

# A Proposed Comprehensive Analysis and Solution for Overseas Construction Project Management

Luoer Liao

Hunan Vocational College of Modern Logistics, Changsha 410001, China

liaoluoer@126.com

**Abstract.** This article explains and demonstrates the overall analysis for overseas construction projects with particular issues, such as cost control problem, subcontractor management risk and construction period difficulties. To critically assess the project monitoring and control processes, the improvements and solutions would be highly recommended for these identified issues, which a new comprehensive solution would be provided to avoid these risks and difficulties in overseas construction project in advance, and improvements would quickly identify whether the general project management methods are suitable for the target project management.

**Keywords:** project management; cost control; subcontract management.

## 1. The Cost Control Issue in Overseas Construction Project

In particular project, cost control problems are going to become vital to construction project management in different way. Moreover, manpower resource, material management and mechanical resources are the factors which takes most of the project costs in construction project, an efficient cost control is getting much more important in project management. According to most reality, the final cost control was always beyond expected. Then some issues would be described in cost control for these aspects respectively.

### 1.1 Potential Issues of Cost Management in Manpower and Material

In construction project, manpower cost takes a large proportion of budget, which is approximately 15-25%. In some particular projects, the manpower cost was determined by man-hours, however, due to the limited regulations, the manpower cost was always out of budget. At site, the various workers are difficult to calculate precisely, so this issue is of a great difficulty. An effective statistical method for manpower calculation was missing. In the actual practice, the management level is extremely hard to acquire precise data about manpower immediately. For example, in a coal berth construction, it is estimated that 50-70 manpower are needed per day, but the list provided by subcontractors is often more than expected for the reason that some workers were transferred to another sections, and some other workers supplement into other sections without record, which is not satisfying with requirement for working shift. As material cost is playing a role as one expenditure, whether the material usage which is the key to successful management factor. In most time, resources are provided by local suppliers with higher prices, and suppliers are required to offer separated enquiry.

### 1.2 Potential Issues of Cost Management in Machinery Equipment

Speaking of quantity of the machinery equipment that are used would be directly calculated from the project bidding contract before construction organization design period, and there was some difference between reality and plan, and the efficiency is also different. In the process of construction, there are many conditions for management level to change machine models, the actual investment is beyond expectation, for example, the pile foundation requires 2 sets of 6DE10M piling barges according to design plan, but it is found that they are not strong enough to satisfy with requirement, and another 2 sets of 6ML-DT piling barges have to be hired instead, then the cost is raising rapidly.

### 1.3 Potential Issues of Subcontract Management

The general contractor is willing to equip with all professional engineering qualifications. The other qualified subcontractors who can make up the range of abilities for general contractor are

professional for technology, manpower, equipment, resources, management etc. Through this combination, general contractor can expand the business range and gain more profit to undertake risks without independence.

For economic effects, some professional engineering items would be subcontracted if it is predicted unprofitable by general contractor for the purpose of avoiding losses as well as to obtain benefits. To transfer and disperse the risks, they can be undertaken by the subcontractors averagely. So, common in general contract risks for both sides, moreover, it could also improve the engineering economic benefits to get a win-win situation. As the owner's requirements are to require the general contractor to subcontract some kinds of construction items.

## **2. Potential Project Management Risks Analysis**

### **2.1 Legal Risk**

According to the legal contract, the general contractor will not accept unqualified construction engineering subcontractors, and the subcontractors are required to fulfill the contract with responsibility and obligation, to subcontract to any parties is a common phenomenon in this industry. For example, the riprap item was normally subcontracted to local construction engineering enterprises, but finally this item would be divided into stone transportation and then transferred to another enterprise, which seriously violated contract, which caused a serious issue for site management. As a consequence, the construction period would be definitely delayed and tons of money would be losses for this legal drawback.

### **2.2 Quality Risk**

Due to the subcontract management system is not well-improved in some construction enterprises, lack of a set of strict subcontract management system would cause some unqualified and low credibility subcontractors without necessary bidding process. For more profit, subcontractors replaced qualified materials to poor quality in structure engineering, seriously affecting the quality of main structure. In fact, companies placed emphasis on package of contracts but ignored subcontracts. In project management, to identify the responsibility and obligation clearly is a real matter of construction period, and it should be precisely for contractor who took full responsibility for the delay.

