International Journal of Intelligent Information and Management Science
ISSN: 2307-0692, Volume 7, Issue 6, December, 2018

Risk Management Technology in Construction stage of Engineering Project

Jiuhe Zhang[1], Jianzhi Zou[2]
1Tianjin Agricultural University, Tianjin, 300384, China
2Tianjin Open University Xiqing, Tianjin, 300380, China

Abstract: Project risk is an inevitable fact. If the risk consciousness of the construction personnel is weak, using the wrong risk analysis method and adopting the improper risk response measures will inevitably make the project target deviate from the expectation. To that end, This paper analyzes the risk factors, risk management technology, Enable the construction project parties to quickly and effectively understand and master the basic risk awareness and take the correct methods and means to deal with these problems.

Keywords: Engineering project; Construction phase; Risk management

1. Introduction

The construction period of the project is long, the process is complex, the technical requirement is high, the environment is changeable, the finance is irregular and the organization structure is diverse. Create greater risk. In addition, the parties involved in the project pursue different interests, the risk information lags behind and the risk is handled improperly. Further increased risk complexity and variability. It will result in economic loss or other loss in different depth. The realization of the four basic objectives of the construction project will deviate from the original plan, with irreversible consequences. Therefore, All parties should study and analyze the risk management to find a way to solve the problem in order to reduce the loss and achieve the expected goal.

2. Risk Management in Construction Stage of Engineering Project

2.1. Definition of risk management during the construction phase of a project

In the construction process, the risk is the uncertainty that causes the loss, and can use certain mathematics method to estimate the probability, in order to study the difference between the actual value and the planned value, and find out the influence factor.
Engineering risk management is to identify and analyze the risks existing in the project, draw a certain conclusion, and then take appropriate measures and measures to reduce the loss of interests and achieve the expected goal.

2.2. Classification of risks in the construction phase of engineering projects

The construction phase of a project is the stage in which the design of the project is transformed into physical value. It takes a lot of time, a lot of people, a lot of money, a lot of uncertainty, Therefore, the workload of risk identification is relatively large. The risks in construction process are divided into national risk, environmental risk, financial risk, social risk and technical risk. Risk factors are shown in Table 1 below.

Table 1. Risk factors

Kind Of Risk	Risk Factor
International risk	Changes in state relations; government or relevant departments' intervention in engineering projects; structural reform, changes in policies and regulations, etc.
Environmental risk	Weather conditions; geographical location and field conditions; irresistible natural disasters such as earthquakes, floods, etc.
Financial risk	A change in the price of building materials; a change in the macroeconomic situation; the raising of funds, etc.
Social risk	Local customs, education, conflicts, etc.
Technology risk	Construction technology level; construction technology scheme; new technology, application of new materials, etc.

2.3. Risk management process during the construction phase of the project

The risk management process is a circular process, After defining the project risk management objectives, Then, according to the characteristics of different risks in the project, different disposal measures should be adopted to formulate the project risk management plan. Then according to the implementation of the risk management plan, keep abreast of the progress of the new situation, and adjust the plan according to the new problems. Finally, the risk management plan is revised and summarized, and a more new plan-executive-feedback-

adjustment is made in order to reduce the loss caused by the risk problem.

