



# **Construction Organization Design and Project Cost**

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<p>Abstract</p> <p>With the construction and building market continuously deepening of reform the management system, the aim of this thesis is that improve the project quality, shorten the construction period, reduce the project cost and realize a safe and civilized construction, it must use scientific methods to optimize the design of construction organization to co-ordinate the whole construction process.</p> <p>I used to work in Savoniallina PR-Urakointi Oy. It is a construction company which focus on house and bridge construction. The construction organization design and project cost what I have been introduced in this thesis is based on my working experience.</p> <p>This thesis is mainly introduced four parts including Construction Design, Organization Design and Project Cost, The very first key is controlling the construction cost, if the enterprises ignore this work, they will lose long-term profits and cannot adapt to the demands of development.</p> <p>The success construction enterprises which are gradually bigger and stronger are a good exam to show the importance of choosing a right management system in a project. Improving construction methods, controlling cost effectively, allocating resources equitably and aiming at maximum profit are vital to enterprises development.</p> <p>.</p>			
Keywords Organization design, construction design, project cost.			

1	INTRODUCTION.....	5
2	Construction Design.....	7
2.1	Construction Organization Research Objects and Tasks .....	7
2.2	The Role of Construction Design .....	8
2.3	The Importance of Construction Design Preparation.....	9
2.4	The Classification of Construction Design .....	10
3	Organization Design.....	13
3.1	Special features of organization design .....	13
3.1.1	Construction organization design content.....	13
3.1.2	Construction Organization Design Preparation .....	14
3.1.3	The Implementation of Construction Organization Design.....	17
3.1.4	Construction Organization Design checks and adjustments.....	19
3.2	Organizational design modelling .....	21
4	Project Cost .....	23
4.1	Project Cost Implications .....	23
4.1.1	The Characteristics of the Project Cost.....	23
4.1.2	The Role of the Project Cost .....	24
4.1.3	The Functions of the Project Cost.....	26
4.2	Project Cost Management.....	27
4.2.1	Opinions on Strengthening Project Cost Management .....	27
4.2.2	The effective control of the project cost should be reflected the following three principles .....	29
4.2.3	Effectively control the project cost, we should take different measures	30
5	Construction Organization Design and the Project Cost Determination .....	32
5.1	Construction Organization Design and Project Cost .....	32

5.1.1 The Relationship between Construction Organization Design and Project Cost	32
5.1.2 Construction Organization Design Optimization Determine the Significance of the Project Cost .....	33
5.1.3 The Specific Measures of Optimizing Construction Organization Design and Determining the Project Cost .....	34
6 Conclusion .....	38
7 References .....	40

## 1 INTRODUCTION

With the increasingly fierce market competition of various types of construction, the construction enterprises are facing more and more challenges, in order to keep in an invincible position in the market. It is depending on whether these companies can use industry-leading management and technology to make good quality construction project for the owners. It is also depending on whether these companies can use the human, material and financial resources in a reasonable way to control costs effectively, improve the possibilities of getting the project bid offer in a lower price and get the maximum economic benefits in the implementation of the project to create a good material condition for business development.

The determination and control of the construction project cost is a major event as for the people's livelihood. Only take the scientific, effective and the whole process dynamic tracking management, and focus on cost control early and optimize organizational design in advance. In this way, we can control the investment of the project effectively and achieve project expected economic and social benefits of the project.

Under such circumstances, the main aim of this thesis is introducing the construction design and the construction organization design. And the second most important part is the project cost.

The method which I choose to research is based on my construction working experiences, the books what I have been reading before and internet resources. I have been working in Savonlinna PR-Urakointi Oy. It is a demolishing company. Since I have been working there, I found that we have to prepare plenty of things before starting working, like designing the organization (who is going to do different tasks, what kind of machine we are going use and what kind way we choose to demolish the building).

The books I have been reading before mainly introduce the construction quality, project cost and project duration. The internet resources include the introduction of the implementation of the project.

## 2 Construction Design

### 2.1 Construction Organization Research Objects and Tasks

The construction organization research objects and task is to promote the development of enterprise of technology, strengthen the core of modern construction management. Construction of a building is a special production activity, particularly modern buildings and structures are growing both on the scale and function. Some constructions have big span, and some of them are in-depth underground, underwater, and some of them have huge body, some have vertical and horizontal lines, which bring to the construction of many of the more complex and difficult problems. There are plenty of viable options for the construction workers to choose to solve construction problems. However, different programs, each of its economic effects are generally not the same. How to choose the best solutions according to the nature the scale of the proposed project, the construction season, the environment, the length of duration, quality and quantity of workers, the degree of mechanical equipment, material supply, component production, transportation, and other technical and economic conditions, economic and technical unified global view which has to be decided by the construction workers before the work start. Construction Organization mission is: Under the guidance of the principles, policies of the party and the government, to find the best way to solve the problem of construction organization, to make the scientific planning and deployment, so the human, material and financial resources, technical resources can be fully utilized to achieve high quality, low cost, high speed to complete the construction tasks. [1]

