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Risk Control in Lump-sum Contracting Projects of Electric Power Companies

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Abstract: The lump-sum contracting mode of electric power projects is domestically in the rise. The mode is a risky business which all kinds of risk run throughout the project. Recognizing as well as controlling risk timely which improves the ability to resist risks dramatically decides the institute and its subordinates whether can remain invincible in fierce competition. This paper aims at the study of perfecting procession about forecasting and preventing the controllable risk of electric power company. The management includes stages of contracting, designing, construction, trial operation, acceptance, assurance of quality, financial risk procurement and subcontracting.

Key words: Electric power projects, lump-sum contracting, risk control

INTRODUCTION

For more than twenty years, a group of lump-sum contracting enterprises which contain designment, procurement as well as engineering construction general contracting enterprises has gradually developed. But in the field of electric power construction, the theory researches of risk management regarding to lump-sum contracting projects of electric power are very few. Lump-sum contractors who take huge risks are at groping stage of risk management and are lack of full-life concept of risk management all over the project. In the mode of lump-sum contracting, risks of project are mainly borne by contractors. How to prevent risks, reduce project risks by effective risk management as well as translate into earnings is one of important subjects for study.

CONNOTATION AND CHARACTERISTICS OF LUMP-SUM CONTRACTING

Basic conotation of lump-sum contracting: Lump-sum contracting refers to the mode entrusted by owners which contains project survey, designment, procurement, construction, commissioning (completion acceptance) in accordance with the contract of whole process or some phases. In general, Lump-sum contracting has some patterns such as Engineering Procurement Construction Contracting (EPC), Turnkey Contracting (Turnkey), Engineering Procurement Contracting (EP) and Design Building Contracting (DB).

Characteristics of lump-sum contracting:

- Management exists in the whole period. Contractors are only involved in the phase-management only involved in the project phase in traditional construction mode while contractors of electric lump-sum contracting attend in the whole-life management according to the signed contract
- The contract is complicated. Lump-sum contracting contract are involved in all stages such as designment, procurement and construction. Contractors should consider the rigor of the contract itself at each stage and links between stages. They also consider the effect of contract as a whole (Sutton, 2010)
- The engineering valuation is more difficult. During the bid of electric lump-sum contracting, projects are always at the stage of study or just preliminary designment. There are a lot of variables in the future, so the engineering valuation is difficult to do at the accurate level
- The proportion of risks and benefits increases at the same time. When risks increase, a lump-sum contracting project can also bring huge profits to contractors

RISK ANALYSES OF ELECTRIC LUMP-SUM CONTRACTING

Contract risk: Contract risk always comes from the total package contract and subcontract mainly concerned with

external factors such as incomplete contract term, wrong expression, inappropriate contract type choice, contract dispute, contract execution and management risk (Arroyo, 2011).

Designment risk: Designment risk mainly contains quality risk, cost risk, schedule risk and designment errors. Because of the close ties among them, we can't carry out the separate management.

Procurement risk: Procurement risk is mainly concerned with purchasing cost risk, quality risk, schedule risk and inherent purchasing risk in the mode of PC.

Construction and subcontract risk: In construction and subcontract risk, we can often see qualified local subcontractors, disruption and downtime, subcontractors' construction delay, safety risk which is involved with machinery damage and field personnel accident, the local government behaviors' effects and unforeseen difficulties.

Trial operation risk: Trial operation risk can be mainly divided into equipment risk, running performance, operating risk, risk of system security. To deal with these risks, we should carry out function test of the units, reliability test and performance test.

Acceptance and handover risk: One of the risk management goals of completion acceptance stage is to identify risk sources, assess risks, take appropriate ways to prevent risks, make the loss to a minimum and make the project smoothly into production stage. The other is to establish risk management files (Edwards and Bowen, 2005).

Quality assurance risk: Quality assurance risk is divided into designment quality risk, purchasing quality risk and construction quality risk. engineering quality risk is comprehensively formed by the three. In implementation stage of project contract, ensure the quality of project construction is the basic obligation of contractors. If not handle that well, it is easy to cause unnecessary losses.

Financial risk: Lump-sum contracting projects usually last long and have hard tasks. In the process of project implementation, there are often many unforeseen events or factors which lead to project risks. Now we mostly undertake projects which form a system containing contract, designment, procurement, construction, trial operation, hand over and quality assurance.

RISK HANDLING MEASURES OF ELECTRIC LUMP-SUM CONTRACTING

Risk management of contract: Control points of contract risk are shown in Table 1:

- According to the corresponding rules and regulations, the department who is responsible for undertaking contract should deal with the formal contract negotiation, qualification and drafting
- Make comprehensive analyses on producers, price changing trend, quality and market distribution according to the contract content. Grasping the market situation as well as choosing contract partners is also very important
- Strengthen the management of contract negotiation to ensure that both parties have fair rights and obligations (Gray, 1997)

Risk management of designment: Control points of designment risk are shown in Table 2:

- Set up project coordination programs. Project coordination programs mean making clear the relation between company and owner in designment work, communication and report system on the basis of contract documents
- Prepare the designment plans. Project designment plans are the supplements and deepening of project plans in designment work which are compiled by designment manager, reviewed by project management department and approved to release by project manager figures and tables

Risk management of procurement: Control points of procurement risk are shown in Table 3:

Table 1: Control points of contract risk

• Management of the total contract	• Management of subcontract
• Management of contract claims	• Docking of the total contract and subcontract
• Qualification examination	• Process management
• Audition	• Contract signing
• Fulfillment of the contract	• Breach treatment