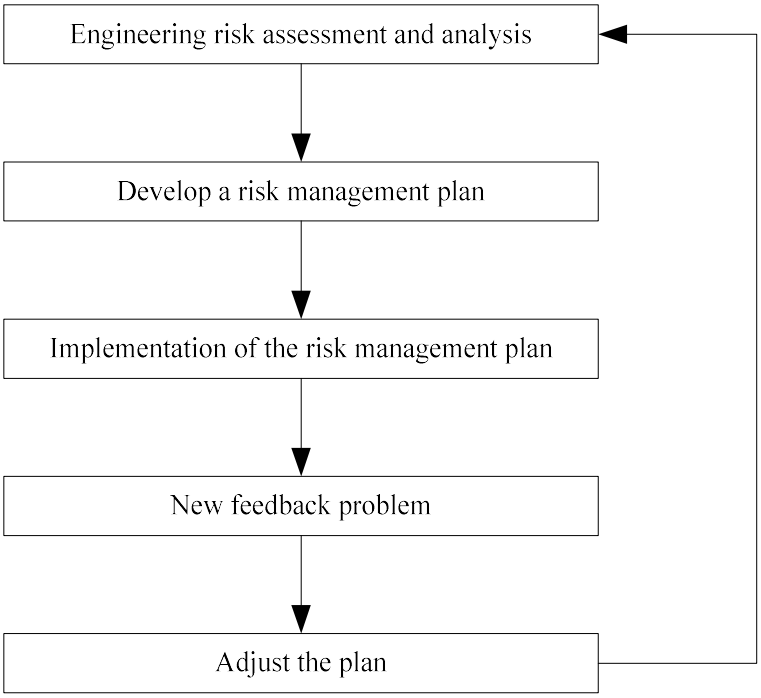

Figure 2. Risk management flowchart

3. Risk Management Technology in Construction stage of Engineering Project

For the particular risk system of the construction process, The most commonly used technologies are: Risk identification method, risk assessment method, risk evaluation method.

3.1. Risk identification methods

3.1.1. Expert investigation method

The method of expert investigation is to invite a lot of experts and scholars with professional qualities to repeatedly study and conclude feedback, so as to finally lock in the main risk factors of construction projects. Then develop risk factor estimates. Then experts and relevant professionals will make a qualitative assessment of the possibility of each risk factor appearing in the construction phase and the degree of impact on the project. Finally, the probability distribution of each risk factor and the effect on the project are obtained by statistical collation and data analysis of the risk factor estimation table. The expert investigation method mainly includes Delphi method and brainstorming method.

Delphi method has the characteristics of anonymity, convergence and statistics. Delphi method is based on the systematic procedure, because of the anonymous method, experts can not communicate and collude with each other to ensure the independence and reliability of the results.

Brainstorming usually takes the form of a small group meeting, consisting of a number of people, giving everyone the opportunity to fully express their opinions, stimulating individual creativity, and putting forward as many ideas as possible.

The participants' opinions are recorded intact, and the experts' opinions are collected through continuous collation and repeated consultation. Finally, several important conclusions are summed up by the moderator.

3.1.2. Safety check table method

According to the analysis idea of system engineering and based on the complete system analysis, the safety check table method finds out the source of the risk from the construction project, and lists the problems into charts by asking questions. The safety check table has the very strong pertinence, is the summary to the actual question. It includes the location of the project focus, not omissions, hidden dangers and other factors.

Its production is mainly based on the following four aspects:

Relevant national and local safety regulations, articles of association, regulations, norms and guidelines, regulations of industry, enterprises, rules and regulations for the civilized use of enterprises.

Domestic and foreign industry, enterprise accident statistics cases, experience and lessons.

The experience of safe production in industry and enterprise, especially the practical experience of safe produc-

tion in this enterprise, as well as the mature practical experience at home and abroad and the classic case of successful risk reduction.

If other techniques or methods are used to identify the source of risk, it shall be added to this checklist and its safety results shall be comprehensively analysed.

3.1.3. Scenario analysis

Situational analysis is the use of mathematical models or formulas to study and discuss the state of a certain period of construction risk. A method for summing up the factors affecting the project and the degree of the influence on the construction project. In general, This method is to identify the factors causing engineering losses; Determining the magnitude of the effect caused by this factor; Discuss the overall depth of influence; Finally, compare the influence degree of various factors and take better measures.

The application steps of scenario analysis can be divided into six stages:

Virtual scene, organize the corresponding scene team, create the situational push team, and determine the scenario plan.

Situational research, clear questions, invite professionals, fill gaps in team expertise and answer team concerns.

The development of the scene, through various relevant data and mathematical methods, to calculate the biggest influence factors and hidden dangers of the situation, enrich the plot of the scene.

