Risk Management and Preventive Measures of Engineering Economy

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Abstract. With the continuous expansion of the scale of construction projects, project risk management is becoming more and more important, especially the economic management risk as the focus of risk management has been more and more attention. From the engineering project, feasibility study, design, bidding, analysis of project bidding and construction stages of economic system risk, economic risk analysis and management of the project extends to the project proposal, feasibility study and economic risk of engineering project phase, occurrence regularity and control technique, and put forward the preventive measures and suggestions, provide the reference for the engineering project risk management and engineering economy.

Introduction

"Risk" refers to the possibility of a loss in a given period of time in a particular environment, that is, the risk may occur. Specific to the economic risk, represents or means the loss of chance or probability, it is a kind of potential loss, changes in the scope and magnitude of potential losses, uncertainty and loss of production is the most basic feature of [1]. With the development of China's construction market continues to expand, increasing competition, more and more risks facing the market, and retrofit. Construction projects are in the pursuit of economic efficiency, but how to ensure the construction of the economic benefits of the project, involving many aspects, including effective control of project economic risk, eliminate in engineering economic uncertainty and the loss is very important.

The whole life cycle of the project and related departments involved in the project risk management, the risk exists in the project decision-making, implementation and operation of the three stages. According to the project and is closely related to the construction of decision-making and implementation of the two stages of economic risk analysis, in order to strengthen the management and control of risk, to reduce the engineering cost and investment cost.

Engineering Economic Risk Analysis

Decision Stage Risk Analysis

Project Proposal Stage. The project proposal stage is the starting point of engineering economic activities. The project proposal stage of economic activity is mainly related to engineering project investment estimation, construction sites, financing plan, project construction time, the content of a huge impact on the project, and the project cost, scale, capital, construction time for the decisive.

Feasibility Study Stage. In the stage of feasibility study, there are three aspects of project economic risk, such as project construction plan, investment estimation and financing plan.

First, the project construction program. Major projects to determine the size and size of the main project, the total cost of the project has a greater impact.

Second, investment estimates. On the basis of the project construction plan and scale determination, the estimated cost of the project and the total investment [3]. The economic impact on the project investment estimation, the main is to estimate whether it is scientific and reasonable, if the estimate is not accurate, will affect the continuity of the late financing or capital chain, estimating the unreasonable difficulties will lead to project progress.

Third, financing plan. On the basis of determining the amount of investment, research and
analysis of the project financing methods and the main body, the structure of funds, channels and costs, as well as risks.

**Implementation Stage Risk Analysis**

**Design Phase.** In the construction project, the design stage is the impact of the project cost is relatively large, the length and cost of the project has a decisive role. Engineering design stage, although the risk is caused by the design side, but often the consequences to be borne by the construction side. According to the relevant data, the design of the project cost accounted for more than 70%, engineering design directly affects the construction cost, size and duration, and even the quality of the project.

**Bidding Stage.** The construction of the project bidding system is to standardize the construction market, make the construction enterprise fair competition, the construction market healthy and orderly development. However, after years of development, there are some engineering economic risks in the project bidding. The bidding stage caused by the economic risk is mainly to the owners, common at this stage of the economic risk is in the bidding before no strict examination of the qualifications of the tendering units, resulting in some lower quality and poor reputation of construction enterprises can also participate in the bidding; bidding without base price, so there is some bidding the unit of unfair competition, by colluding bid rigging and other illegal means will raise the price, so that the contract price is much higher than the actual cost of the project.

**Engineering Economic Risk in Construction.** The construction activity is the main stage of the cost, and also the key point of the economic risk prevention. As a result of the construction activities involving a long time, more professional and complex environment and participate in personnel, equipment, funds and other factors, has single product characteristics and characteristics of irreversibility, engineering economic risk points, risk control is difficult, involving a wide range of.

**Project Quality, Safety, Duration Risk.** Quality, safety, construction period is the basic guarantee of the project, any problem will directly lead to serious economic losses and the corresponding consequences. It can be seen from Table 1 that the direct economic loss of quality and safety accidents is huge, and it is necessary to show that the quality and safety of the project are of great economic risk.

| Accident grade               | Number of casualties                                                                 | Direct economic loss          |
|------------------------------|--------------------------------------------------------------------------------------|-------------------------------|
| extraordinarily serious      | Cause more than 30 deaths, or more than 100 seriously injured (including acute industrial poisoning, the same below) | More than 100 million yuan    |
| Major accident               | More than 10 people were killed and more than 30 people, or more than 50 people were seriously injured following 100 | 50 million yuan more than 100 million yuan |
| Major accident               | More than 3 people were killed and more than 10 people were injured, or more than 10 people were seriously injured | 10 million yuan more than 50 million yuan |
| General accident             | Cause 3 deaths, or less than 10                                                     | Below 10 million yuan         |

**Project Cost Risk.** From the point of view of the source of risk, the cost of the project risk comes from three major categories of factors, see table 2.