### **2.3 Period Risk**

A loose subcontract management is easy to impact construction schedule, as well as safety consciousness and effective technical support. For project risk management, the low performance of subcontractor is the main reason. For example, the construction site had not been cleaned up in time, which was causing that piling barges could not enter construction area, which delayed period, and actual weather conditions cannot meet the demand of security for the piling work because of poor coordination between subcontractors, who required the piling barges should reach to the designated sea position in time, which leads the piling barges could not be approved to enter the territorial sea without permission within stipulated period, so the vessels failed to enter the construction site to force a planning change, and causing unnecessary waste of resources.

## **3. Project Management Solutions for Issues**

The project manpower cost should be improved the cost control management according to subcontracting contract management. By the method of subcontract package to subcontractors, which is selected the subcontractor, and it should initiate strategic bidding method for this matter. The management level should confirm the bid that is to prevent to create extra quantities. Before signing the contract, quality, schedule, safety, environmental protection, completed product protection should be taken into consideration. After confirming the contract price, the subcontractor should be deducted the amount payments related to the corresponding liability for breach of contractor with period delay or other factors above. As for subcontract management, the mechanical equipment cost should firstly

consider inner business. For small mechanical equipment's, the cost for repairing and maintenance are required to be controlled by subcontractors, if the equipment cost is over budget out of the construction period, the subcontractor shall take the responsibility. In terms of material procurement, which can be effective in the source to the material cost control. Raise the awareness of legal risk for the construction subcontractors, and the project management group members should priority legal part into the risk control study. The project assessment group can evaluate the subcontract with the project management system. Moreover, pre-assess is needed to develop the management ability and the background for subcontractors at the first place to raise barriers to entry to select the qualified subcontractors at first step. And professional law background of management staff would be required to avoid legal risk during project management. For the subcontractor, the lack of effective technical support should also be considered. To contact with the local government department to confirm the priority issues at site and cooperate with the subcontractors to negotiate with project designing party. Then the project period assessment should be completed with 3 parties together. The business group is in charge of procurement process for all costs.

To solve the difficulties period control, the decisions would be formed by procedures of decision making. It could be identified that the problem that the supply of equipment and construction materials should be fully unified allocated by project management department. As price, quality and subcontractors are received by purchasing, which should be monitored by project management personnel, especially for the procurement process. To arrange on-site technical engineers to offer professional service to solve technical problems at site is another method. In contract management, it should be a strict accordance with the appropriate project funds distribution to perform the rewards and punishment system in the contract. The subcontractors are required to make overall construction plan, and weekly and monthly plans should be established, which should be supervised by project management staff.

#### **4. Recommended Project Management Improvements**

Whenever there is a potential problem, there must be a specific monitoring and control team should find a solution to solve. The monitoring and control team should consist of 4 parts: (1) Professional construction technology risk evaluator (Project General Engineer), (2) Professional project schedule reviewer (Assistant manager), (3) Professional contract management administrator (Business project manager), (4) Professional construction site investigator (Construction Site Manager).

The Construction Technology Risk Evaluator is responsible for conducting the construction quality work of each item project. Including weekly evaluation of the progress and monitor quality.

The Project Schedule Reviewer is responsible for specifications of the construction procedure and plan on the functions of each item project and preparing the reviewing part of the potential delaying factors and technical analysis of risks.

The Contract Management Administrator is responsible for detailed arrangement in the procurement process including setting up on-site inspections for the specification of subcontractors, preparing the business part of the bidding document as well as in charge of the cost management for the procurement process.

The Construction Site Investigator is responsible for investigating the potential or existing problems at construction site. To monitor the whole process of construction and coordinate all resources with both sides.

The decision making monitoring procedure also co-effect with the monitoring team. When the Construction Site Investigator finds that some potential problems or risks in construction site, and the Construction Technology Risk Evaluator would evaluate the risks immediately to judge the feasibility of the item, if the item cannot continue to be operated, then the Project Schedule Reviewer would receive the information to modify his original construction schedule and ensure other parts of project could keep on processing well within construction period. As a result of it, the Contract Management Administrator would suspend the related subcontracts with subcontractors to arrange another item subcontracts for priority. EPC project generally refers to the general engineering contracting

enterprises entrusted by the owners engaged in survey, design, purchase, construction, commissioning (completion acceptance) practice for the whole process or some phases of the general contract according to the contract of project. And the general contractor enterprise will be entirely responsible for the quality, security, construction period and cost for a project. In the process of project construction, we often encounter with the contract alterations by owner, for this case, it is a kind of difficult situation to the project monitoring and control. It is strongly recommending that a clear bilateral contract constraint should be definite as well as the limitation of period and scope for contracts alteration with the owner before. And then the reasonable construction design can be modified within the prescribed period and scope by contract alterations. In the process of contract alterations, it should be executed in levels, monitoring each phase of alteration, clearly prioritizing each alteration on all levels.