Stakeholder analysis. Check understanding of business issues; monitor internal consistency.

System inspection. Draw the influence diagram to carry on the system inspection.

Influence the thinking and action of the organization. Arouse the interest of the members of the organization and design future action plans.

3.2. Risk assessment methodology

3.2.1. Bayesian probability estimation

In the process of risk estimation, it is difficult to obtain enough qualified sample data or even objective data. In addition to subjective probabilities, there are other ways to identify the probability of risk impact, but these are artificially defined in the absence of historical data called lead probability.

This kind of cognition is based only on the subjective cognition of a certain uncertain event based on past experience and knowledge, and the subjective probability has uncertain factors. This requires us to collect more data for experiments, to establish relevant mathematical models, to simulate calculations, to investigate, and so on. The Bayesian probability is more analytical, and the Bayesian formula provides an effective means to correct the original judgment by using the collected information. Before getting a certain amount of data, there will be a leading probability judgment, that is, the historical summary of the predecessors. A summary of these historical studies can empirically identify some risk factors, And then use the historical experience of predecessors and the principle of mutual information to make clear the distribution of advance probability. Then the posterior probability is calculated by using the improved mathematical formula to determine the probability of the occurrence of the risk (when there is no information, it is generally assumed that the prior probability is the same). More complex and accurate methods including the maximum technical or marginal distribution density and the principle of mutual information can be used to determine the prior probability distribution. A posteriori probability is obtained from the improved probability estimation, and the posteriori probability of the risk consequence is calculated.

3.2.2. Uncertain risk estimation

The risk of uncertainty refers to the risk that not only the probability of occurrence is unknown, but also the form of occurrence is not completely clear. The uncertain risk estimation is called uncertainty risk estimation. In the process of actual project management, more information is usually needed to make the risk countermeasures. In the course of the management of people's history, some generally accepted principles have been summed up: The principle of equal probability, the principle of optimism, the principle of pessimism, the principle of minimum regret, etc. In the case of uncertain risk, the profit and loss value of each party should be calculated first, and then the conclusion is given according to the selection criteria.

3.3. Risk assessment methodology

3.3.1. Analytic hierarchy process

In order to control the risk, a project often set up multiple risk prevention and control network, and the cross-application of various means. In the case of the same risk, the efficiency of each measure is different. In order to ensure the efficiency of risk response, the priority of various risk measures should be given when comprehensive use of multiple measures to protect risk aversion. Analytic hierarchy process (AHP) is between quantitative and qualitative analysis. The order of analysis variables can be obtained by calculating judgment matrix, and AHP can be used to solve the priority of risk emergency measures.

The Analytical hierarchy process arranges a series of risk measures in the form of a matrix, compares them between two and two, lets different experts judge them, and obtains the average comparative advantage. The comparison matrix is obtained by analogy, and then the relative superiority is calculated by square root method, the test

of mathematical method is made, and the priority order of risk disposal measures can be obtained through the test. If not, the amendment is recalculated until priority is obtained.

3.3.2. Check table comprehensive evaluation method

Check the form of comprehensive evaluation method to check the way, comprehensive evaluation of a specific risk system. To ensure the effectiveness of the evaluation, the key is a reasonable design inspection project and risk evaluation criteria.

References

[1] Liang Fusheng. Study on risk management of construction project. Jilin Province: northeast Petroleum University. 2012.

[2] Keah Yinglim, Sunny, Jiang. Reevaluation of health risk benchmark for sustainable water practice through riskanalysis of rooftop-harvested rainwater. Water Research. 2013, 20, 47

[3] Hyung Hun Kim. Endoscopic treatment for gastrointestinal stromal tumor: Advantages and hurdles. World Journal of Gastrointestinal Endoscopy,2015(03):192-205.

[4] Wang Qiming. Risk analysis and countermeasures of supervision in engineering project. Building Engineering Technology and Design. 2016, 16.