**Preventive Measures of Engineering Economic Risk**

**Strengthen the Understanding of Engineering Economic** [2]

Understanding of engineering economic management, we have to do the following three points:

- Correctly handle the relationship between time limit and benefit, abandon the traditional concept of "heavy progress, light benefits", so that enterprises enter a virtuous cycle of development track;

- To strengthen the research of cost engineers to participate in the construction project, so that the engineering technology and economic management play a common role;
To improve the economic consciousness of employees, to strengthen the cost control of enterprises, to achieve equal emphasis on safety and quality, and to achieve a win-win situation of economic and social benefits.

| Risk category         | Typical risk event                                               |
|-----------------------|------------------------------------------------------------------|
| **Environmental factor risk** | Politics Changes in laws and regulations, wars and riots, pollution, strikes, etc. |
|                       | Economics Inflation, exchange rate changes, changes in taxes and fees, price adjustment |
|                       | Natural disaster Floods, earthquakes, fires, typhoons, landslides, lightning |
| **Cost system architecture** | Design Improper specification, defect design, incomplete design |
|                       | preparation in advance Tender, contract, procurement |
|                       | construction Construction site management, construction plan changes, defect engineering |
| **Behavior subject risk** | personnel The change of the quality of the technical staff, managers and general workers, and the change of their ideas |
|                       | Material Science The introduction of new materials and new technology, the change of consumption quota |
|                       | capital Unreasonable way of financing, funds are not in place, lack of funds |
|                       | equipment Improper selection of construction equipment, failure, installation error |

**Develop Project Risk Management Plan**

The project economic risk management plan is an important tool for the risk management of the project economic risk management organization. Collect the basic information, put forward the methods of risk identification, risk assessment, risk assessment, risk management and risk monitoring. Clear all the responsibilities, personnel and organization, object target, risk assessment and risk acceptance criteria, the parties put forward goals, scope, methods and evaluation of the standards, good coordination and management of the parties themselves and each other risks, formulate plans and strategies.

**Guard Against Risks in Procurement**

Establishment of material procurement market price information platform, develop and improve the relevant management system, effectively prevent procurement risk. The establishment of internal price information dissemination and query platform, will collect the online price website price, the production plant factory price and market price, each unit of the current purchase price determined by the tender and the price of the price information are analyzed and summed up, the formation of various types of materials market purchase price information for reference, and regularly in the instant price information platform release, use and reference for each unit to implement procurement and project bidding, avoid blind procurement and project bidding, effective risk prevention.

**Improve the Management System and Mechanism**

Strengthen the engineering economic management system, mainly to improve the organizational system, including engineering project, feasibility study, preliminary design, construction design and construction process, settlement, settlement of various aspects, technical department, sales department, security department, market department and other departments of the contract management. Improve the management and control mechanism of the economic management of the project, to avoid the lack of supervision of the people due to the lack of loopholes. The engineering economic management system under the control of the engineering economic management mechanism, with the system to replace the tube man.
**Project Contract Risk Management**

Project managers need to improve their awareness of risk, for each of the terms of the contract, we must strengthen the risk analysis and management, a comprehensive understanding of the economic risks may be encountered in the project. The contract of construction project is the most important basis for the legal documents of the project and the risk management of the enterprise, so as the construction engineering enterprise, we must strengthen the contract risk management of the project.

**Engineering Economic Risk Assessment**

The general risk assessment can be divided into the risk estimation and risk assessment, risk estimation is based on individual risk as the object of risk estimation, risk assessment is the focus of the project including all stages of the overall risk, the risk between the interaction and the project main project, the overall impact on risk tolerance on. Therefore, the construction enterprises should be based on a fixed time to assess the risk, reduce security risks, improve the quality of the project, to provide a reference for sustainable development.

**Concluding Remarks**

Project benefit and engineering economic management is the mutual influence, only by constantly improving the level of risk management, in order to improve the management level and economic benefit of enterprise, therefore, through the above analysis of the whole process of the project, the following conclusions can be drawn:

1. In the project proposal, feasibility study and project phase, careful decision-making, strengthening the project decision-making stage project economic risk control, scientific and rational planning, can effectively prevent the "unfinished" and "bottomless investment" and other major risks.
2. In the design, bidding and construction process, the risk control of each element is the important means of risk prevention and control in the implementation phase. The implementation phase of the project economic risk prevention and control, but also to achieve the economic objectives of the project is an important means.
3. To develop the project risk management plan and improve the risk management system. According to the characteristics of the project, through the whole project life cycle, do a good job of engineering economic risk identification, evaluation and risk management, and according to the risk prevention mechanism to implement the project economic risk management plan.

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