## 2.2 The Role of Construction Design

Construction design role is an important way to provide scientific management in the whole process of construction. Through construction organization design we can fully consider all the specific conditions of the project, choose the reasonable construction plan, determine the construction sequence, construction methods, labour organizations and technology economy, manage construction schedule in order to ensure the project is producing on schedule or post speculate use, also for providing economic, scientific and technic evidence for construction design plan's implementation possibilities. Construction Company can manage the sequence of human, material, and equipment use in advance. Also it can determine the number of facilities, size and purpose and the layout program for temporary facilities, materials and equipment on the construction site. It is based on the country or the owners of the project's requirements, the basic principles of design drawings and preparation of construction design, from those three elements of human, material and space in the whole process of construction. In terms of human and material resources, subject and auxiliary, supply and consumption, production and storage, professional and collaboration, use and maintenance, time sequence and space layout and so on which need scientific and reasonable arrangement in order to provide the best solution in production rhythm, balance and continuity with minimal consumption of resources to achieve maximum economic effect and finally the building products will achieve fast speed and short duration in time, achieve high accuracy and better function in terms of quality and achieve less consumption, low cost and high profit purpose in economy. [2]

Through the preparation of construction organization design, you can expect a variety of situations that may occur during construction. Pre-preparation and prevention



can provide the evidence for the construction enterprises to implement construction plans.

It can make the project design and construction, technology and economy better coordinated. According to practical experience, for a project, if the construction design was reasonable, accurately reflecting the objective reality, satisfying the construction unit and design unit requirements and can be seriously implemented in the construction process, then it can ensure the progress of construction goes smoothly and achieve good, fast and safety effects. [2]

### 2.3 The Importance of Construction Design Preparation

From the view of building products and production characteristics, we can know that different buildings or structures have different construction methods. Even for the same buildings or structures, the construction methods are not same. Even with the same standard design of buildings or structures, the construction methods are different because of different construction location, so there is no fully unified, totally same construction methods that can be chosen, so we should prepare the different construction design according to the different constructions. So we have to research the construction characteristics, local environment and construction conditions, follow the construction process requirements; organizing the supply and consumption of material resources. The relationship between construction units and various departments need to be coordinated. This requires that the project needs to be prepared before starting. [2]

## 2.4 The Classification of Construction Design

### (A) Classification of Deferent Design Phase

#### 1. Design in two stages.

Construction Design is divided into Total Construction Design and the Units' Construction Design. [3]

#### 2. Design in three stages.

Construction Design is divided into Construction Design Outline, Total Construction Design and the Units' Construction Design. [4]

### (B) Classification of Different Target Range

The Target Range is divided into Total Construction Design, Units' Construction Design and Part of The Construction Design. [4]

#### 1. The Total Construction Design

The Construction Organization design is based on the buildings or a construction project for the preparation of the object to guide the technical, economic and organizational comprehensive document. The Total Construction Organization Design is approved by the General Contractor after the preliminary design under the leadership of chief engineer. [5]

## 2. The Units' Construction Organization Design

The Units' Construction Organization Design is based on a unit project for the preparation of the object to guide the whole process of construction activities, economic and organizational comprehensive document. The Units' Construction Organization Design is generally completed before starting the project by the technical director. [5]

## 3. The Part of The project Construction Design

The Part of The Project Construction Design is part of the project for the preparation of an object to a specific implementation of technical, economic and organizational comprehensive document in the entire construction process. The Part of The Project Construction Organization Design is generally prepared with the Units' Construction Organization Design at the same time, and the Units' Construction engineering and technical person is responsible for preparation. [6]

The relationship for The Total Construction Organization Design, The Units' Construction Organization Design and The Part of The Construction Design as follows:

The Total Construction Organization Design is the overall strategic plan of the entire construction project which content and scope are more general; The Units' Construction Organization Design is under the control of The Total Construction Organization Design and enrich the content of The Total Construction Organization Design; The Part of The Construction Design is under the control of The Total Construction Design and The Units' Construction Organization Design and enrich the content of The Units' Construction Organization Design. [7]

### (C). Classification of Content of Different Sophistication

The Content of different sophistication on the design can be divided into two parts: Complete Construction Organization Design and Simple Construction Organization Design. [7]

#### 1. Complete Construction Organization Design

As for the project which is large-scale, complex, technically demanding, and has new structure, new technology, new materials and new techniques, the content of construction organization design must be detailed. [7]

#### 2. Simple Construction Organization Design

As for the project which is small-scale, has simple structure, technical requirements and process for the proposed project are not complicated, it generally only includes the preparation of the construction plan, construction schedule, construction general layout plan and the simple construction organization design. [7]

### 3 Organization Design

#### 3.1 Special features of organization design

There are many special features of organization design which including the content of the organization design, the preparation of organization design, the implementation of organization design and the organization design checks and adjustments.

##### 3.1.1 Construction organization design content

###### (A) The Total Construction Organization Design Content

- (1) The Project Overview of Construction Projects;
- (2) The Construction plan of The Main Building;
- (3) The Plan for Prepare Construction Work
- (4) The Construction Plan;
- (5) The Resource Requirements Plan;
- (6) The Overall Construction Design;
- (7) The Technical and Economic Indicators;
- (8) Conclusion. [8]

###### (B) The Units' Construction Organization Design Content

- (1) Project Overview and the Analysis of Construction Characteristics;
- (2) Construction Programs;
- (3) The Units' Construction Preparation Work plan;
- (4) The Units' Construction Schedule;
- (5) The Resource Requirements Plan;
- (6) The Units' Construction Design Plan;

(7) Technology Organisation Assurance Measures of Quality, Safety, Conservation and Construction in the Winter Rainy Reason;

(8) The Main Technical and Economic Indicators.