The solution is established by full-time monitors for all levels of construct alterations, the responsibility is to manage and maintain the specific alteration of the contract, to report the alteration contents to the designer in time, to submit the list of additional cost through contract alteration to the owner as soon as possible. After the contract alterations being approved through the project designer and owner, the monitors should report to the Construction Site Investigator and the Project Schedule Reviewer to ensure the construction designing purpose would be in line with the contents of contract alterations.

## **5. Critical Assessment on Monitoring Project Management**

### **5.1 Solution for Project Monitoring Process**

As project monitoring refers to the project managers at all levels timely and continuously record or report the series of activities for the system of the project status and the internal and external factors influencing the project progress according to project plan and purpose, etc. In the process of project monitoring, it mainly consists of plan, task and project members these three aspects. In order to understand the actual progress for project, we should understand work situation for project members, the project plan completion, etc. Project monitoring is necessary for the reason that it can prove that whether the plan is executable and plan can be completed at the same time. Because of insufficient monitoring work, the construction site was not satisfied with the condition of piling work, which prevent the piling barges entering the specified area that leads the commencement date had to be delayed until site transferred completely.

It largely influenced following items in the long run, and the head office had to reschedule the date of related items, moreover the material preparation, labor resources, equipment machinery should be arranged by the modified version. And the extra fees of fuel and rent for machinery equipment should be wasted. The planned construction period for steel pipe pile driving requires months. According to the designing plan, the weather condition in that period was totally satisfied with the steel pipe pile driving, but it is found that the swell in there was extremely strong and the sea wind speed was also too fast to maintain the stability for piling barges to drive in the sea bed. The weather condition there was far more difficult than predicted before. For this, the construction must wait until the breezeless season came for the safety consideration to delay the period.

In the process of the project, it was difficult to change schedule, which greatly affected the following works with alteration submitted through designer. And then, in the process of alteration monitoring, it is difficult to classify the alteration into prior level, which made the work modify repeatedly on useless plans. On monitoring management, specific alteration monitor is in charge of business, unfortunately, it is the field engineer who took responsibility to do that job, however, the field engineers were strained by limited energy to process all the requirements, which led to the alteration request cannot be processed timely to fail to meet the alteration requirements of owner. At last, the lack of monitoring staff to do follow-up job, which made the extra fee in the process of alteration be unable to be submitted to the owner immediately.

## 5.2 Solution for Project Control Process

Project control refers to the project according to plan in advance toward the ultimate goal during the whole process, because of the uncertainty of the prophase work and a variety of interference factors during period, the implementation of progress will deviate from the desired path. The project manager must compare with the original one to find out deviation as well as causes through project tracking information system, moreover, to adjust the whole process through implementation of corrective measures. So, the project control process is a specific, selective, active and dynamic process.

During the process of construction, the cost control of project was out of expectation. In terms of construction materials procurement, the existence of the problem was not effectively controlled as well as the materials transportation costs, the poor control for the comprehensive consideration of construction costs and transportation costs. It is found that more attention should be paid to cost of construction materials, but neglected the transportation cost, for example, in process of procurement, although local construction materials market investigation and transportation cost were out of expectation, the selected the supplier's price was even higher, but the distance was less than purchase price in other places, moreover, the transportation time was largely shortened, therefore, comprehensive consideration is an important link for project cost control.

According to construction schedule, site construction should be started in time. From construction design, it can be seen that the problem was that each project item was in poor coordination, which made it quite a long period, causing a part of issues in quality. As a consequence, we had to purchase new materials to replace the damaged ones. To summarize the causes, and construction machinery were insufficient in control, which made the item project process slow down. Each section of site work was unable to keep up with the normal rate.

Therefore, in general project, all item projects control should be satisfied with for each other. In particularly overseas project, which disturbed multiple item projects for the whole construction period, and even economic losses for construction materials and others.

## References

- [1]. Jingliang Liu. Introduction to engineering construction technology and design. *Advances in technology and innovation research* Vol. 41 (2014) No. 311, p. 531-541.
- [2]. Qijun Chen. The current problems existing in the engineering construction project management and countermeasures. *Innovation and Quality Research Perspective*. Vol.31(2016) No.121, p.98-110.
- [3]. Robert Alwanka. The current cost control in construction project. *Engineering Management Perspective Research*. Vol.137 (2013) No.64, p.11-18.
- [4]. Teresa Salvator. Risk and control of subcontract management in construction project. *Engineering Management Research and Development*. Vol. 221 (2017) No.119, p.218-229.