Discussion on the Risk Analysis and Prevention of the EPC Model of University Infrastructure Project

Fangyan Yu, Na Xiong, Liang Chen

Nanchang Institute of Technology, 330044, China

Keywords: University Infrastructure Project, EPC Model, Risk.

Abstract: EPC is the general contract of the project, that is, the company receives the entrustment of the owner, and carries out the design, purchase and trial operation of the construction project according to the requirements of the contract. At present, there are more and more contractors using the EPC mode in the domestic engineering contracting market. This mode is a unique management mode, and the ultimate goal is to deliver the products and services to the owners. On this basis, the project is conceived, arranged, operated and so on, which is a kind of contract system which is connected with each other. EPC model can be applied in university infrastructure projects, but this model has certain application risks and needs to take corresponding preventive measures.

1. Definition and Characteristics of EPC Patterns

University infrastructure projects have many construction characteristics, including complicated procedures, cumbersome procedures, changeable site, tight construction period and so on. At the same time, it will be affected by financing, environment, function and other factors. If effective management measures are not taken, it is easy to affect the construction efficiency and quality. It will not only prolong the construction time, but also increase the construction cost, and even cause huge claims when serious. Not only did not complete the capital construction, but also lost a lot of capital and resource costs. EPC model can be adopted in order to ensure the quality of infrastructure projects in colleges and universities, but there are some risks in the process of applying this model, so it is necessary to do a good job of prevention.

1.1. Definition

A so-called EPC mode (such as Table 1) is the general contracting mode of the project, which includes three contents: design, purchase and construction. Based on the contract mode, it contracts all the contents of design, purchase, installation and commissioning from construction to completion. Engineering is not only the design work, but also the overall planning, construction, organization implementation, organization management and so on. Procurement also refers not only to the purchase of construction equipment and materials, but mainly to the procurement and screening of professional application equipment, process materials. Construction translation into Chinese means construction, but it actually contains more contents, such as construction, training, testing and so on[1]Compared with the traditional contract model, the EPC model has obvious application advantages, which can play a leading role and thus promote the improvement and optimization of the construction project scheme. The model can also overcome the disconnection between the various links in the traditional model, make the link planning more reasonable and orderly, and thus improve the investment efficiency.

Table 1 Composition of the EPC model

Engineering(Design)	Planning, construction, organization and implementation, organization and management
Engineering(procurement)	Material procurement, equipment procurement, material screening, equipment screening
Construction(construction)	Construction, training, testing

  DOI: 10.25236/edbm.2020.173

1.2. Characteristics

EPC model first appeared abroad and developed for a long time, but the time of domestic application is short, and many aspects still need to be optimized and perfected. According to the research and analysis of the EPC model, it can be found that it has the following characteristics (such as Table 2): First, EPC project has a strong ability of planning and coordination, and a strong integrity. The project operation under this mode can be comprehensively managed and factually, the contractor will no longer join the project construction as the construction party, and can directly deal with and solve the problems of construction, procurement, design and so on. The owner side mainly manages the core goal, the control strength is not high; second, the purchase must formulate the total price contract, the time limit has the fixed nature. The main purpose of the owner's investment project is to obtain economic benefits, whether the amount of investment or the time of investment is very clear, and the cost can be reasonably and effectively controlled; third, the project risk can be transferred to the general contractor as far as possible. The general contractor is responsible for the project, even if the owner and subcontractor have problems, there will be a part of the general contractor, while assuming the responsibility, but also do a good job of communication, consultation and other work, so as to reduce the conflict between the stakeholders and reduce the risk of loss; fourth, the owner can withdraw from the various affairs, to ensure that the overall direction of project management is correct. The management model can give full play to the advantages of management, so that the management objectives can be achieved.

Table 2 Characteristics of the EPC model

Serial number	Pattern characteristics
1	Strong planning and coordination capacity
2	Fixed duration
3	Risk transfer
4	Give full play to management advantages

2. Advantages of Application EPC Mode of University Infrastructure Projects

2.1. National Policy Support

In recent years, the EPC model has been more widely used in the construction of projects in China, and the country has paid more attention to the application of the model, and has formulated many policies to support the wide application of the EPC model. At home, the departments in charge of housing construction system at all levels have contributed to the application and development of the EPC model, not only formulated corresponding policies, but also issued many relevant documents, which have gradually become the main object of encouragement in the country, and promoted the progress of the construction industry in China through the development of the EPC model.[2].

2.2. Ensuring Financial Efficiency

During the process of university construction, the application of EPC mode can improve the efficiency of fund application. In the traditional management mode, the overall planning level of infrastructure projects in colleges and universities is not high, and the investment efficiency is relatively low. If there is a problem, the relevant departments or units will shirk their responsibilities to each other and have no strong restraint ability, which will affect the efficiency of the whole project. After the application of the EPC model, through the overall coordination and coordination, colleges and universities need to control outside the bureau to provide more guarantees for the improvement of the quality of infrastructure projects, so as to increase the efficiency of investment and greatly reduce the waste of funds.