(9) Conclusion. [8]

(C) The Part of the Construction Organization Design Content

(1) The Part of Construction Overview and the Analysis of the Construction Characteristics;

(2) Construction Methods and Construction Machinery Selection;

(3) The Part of the Construction Prepare Work Plan;

(4) The part of the Construction Schedule;

(5) Labour, Materials and Equipment Requirements;

(6) Technology Organization Assurance Measures of Quality, Safety and Conservation;

(7) The Construction Work Zone Floor Plan Design;

(8) Conclusion. [8]

### 3.1.1.2 Construction Organization Design Preparation

(A) Preparation of Construction Design

(1) When the proposed project is bid, the construction unit must prepare construction project organization design. A construction project is generally divided into total contracting and subcontracting and the total contracting unit is responsible for the preparation of construction design or construction design phases. Subcontractors are

responsible for the preparation of subcontracting construction design under the deployment of the total contracting. Construction design should be prepared in accordance with the contract period and the relevant provisions and solicited opinions from all collaborative construction units. [9]

(2) As for the construction project which is complex and has new technology that needs conduct a professional research, it must be organized a special meeting, if necessary, and to invite experienced professional engineering and technical personnel to participate in, pool their wisdom, lay a firm foundation for the preparation and implementation of the construction organization design. [9]

(3) In the preparation of construction design process, we should give full play to the function of the various divisions and involve them in development and validation, take full advantage of the technical quality and management quality of construction enterprises, to co-ordinate arrangements and take the advantage of construction enterprises to carry out the program design process. [9]

(4) When the construction organization design is done, we should organize the personnel and units who participate in this design to start a discussion to determine the final official documents after modification and delivering them to the authorities for approval. [9]

#### (B) The Preparation of Construction Design Program

(1) The Total Construction Organization Programming Design.

(2) The Units' Construction Organization Programming Design.

(3) The Part of the Construction Organization Programming Design.

In the preparation of construction design, we are not only using the correct and reasonable method, but also the use of scientific programming and we have to focus on the feedback information at the same time. The process of construction design

preparation is from wraparound to fine, repeated coordination and ultimately it achieves the purpose of optimizing the construction organization design. [10]

(C) Construction Organization Design and Key:

According to the objective construction laws and the specific condition of time and locations, we need to consider human resources, funds, materials, machinery and methods of construction. We have to make a scientific and reasonable arrangement for the whole project construction schedule and resource consumption. [10]

The key is to select the construction plan and construction method according to objective conditions.

(D) The Basic Principles of Construction Design Preparation:

1. Strict implementation of the infrastructure program and construction program
2. Arranging scientifically the construction sequence.
3. Using the advanced construction technology and equipment.
4. Applying the science program to make the most reasonable construction organization.
5. Implementing the seasonal construction, ensuring continuous construction throughout the year.
6. Making ensure the construction quality and safety.
7. Saving the infrastructure costs, reduce project costs. [10]



### 3.1.3 The Implementation of Construction Organization Design

The preparation of construction organization design just provides a viable option for the production process of implementing project. The economic effect of this program has to be verified by practicing. The essence of the construction organization design implementation is the process of assessing its effects and checking the pros and cons by evolving a static equilibrium design into the construction process in order to achieve the desired goal. In order to ensure the smooth implementation of the construction design, we should focus on the following aspects: [11]

#### (A) Convey the Content and Requirements of Construction Design

After the approval of construction design, we need to hold production and technical meetings to explain its detailed contents, requirements and key construction. We also need to organize all the people together to conduct a discussion to develop technical measures to complete the task to make appropriate decisions. At the same time, the Ministry of Planning makes a practical and strict construction schedule and the Ministry of Technology has to develop the scientific and specific technical implementation details to ensure the implementation of construction design. [11]

#### (B) Making the Management System

The implementation of construction design will be successful or not that depends on the construction enterprise management quality, technical quality and management level. And the enterprise management system is good or not which can reflect the quality and level of enterprise. Practical experience

has shown that only construction companies have scientific and high level management system, then it can ensure the project quality, improve labour productivity and prevent accidents. So we must establish and improve the management system to ensure implementation of the construction organization design. [11]

(C) Implementation of the Technical and Economic Contracting

The technical and economic contracting is using economic methods to make the clear responsibilities for both parties on contract. It is easy to strengthen supervision and promote each other and it is also an important method to ensure the achievement of contractor objective. For the better implementation of the construction design, we should carry out the technical and economic contracting system, conduct labour competition and connect the technical and economic responsibility in the construction process with the workers' profits together. For example, we carry out the Excellent Engineering competition. Implement the Excellent Project Quality Award, Saving Material Award and Technological Progress Awards and other awards which are the very important ways for the implementation of construction design. [11]