Table 2: Control points of designment risk

• Control responsibility of designment personnel
• Management of designment process
• Designment control
• Designment ending

Table 3: Control points of procurement risk

• Supplier management	• Procurement strategies
• Management of procurement contract	
• Internal audition and internal control	
• Financial control	

- Increase the ordering time of the critical equipments and the equipments produced for longer cycle
- Make binding orders. Bind products which have similar functions and requirements to make full use of the suppliers' procurement channels and partners, increase purchasing money and get discounts
- Make sure important raw materials supplied in time. Contractors join with domestic large trading enterprises and seek and establish long-term and stable strategic partnership with these companies

Risk management of construction and subcontract: Control points of construction and subcontract risk are shown in Table 4:

- The owner leads to risks. The contractor can ask the owner to give time and cost compensation. It should be clearly stated at the conclusion of contract
- The force majeure event leads to risks. The contractor may require the owner to give time compensation. If delaying the construction period due to the typhoon, rainstorm, mudslide and other natural disasters. The lump-sum contracting company can require proper compensation
- The contractor itself leads to risks. The contractor can't get any compensation. Need to find out reasons in order to reduce or avoid the happening of the similar situation

Risk management of trial operation: Control points of trial operation risk are shown in Table 5:

- Strictly implement the relevant rules and regulations and prepare the perfect starting outline of a complete set of unit. Before start the trial operation, organise the related personnel for organizational learning
- Make unified command in the related work complete the safety and danger point analyses and train the construction personnels (Wang, 2011)
- Troubleshoot strictly carrying on relevant regulations and guardianship system during trial operation

Table 4: Control points of construction and subcontract risk

• Subcontractor selection	• Construction stoppage disposal
• Construction schedule of subcontractors	• The local government behavior
• Construction safety	• Unforeseen difficulties

Table 5: Control points of trial operation risk

• Equipment quality	• Installation and debugging
• Operation cost	• The establishment of accountability mechanism

Risk management of acceptance and handover: Control points of acceptance and handover risk are shown in Table 6:

- The completion data. Strictly manage according to the relevant information and prevent completion data from incomplete or confusing to make the project completed smoothly
- The whole system is running. Strictly monitor designment, procurement, construction and trial operation phase to ensure acceptance smoothly. Set up special acceptance group to test the operation situation of system. It should be improved in time if there are problems
- Send someone to discuss with the owner in order to increase the owner approval of projects
- In the early stage, contractors must make the reasonable designment and construction to make the sewage, sulfur dioxide, smoke and dust emission at the normal level and build up environment management system

Risk management of quality assurance: Control points of quality assurance risk are shown in Table 7:

- The designment phase. Each major must coordinate with each other to strengthen cooperation to make the designment reasonable and construction convenience to use. It can improve integrated level of designment and ensure quality
- The procurement phase. Purchasing materials will be on the basis of the current specification, construction drawing and technical requirements. It needs confirmations of the owner and designer. After purchasing the contractor can only implement the project by acquiring test and verifying of the owner, supervisor and designer (Zhao, 2012)
- The construction phase. Train all construction personnels before construction according to the characteristics of the engineering. And improve the professional level of managers and technical personnels. Establish a complete quality assurance system and hold people accountable for the quality of the project

Risk management of finance: Control points of financial risk are shown in Table 8.

Table 6: Control points of acceptance and handover risk

• Completion data	• Running of the whole system
• The owner recognition	• Local relationships
• Acceptance of the environment protection	• Fire acceptance
• Planning	• Water keeping and greening
• Stylization	• The order and number of acceptance projects

Table 7: Control points of quality assurance risk

- Assurance strategies of designment phase
- Assurance strategies of procurment phase
- Assurance strategies of construction phase
- Dynamic management of the whole process

Table 8: Control points of financial risk

- | | |
|-------------------|------------------|
| • Designment | • Contract split |
| • Receiving money | • Cost |

- Take the economic benefits into account to maximize interests of the company. Can't only take the quality as the first purpose and consider the company's interests. Reduce engineering cost and maximize the company's interests under the condition of ensure the quality
- Limit the number of variation changes when signing the contract. If the total exceeds the certain level, the owner and contractor share cost changes and set excess progressive rate
- Make the control process of cost planning, decision-making, budget, control, accounting, analysis, evaluation clear. Define ways of cost accounting, settlement method and relevant cost assessment, too

CONCLUSION

This study firstly analyzes the problems existing in the lump-sum contracting projects of electric power companies and put forward the overall thought and target of risk control based on the relevant basic theories of risk control. Then the article excavates the main risk types. At last, the paper finds out control points of the current risks and discusses control measures. These are done in order to strive to succeed in achieving the comprehensiveness and systematicness of risk control mechanism, improve work efficiency and quality and play a positive role for the development of electric power companies.

In a word, the lump-sum contracting mode of electric power projects has been increasingly used in engineering construction projects all over the world. Various risks run through the whole process of electric power projects. Correctly identifying risks as well as taking corresponding measures to avoid or reduce risks is one of the important jobs of project decisions. In the process of implementing risk management, contractors should take targeted measures on the basis of the type and nature of risks and make risk management dynamic. And with the development of lump-sum contracting projects, it is very necessary for contractors to adjust management plans in time to make strategies more effective and beneficial. The risk management mechanism of lump-sum contracting of electric power projects can't be established overnight, it needs constant practices, improvements and developments.

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