent cost control and management work. The design factor contains more content, including general layout design, architectural design, and other aspects [1]. In the actual construction process, usually according to the construction of the area of origin, the degree of destruction, the cost of transportation of raw materials and other aspects will have a certain impact on the cost. The overall arrangement considers the appearance of the building objectives, space and other detailed factors affecting the put into use. In addition, the height of the floor is also an important reference, the higher the floor of the building, the greater the difficulty in construction. Such as the consideration of heating, periphery and other configurations will directly affect the final construction

costs. Also, due to the unreasonable design error caused by the wrong construction in the construction process, etc., counterfeiting in the construction process produces a certain bias.

4.2. Construction Factor

Construction factors have a great impact on the cost of the project. For example, there are unreasonable places in the architectural design drawings. In the construction process, construction employees cannot provide timely feedback to their superiors. Then, the professionals will need help to correct the defects in the drawings and cannot do the corresponding revision planning. Correction projects make the construction period longer so that the overall cost increases, leading to a decline in the profitability of the construction project. Therefore, construction companies must track the construction situation promptly, provide timely feedback and adjustments to the problems arising therein, do a good job of cost control, and ensure the quality and progress of the project. It is worthwhile to pay attention to the fact that in the project's construction, there are often interruptions in communication, delays in the schedule, and increases in construction costs.

4.3. Managerial Factor

It is well known that management is crucial for any industry, especially construction. At the same time, the construction industry is more complex. The project cost is much higher compared to other industries. There are many cases of wastage of construction materials in the construction industry due to managers' need for more awareness of project costs. Therefore, managers with cost concepts can assist the company in reducing the cost of the project. At the same time, if people with high professionalism can take the initiative to engage in the practical activities of the project, it will greatly improve the construction efficiency. A large portion of the cost of the project is in the construction phase. If the construction managers are more relaxed in managing the construction, it will greatly impact the project cost [9]. For example, when purchasing raw materials, if the construction manager does not take strict measures against the distributors, then the transportation cost will become higher; during the construction process, the damage to equipment and materials, as well as the loss of construction materials, will increase the project cost.

4.4. Installation Materials, Equipment

Materials and equipment are another influential factor in implementing the installation costs. It is mainly divided into two aspects: The quality of the materials and equipment used in the installation project. If the quality of materials and equipment in the use of the process of quality problems, then the latter will lead to an increase in the cost of secondary procurement or an increase in the investment in maintenance costs. Secondly, under the influence of the market economy, the price of materials and equipment will often change. If the enterprise adjusts the market expectations promptly, these factors will impact the project, making it easier to control the cost.

4.5. Construction Technology

Construction technology is not only the key to affecting the cost control of construction and installation projects but also will have an important impact on the quality of construction and installation projects. Construction technology will also extend and shorten the construction time invisibly. Construction technology is an important factor affecting the cost of building installation projects. There are two main aspects.

4.5.1 Technical Level

Construction cycle and quality by the construction around the influence of external factors will change, usually, the control of project cost in the implementation of its fundamental means of guaranteeing the quality of materials, as a basis for realizing the control of material costs, most enterprises in the installation project will occur in the case of jerry-building, later will be affected by a variety of problems make the cost increase, part of the construction unit to promote the degree of

cost control, the use of equipment is backward, inadequate equipment in use will not only fail to ensure the quality of the installation project, will cause material waste, resulting in increased actual cost consumption, cost management work is difficult to implement. Control: The equipment used by some construction units to promote the degree of cost control is more backward. There needs to be more equipment to use the function to guarantee the quality of the installation project. Still, it will cause material waste, resulting in the actual cost of consumption increases. The implementation of cost management work takes a lot of work.

4.5.2 Installation Technology

Installation technology use of different actual program designs will be different, and the project cost will have a certain degree of impact. In terms of technology, if the technical means of selection and application are defective, there is a large amount of material waste phenomenon, the most serious of which will cause the project cost to be out of control. Technological irrationality will slow the construction progress and make the whole cost management of the implementation difficult. The growth of the demand for installation projects is also increasing the demand for technical personnel, and improving the technical level of cost management is necessary.

5. Control Measures of Construction and Installation Cost Management

Construction and installation project cost management as a matter of building construction technology, quality and many other missions in one systematic project, and the economic and social benefits of the building are closely related. In the face of the many problems existing in the actual management, it is necessary to vigorously rectify the market disorder, improve the management system, improve the management system, strengthen the cost control and finalization stage of cost management, and realize the management objectives with high quality. Through a profound analysis of the causes of the problem, if reasonable measures are taken, the chaotic situation in the market can be significantly improved, which will lead to the gradual improvement of the construction cost management system in the construction industry and put it on the road of standardization and legalization [6].

5.1. Improving the Quality of Bidding Management

Reasonable bidding for construction and installation projects is the basis for improving the quality of the project. It is also an important part of the bidding for construction and installation projects. The quotation needs to be higher or higher, which will negatively impact the management of project costs. Therefore, to improve the management level of bidding and quotation for construction and installation projects, it is necessary to strengthen the study of bidding documents, do a good job of on-site investigation of construction and installation projects, improve the ability to prepare bidding documents and establish a scientific and perfect engineering quotation system.