(D) Arrangements and Balance

During the process of the project construction, the management of human, material and financial resources not only can meet the needs of the project construction but also bring better economic results. Any balance in the construction process is temporary and there are always some relative imbalance factors in balance, so we need to analysis and study of these imbalance factors to improve the construction design, to ensure the rhythm, balance and continuity of the construction. [11]

(E) The Construction Preparation Work

The construction preparation work is an important prerequisite to ensure the balanced and continuous construction as well as an important guarantee for the implementation of the construction organization design. The project not only needs to be ready all the human, material and financial resources before starting, but also at the different stages in the construction process should make the appropriate preparations. This is very important for the implementation of the construction design. [11]

### 3.1.4 Construction Organization Design checks and adjustments

#### (A) The Inspection of the Construction Organization Design

##### 1. The Inspection of Main Index.

The inspection of main index of construction organization design is always using the method of comparison. It means that comparing the indicators of completion with the indicators of plan. The contents of inspection should include the project progress, quality consumption, material consumption, machine usage and costs. We also need to connect the inspection amount of main indicators with the inspection of their corresponding construction content, construction methods and construction progress to provide evidence for further analysis if the problem is found. [12]

##### 2. The Inspection of Construction Plan Reasonableness.

The construction site plan must include the temporary facilities, pipe and transportation roads as well as reasonable storing equipment and piling material. The construction site has to meet the requirements of civilized con-

struction. The situations of the local construction site of power outage, without water and open circuit must be approved by the relevant departments. Each stage of construction requires an overall construction plan and any change in the overall construction plan must be approved by relevant authorities. If you find the unreasonable point in the construction plan, we have to make the improvement plan, submit it to the relevant departments for approval and continue to meet the needs of the construction progress. [12]

#### (B) The Adjustment of Construction Organization Design

According to the inspection of the implementation of the construction organization design, problems and reasons, we have to develop the improvement measures or programs, make adjustments for the construction organization design's relevant part or indicators and modify the total construction plan to achieve a new balance on the new basis for the construction organization design. [12]

In fact, the implementation, inspection and adjustment of the construction organization design is a regular job throughout the whole construction process.

[12]