2.3. Enhancing Management Capacity

After the application of EPC mode, the efficiency of engineering management has also been

effectively improved. Under the function of staffing, the level of infrastructure management in many colleges and universities can not meet the management requirements of project construction. Moreover, the function of management department is separated, the connection between construction and project management is not strong, and the quality level of management personnel needs to be improved, resulting in low management quality. After the application of EPC mode, infrastructure management has entered the form of socialization, which can not only improve the level of management team, but also improve the quality and efficiency of management.

3. Risk Analysis of EPC Model of University Infrastructure Projects

3.1. Cost and Quality Risks

During the application of EPC mode, the management of infrastructure projects in colleges and universities is prone to cost risk. Because the pricing method generally adopts the total price dry way, the contractor often will consider the cost, the profit and so on risk question when undertaking this kind of project, the construction project cost under the EPC mode is relatively high. Furthermore, combined with the intersection of design, procurement, construction and other links, as well as possible engineering changes and other factors, it is easy to appear cost risk, resulting in a large increase in costs; in terms of quality, the EPC model often adopts the way of design while construction. On the one hand, the procurement time is relatively tight (as shown in Table 3), and the products purchased may not conform to the design requirements, which in turn affects the quality of the project. On the other hand, colleges and universities need to purchase more types of capital construction projects, large quantity, usually will take part of the project subcontract way, if not done well in procurement management, it is likely to have quality problems.

Table 3 Procurement workflow under the EPC model

Serial number	Procurement workflow
1	Procurement plan
2	Purchase orders
3	Purchase orders
4	Procurement warehousing
5	Procurement invoices
6	Procurement settlement and analysis

3.2. Duration and Integrity Risks

Although the EPC mode can control the construction period to a certain extent, it will still be affected by many aspects, including design, procurement, construction management, engineering changes and so on, and finally affect the progress of the whole project. Not only that, the school infrastructure project is different from the general project, the school opening time is fixed, affected by the opening time, can not adopt the general project management, before the beginning of the school year, the university will be more stringent requirements for the construction period, the general contractor may not be able to meet the commitments made in bidding; in the aspect of clean government, mainly in bidding, contract, supervision and other aspects are reflected.[3]. The bidding limit is related to the approved amount of the estimate. The general contractor will use materials such as higher materials in the design process, some equipment can not be priced, or may falsely report the cost when paying, which will affect the quality of the infrastructure projects in colleges and universities.

4. Risk Prevention Scheme the EPC Mode of University Infrastructure Projects

4.1. Establishment of Regulations and Normative Management

First of all, we should build perfect rules and regulations, give full play to the advantages of EPC mode in fund payment, internal audit, clean government responsibility and so on, do a good job of supervision and control, use perfect rules and regulations to manage and restrain, put an end to

corruption and other behaviors, build good management atmosphere, make the project construction have rules and regulations, so as to reduce the appearance of clean government risk, quality risk and so on. In the aspect of purchasing, we should take effective normative measures, establish corresponding purchasing projects, strengthen contract management, strictly audit and control all links, enhance the ability and accomplishment of purchasing personnel, strengthen the sense of responsibility of purchasing personnel, timely carry out problem feedback, strengthen link control, ensure the quality of the project, and complete the construction within the time limit.

4.2. Tracking Audit and Disclosure of Information

In order to give full play to the role of the EPC model, in the capital construction project of colleges and universities, we should strengthen the tracking audit, track and review the various stages of project planning, implementation and design, so as to play the role of audit early warning and supervision, so as to reduce the management loopholes, improve the management efficiency, ensure the cost settlement risk is effectively prevented and controlled, and avoid the cost increase. In addition, it is necessary to make information public so as to put an end to corruption and to publicly display the bidding situation, change information, payment information, etc. Information bar, website platform, public number and so on can be built in the campus, and relevant information can be published in different platforms, so that all personnel in the school can supervise the project, thus reducing the probability of risk occurrence.

5. Conclusion

Above all, the EP C model can be applied in the school infrastructure project, which has great application advantages, but at the same time, there are some application risks. During the process of practical application, in order to ensure that the EPC model plays a full role, reasonable and effective risk prevention and control measures should be taken to improve the quality of the project construction in an all-round way.

Acknowledgements

Science and Technology Research Project of Jiangxi Education Department in 2019, Project Name: Research on Innovation and Application of BOT Financing Model in University Infrastructure Projects, Project Number GJJ191018.

References

[1] Huo, Zhenyang. Management of General Contracting and Risk Prevention of EPC Project of "Double Owner "—— Taking the Project of a New Campus of a University as an Example. University Logistics Research, no. 12, 2018.

[2] Han, Jianjun. Research on Project Risk Management under EPC General Contracting Mode. Building Materials and Decoration, no. 11, 2018.

[3] Zhao, Qichao. Risk Control Analysis of EPC General Contract Project. Construction and Budget, no. 5, 2018.