5.2. Full Implementation of Cost Control

An important aspect of the project management of construction and installation enterprises is controlling the cost of construction and installation projects, which is the key to realizing the benefits. Especially with the increasingly fierce competition in the market of construction and installation projects, it has become an inevitable development trend to reduce the cost of construction and installation projects and strengthen the control of construction and installation costs. Therefore, to strengthen the control of construction and installation project costs, it should first combine technology and economy. Secondly, it should strengthen the effective management of the installation quality and installation period. At the same time, it should establish a set of rigorous construction and installation fund audit systems to strengthen the scientific nature of the settlement of the construction and installation projects. Only with a full understanding of the information in all aspects of the construction process can it objectively and impartially carry out cost audits in the construction process.

5.3. Promote the Comprehensive Quality of the Cost Control Team

The improvement of the overall quality of the costing team is related to the professional quality of the individuals in the engineering costing team and the organization and management style of the engineering costing team. In addition, the engineering installation cost is a quality and professional level of high requirements of the industry requirements of the relevant staff must have a certain degree of professional knowledge and some understanding of the relevant laws and regulations. Therefore, building construction enterprises should do a good job of cost budget control personnel and appropriately increase their salaries and wages to mobilize their work enthusiasm. Budget system staff with higher professional standards should be promoted appropriately to give full play to their specialties and lead those who lack experience [10]. The specific process is as follows: first of all, the selection of cost staff should be combined with the specific requirements of the cost control work, the qualification of the staff to carry out a rigorous review, give priority to the selection of employees with relevant work experience; then, by the characteristics of each stage of the installation of cost control, clear professional and technical personnel must be the basic construction of the construction project and the construction of the skills necessary to master; finally, it must be clear that cost management team The way of work composition. To give full play to the function of each employee, the management mode of group work can be adopted; to improve the sense of responsibility of cost management personnel, a responsible management system should be established to determine the degree of responsibility of each employee [11].

5.4. Improvement of the System of Construction and Installation Project Cost Management

Construction and installation project cost management is carried out in the whole project, so to strengthen the whole cycle of cost management of construction and installation projects is to accurately grasp the cost of construction and installation projects, which can also reasonably reduce the cost of construction and installation projects. Therefore, this also puts forward higher requirements for the construction unit in the cost management work and project budget, which should be based on this, continue to improve the construction and installation project cost log to enhance the enterprise construction, supervision, and construction of the three-information linkage and communication ability. Improve and sound enterprise information release mechanism by constructing the country's construction party information database system. The relevant data is timely uploaded to the construction company's enterprise information network monitoring system to carry out the retrieval of enterprise credit information, records and assessment to enhance the effectiveness of the transparency of the enterprise credit information to ensure that the standardization of the information and the reasonable classification, to achieve the modernization of the management of the project cost information [12]. The final account of completing the construction and installation project belongs to the last control link. In this stage, to better improve the cost management level of the construction and installation project, it is necessary to make the cost management personnel of the construction and installation project able to penetrate the construction site promptly to have a comprehensive understanding of the content of the changes in the installation project, the amount of work, the construction technology and so on, and to do a good job of recording, and to solidify the basis of the final account audit work [13].

6. Conclusion

In summary, this paper analyzes in-depth the deficiencies of cost control in implementing management work to avoid adverse effects in the construction and installation projects and to improve the effectiveness of the control implementation strategy. The cost of construction and installation projects is a special and systematic work. It is also involved in various fields and is easily interfered with by various external factors. Therefore, it is necessary to pay full attention to it and strengthen its control to promote the sustainable development of the construction industry.

References

[1] Meng Jihong. Influencing factors and control measures of construction installation project cost. Popular Standardization,2022(14):173-175.

[2] Shou Weiming. Influencing factors and control measures of construction installation project cost. China New Technology and New Products,2016(01):173.

[3] A Quan, Wang Dawei. A review of research on construction project cost management. Science and Technology Information,2011(15):361.

[4] Fan Chunxia. Literature review of construction project cost management and control. Science and Technology Perspectives,2016(06):205.

[5] Szóstak, Mariusz, Jarosław Konior, and Marek Sawicki. Technology and Management Applied in Construction Engineering Projects. Applied Sciences, 2022, 12(22): 11823.

[6] Gao Shan. Analysis of Current Situation and Countermeasures of Cost Management of Construction and Installation Projects. Science and Technology Perspectives,2014(22):113.

[7] Chan, Albert PC, David Scott, and Ada PL Chan. Factors affecting the success of a construction project. Journal of construction engineering and management, 2004, 130(1): 153-155.

[8] Wang Yongxin. Introduction to the influence factors and control strategies of construction and installation project cost. Financial Economy,2019(16):230-231.

[9] Yunshan Zhao. Factors affecting construction project cost and control measures. Bulk cement, 2022(02): 67-69.

[10] Zhou Peng. Analysis of how to strengthen the construction and installation project cost control. Construction and Budget,2022(05):13-15.DOI:10.13993/j.cnki.jzyys.2022.05.005.

[11] Zhengzhou. How to effectively control the installation cost of high-rise building projects. China interior decoration world,2019(4):224.

[12] Chen Huan. On the management and control of construction installation project cost. Building materials and decoration,2017(09):121-122.

[13] Zhou Shengbai. Analysis of the construction and installation project cost and control measures. Enterprise science and technology and development,2013(13):98-99.