### 3.2 Organizational design modelling

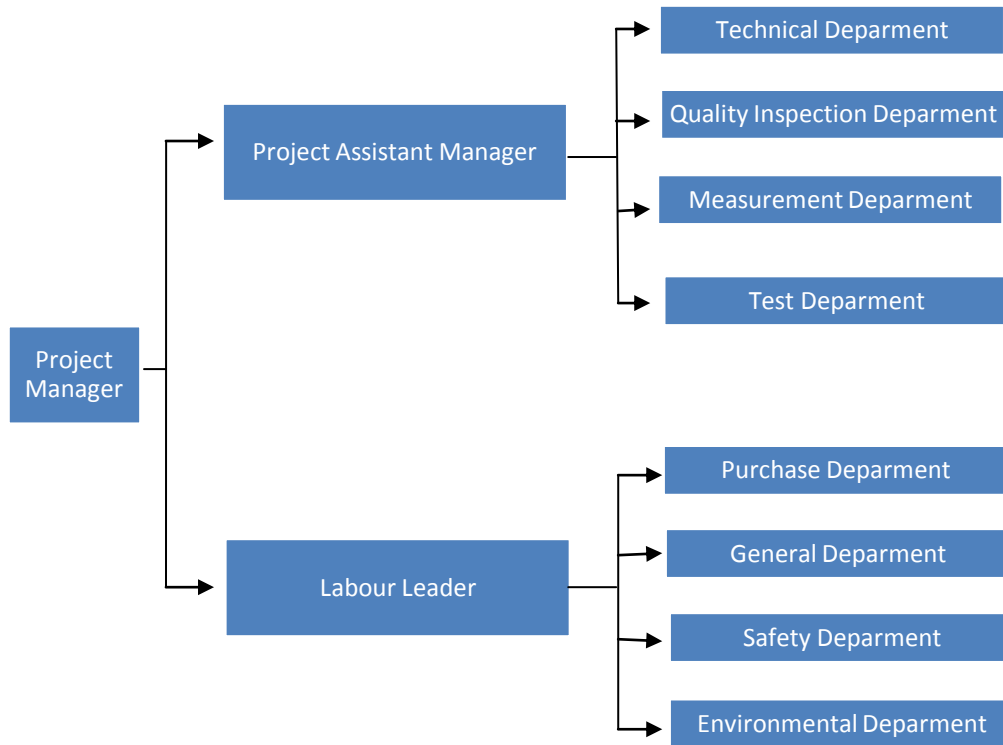


Figure1. The structure of organization

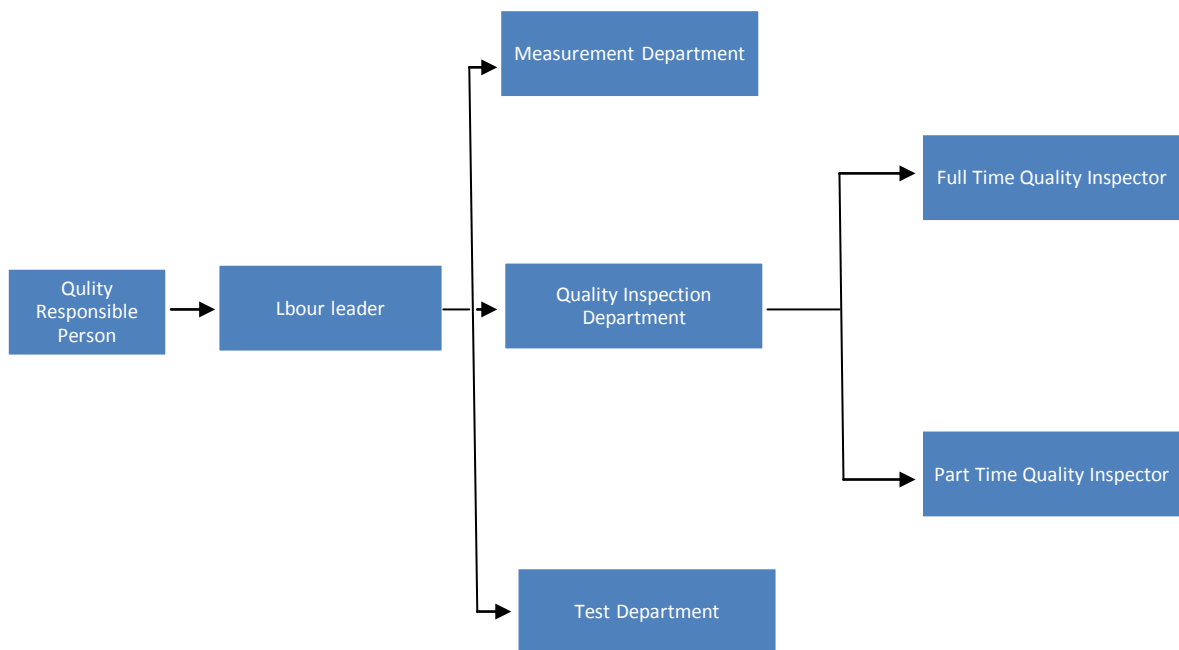


Figure2. Quality system

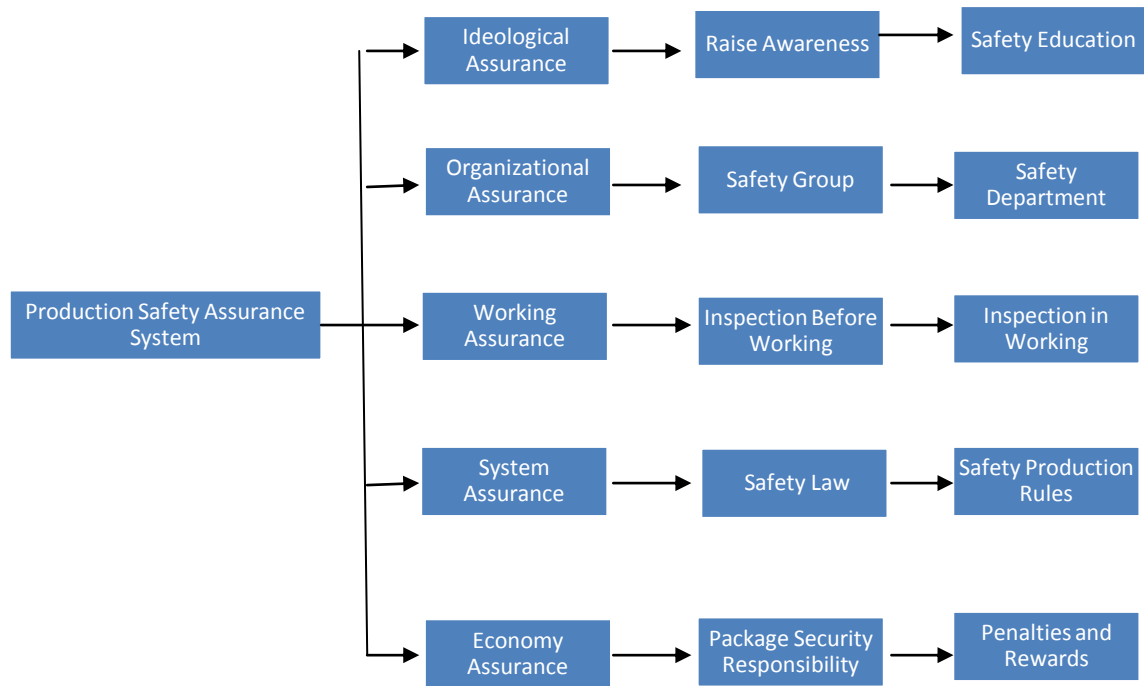


Figure3. Production safety assurance system

## 4 Project Cost

### 4.1 Project Cost Implications

Project Cost refers to the construction costs of a particular project. It can be defined from the following two aspects:

1. Project cost refers to the total fixed asset investment cost of the project.

Project cost refers to the project price that includes the estimated total price or the actual construction price in the land market, Devices market and technology labour market as well as contracting market and other trading activities. [13]

#### 4.1.1 The Characteristics of the Project Cost

1. The dynamic nature of the project cost which refers to there are many dynamic factors affecting the project cost in the working period, such as the fluctuant price of materials and equipment, the changes of wage rates and tax and other uncertainties will affect project cost. [13]
2. The huge cost of the project which refers to the features of huge physical project and expensive making. [13]
3. The individuality and difference of the project cost. Any project has its own specific purpose, technical and economic requirements. Therefore, the structure, shape, space division, equipment installation and layout of each project have specific requirements, so the construction content and physical form have individuality and difference. [13]

4. Project cost hierarchy. As the project itself has different levels, so that the project cost also has hierarchy. [13]

5. The compatibility of the project cost. In the project cost, the cost factor is very complex. The cost of obtaining land for construction expenditures and project feasibility studies, planning and design as well as the cost of the government policy (Industrial policy and tax policy) in a certain period are very big fund. [13]

#### 4.1.2 The Role of the Project Cost

##### 1. Construction cost is a tool for project decisions

The characteristics of big construction investment and long production cycle determine the importance of project decisions. Project cost determines the cost of an investment project. Do investors have the sufficient financial ability to pay the fee and think that is worthy to pay this fee? That is the main problem to be considered in project decisions. [7]

##### 2. Construction cost is an effective method of making investment planning and controlling investment.

The investment plan's development is according to the construction period, the project schedule and the construction prices. The right investment plan will help the effective use of funds. [7]

##### 3. Construction cost is an important indicator of evaluating the investment effect.



Construction cost is a system of multiple levels of construction cost. It is including the total cost of the construction project, cost of individual projects, unit construction costs, the cost of unit production capacity and the cost of one metre square construction area. All of these make the project cost itself an indicator system. So it is able to provide a variety of investment indicators for evaluating the investment effect which is helpful to provide the new price information for the similar projects in the future investment. [7]

#### 4. Construction cost is foundation of raising construction funds

The reforms of investment constitution and the establishment of a market economy require that the investors must have a strong ability to raise funds in order to ensure the adequate construction funds. [7]

#### 5. Construction cost is the method of adjusting the industrial structure and rationally distributing the benefits.

The lever of project cost is affecting the benefits distribution between the national economy sectors and enterprises. Under the planned economy, the government wants to build more projects with limited financial resources, so they are always tending to depress construction cost that causes the construction work consumption cannot be fully compensated, the value cannot be fully realized. The part of the value is not realized were reassigned to various investment sectors and occupied by the project investors. This kind of benefits redistribution is good for the various sectors to accelerate the development in accordance with the government's investment-oriented and also is good for adjusting the industrial structure in accordance with the requirements of macroeconomic. [7]

### 4.1.3 The Functions of the Project Cost

#### 1. Evaluation Function

The project cost is one of the main foundations of evaluating reasonableness the total investment and the investment returns. When we are evaluating the reasonableness of the land price, construction installation products and equipment prices, we must use the project cost data. When we are evaluating the construction projects capacity of repaying loans, the capacity of obtaining profit and macroeconomic benefits, we also can use the project cost data. Project cost is also an important foundation for evaluating the management level of construction installation enterprise and operating results. [8]

#### 2. Regulatory Functions

The Macro-control of the country is indispensable under any conditions in building size and structure and also it is necessary for the country to control and manage the government investment projects. All of these need to use the project cost as an economic leverage to adjust and manage the material consumption level, the scale of construction and investment direction in construction. [8]

#### 3. Forecasting Functions

The investors and builder must estimate. The estimation of project cost for investors can be a foundation for decision making, raise funds and control cost. The estimation of project cost for contractors can be a foundation for bidding decision, bidding quoted price and cost management. [8]

#### 4. Control Functions

The control functions of the project cost are manifested in two aspects: One is the investment control, which is the whole process and multi-level control based on the repeated budget and assessment of the project cost in all phases of the investment. The other is the cost control of the labour supply companies. [8]

#### 4.2 Project Cost Management

##### 4.2.1 Opinions on Strengthening Project Cost Management

Project cost is divided into four stages: (1) the project division and feasibility study stage, and the accuracy reached 30%. (2) The process design stage, the accuracy can reach 15-25%. (3) the basic design and preparation of bidding documents stage, accuracy can reach 5%. (4) the construction design stage. [5]

After winning the construction bidding, construction enterprises strengthens the whole process of construction project cost management is the key to improve the economic efficiency of the enterprises.

1. Making the fair and reasonable contract is the basis for doing the project cost management.

After winning project bidding, the construction unit will sign the construction contract with construction contractors. The construction unit and construction contractors are in the same position when sign the contract. The contract itself should also have fairness as well as the unfair contract itself is illegal and without legal effect. At the same time, both of the construction unit and the construction contractors should also be aware of the seriousness of the contract that refers to the contract can't be changed by anyone after signing the contract and the contract will become the future

behaviour guidelines for both of the parties. From the view of the cost, every word in the contract is likely to be the main issue of debate for both of the parties in the future, so in the period of signing the contract, the construction contractors shall sign the fair and reasonable contract to lay the foundation for cost management. [8]

2. The comprehensive management during the period of construction is an important part of strengthening the project cost management.

In the construction process period, the construction contractors should (contract-based and fact-based) full play the initiative and strengthening project cost management work.

- (1) The statistical work of project amount.
- (2) The claimant work in the project implementation.
- (3) Establish a good project cost management system.

3. The combination of technology solutions and economic management is an important work of strengthening the project cost management.

Economics and technology are belongs to different scientific areas, but in the process of construction, the combination of both is good or bad will directly affect the economic and social benefits. It is necessary for the technical work of construction enterprises focusing on improving the quality and ensuring the construction period. At the same time, we must focus on the economic efficiency of enterprises, if an enterprise doesn't have economic benefit, seriously loss money and survival at risk, then our technical work will be nothing. [8]

What kinds of relationship between technology and economy have? Technology is the method; the economy is the goal. The purpose is to achieve the good economy through technical methods. Both of them help each other. Ignoring any of these will

cause bad consequences. For example, if we want finish the project in a shorter period, we need to invest a lot of manpower and resources, but it causes a loss. If we want to ensure the high construction quality, we need to invest pretty much money, but the project costs exceed the cost of the project contract. Conversely, if we consider ensuring the construction duration and quality, at the same time, we also consider controlling the project contract cost, saving and improving the economic efficiency of enterprises, then, we will have abundant funds to purchase advanced equipment and technology. Thus, we will be more capable of ensuring the construction duration and quality. Therefore, the combination of technical solutions and economic management plays an important role in strengthening and improving the economic efficiency of enterprises. [9]

In summary, in order to strengthen the project cost management, improve the economic efficiency of construction enterprises, we should determine the reasonable project cost. After winning the project bidding, we need to sign a fair and reasonable contract and optimize the construction organization design. In the project implementation phase, we should effectively control the project cost and carry out the comprehensive project cost management. [9]

#### 4.2.2 The effective control of the project cost should be reflected the following three principles

- (1) The keys of project cost control are the investment decisions and design stage before starting working, after making the investment decisions in the project, the key of project cost control is design stage. The design quality plays an important role in the entire construction efficiency. [10]

- (2) Getting Active Control in order to obtain satisfactory results. After applying the research findings of systems theory and cybernetics with the project management, taking the "Control" as the decisions measures to reduce or even avoid the deviation from the target value and the actual value as much as possible, which is the active and positive control method, so we define that Active Control. [10]
- (3) The combination of technology and economy is the most effective way of controlling project cost. If we want to control the project cost in an effective way, we should take measures from the organization, technology and economics and so on. The measures taken from the organization is including clear the project organization structure, clear the cost controller and their missions and clear the management division functions. The measures taken from technic is including emphasis on design scheme selection, inspect strictly the preliminary design, technical design, construction design and researching the possibilities of saving the investment. The measures taken from the economy is including compare the planned value and actual values of the cost and inspects strictly the every expenses of the cost. [10]

#### 4.2.3 Effectively control the project cost, we should take different measures

The measures taken from organization is clear organizational structure, clear cost controllers and their missions to make sure every part of the cost have someone who is in responsible. The measures taken from the technology is that inspecting the every of stages of design, using the view of the technical economy to inspect the design, researching the possibility of saving investment. [12]

The measures taken from the economy are dynamically comparing the cost of planned value and actual value, inspecting the expenses and adjusting the design according to the progress of the design. [12]

All in all, the construction cost is the management throughout the entire process of construction. The reasonable determination and effective control of the project cost is an important construction management. [12]

## 5 Construction Organization Design and the Project Cost Determination

### 5.1 Construction Organization Design and Project Cost

Construction organization design is the technical and economic documents to guide the project tender, signing contracts and construction preparation. Construction organization design as the project management planning documents is including the construction schedule control, quality control, site management and cost control. [13]

That project cost is the price of construction and installation works, from the contractor's point of view, refers to the construction contractor and Construction Company complete the construction tasks in accordance with the contract. Owners should be paid for the works is construction and installation cost. Project cost determination is based on construction organization design and considering the company's existing human resources, construction equipment and many other factors. [13]

#### 5.1.1 The Relationship between Construction Organization Design and Project Cost

Construction organization design and project cost are equally important, but they are not independent of each other. On the contrary, they are closely linked to each other. Project cost is determined by the construction organization design, the lever of project cost not only connects with the estimation knowledge, but also depends largely on if the construction program is advanced or not. The price of different construction program is not the same. Only reasonable construction plan and construction techniques as a basis, we can determine the reasonable project cost. Reasonable project cost also affects the optimization of construction program. To make a reasonable



construction plan, construction and technical personnel also must use the project estimation knowledge. In the process of implementing the project, we should organize experts to check the bidding documents of construction organization design. In addition, we need to deal with the comparison and selection of all stages of the construction process in construction program to find the potential of saving the project investment to achieve the purpose of controlling the project cost and obtaining a higher economic efficiency. [13]

#### 5.1.2 Construction Organization Design Optimization Determine the Significance of the Project Cost

- (1) Ensuring the quality of construction organization design is the key of determining the project cost. Construction organization design quality is good or bad is the key of determining the project cost, so enhancing the quality of the construction organization design plays an important role in determining the project cost. If the work of construction organization design is not good, it will bring a great trouble to determine the project cost and execute the contract. Therefore, in the preparation process of the construction organization design, construction program selection cannot be simply decided by using the executive order, but also should rely on the collective wisdom. [12]
- (2) Construction organization design is the basis of project cost control. The design of construction program is a central part of construction organization design, the project costs can be controlled or not, which depends on the program is excellent or not. During the design process, we need to compare with various programs to choose the best design. [12]

- (3) The new technologies and new crafts are the main methods of reducing the project cost. Applying the new technologies, new materials, new technology and new equipment in construction design can enhance productivity and reduce project cost. [12]

Preferred design should follow the following principles;

- (1) The design must handle the relationship between economic rationality and technological advancement.
- (2) The design must take into account the construction and using.
- (3) The design must take into account the short-term and long-term requirements.

### 5.1.3 The Specific Measures of Optimizing Construction Organization Design and Determining the Project Cost

Construction organization design optimization and project cost determination belong to the project cost management. Improving construction organization design is an important part of the project cost. Well-organized construction, construction optimization, the total duration of schedule arrangements, improvement of machinery and equipment efficiency and improvement of construction management level reduce the construction costs, all of those can be achieved through the construction organization design. The construction organization design optimization and the project cost determine measures are: [13]

- (1) Having the accurate biography and familiar with the contents of the fixed cost.
- (2) Studying the drawings and technical data, each part of the project are in your mind. When the construction program is determined, you should compare the

economic rationality of the construction program, try to use more economical construction plan to control the project cost. [13]

- (3) Study the relationship between duration, quality and craft, according to the actual situation of the enterprises, relying on technological progress, using the new technology, new equipment and new materials. According to the local conditions, increasing their own enterprise reform efforts and other measures to ensure the duration and quality of the owners. [13]

There are many ways to reduce project costs which include organizational, technical, economic and contract management.

① organizational measures

I . Preparing the investment control work plans and detailed work flow chart. [13]

② economic measures

I . We need to make the plan of using fund, analysing the risk of project cost targets and developing preventive countermeasures.

II . The project evaluation.

III. Reviewing construction payment bill and payment certificates issuance. .

IV. We need to make the investment control plan in the construction process, comparing the actual costs value of investment with the planned costs value periodically. Finding the deviations, analysing the reasons of deviations and take corrective measures.

V . We need to negotiate the price of construction changes.

VI. We need to make the analysis and estimation of investment costs in the construction process, submitting project investment control and reporting to the problems to the construction unit. [13]

③ technical measures

I . We need to make the technical and economic comparison for design changes, strictly controlling the design changes.

II . We need to continue to look for the possibility of savings investment through design.

III. We need to inspect the construction organization design of contractor and prepare for the technical and economic analysis for the construction program. [13]

1) Developing the advanced, economical and reasonable construction plan to shorten the construction period and also improve the construction quality and reduce costs. Construction program includes four major elements: choosing the construction method, choosing the construction equipment, arranging the construction sequence and arranging the construction organization. Choosing the correct construction program is the key to reduce costs. First, according to the actual situation of the construction site, designing scientifically the construction site layout to create conditions for reducing waste and saving money. [13]

2) During the construction process, we have to seek the new technology, new materials and other technical measures to reduce costs, reduce consumption and increase efficiency. [13]

3) Controlling the quality, eliminating the rework phenomenon, reducing inspection time and saving expenses. [13]

④ contract measures

I .We need to record construction process, saving various construction files and drawings to provide a basis for the correct handling of claims that may occur. [13]

II . We need to Participate in contract modifications and additional work. Consider the impact of controlling investment. [13]

## 6 Conclusion

If we want to control the construction cost rationally and effectively, we must focus on the control in the early stages. First, we have to emphasize and strengthen on the work of investment estimation in project decision stage, strive to improve the accuracy of feasibility report on the number of investment control and play its role in controlling the total cost of the construction project. Secondly, we must work not only clear the project estimation and design, but also optimize design and exert the function of controlling the project cost and rationally use the construction fund. At the same time we have to carry out integrated management for investment estimates, design estimation, construction drawing budget, contract price, the settlement price and completion accounts in the project cost. Also we need to carry out the scientific and effective management in the whole process of the project, which needs through industry restructuring and running the market price mechanism to form a unified, coordinated and orderly project cost management system to achieve the purpose of reasonable use of the investment, effective cost control, scientific management cost and getting the best return on investment, gradually establishing a socialist market economic system.

Through this graduation project I learned a lot of things. Some issues have been resolved in the course of the organization, some of which has to be slowly learned in the future. I am convinced that as long as there will be more questions and more difficulties, here will also be more rewarding.

As we know, there are still many serious problems in the real working. In order to improve the management of the construction and project cost. I have my own options as follows:

1. The environment of all the projects is very complex that needs the cooperation and collaboration of all members of the project. Its effect is poor if only the project leader and finance staff do the project cost management. . So, the idea of project cost management needs to be in the consciousness of every project members to make them know their own duties and rights.
2. Today is an information society. Information plays a very important role in the project's success or failure and the achievement of the goal of project cost. We can even say that the information itself is a commodity. We need to do the work of project information management, including the use of a variety of professional software to discover the project and cost management issues in time and solve it.
3. When we are emphasizing on the cost management, at the same time we ignore the project quality management that causes the substandard project quality, so we have to rework which essentially is the biggest waste of costs. Therefore, we must promote the quality cost management to ensure the quality in a minimum cost.

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