Research on the Engineering Project Cost Management and Cost Control based on Data Mining Method

Qingrui Huang

School of Urban Construction, Yangtze University, Hubei Jingzhou, China
Corresponding author (Email:)

Abstract: The effective management of the project cost is the guarantee for the construction enterprise to gain profit, which directly affects the economic benefits of the enterprise. In this paper, the author analyse the engineering project cost management and cost control based on data mining method. As the engineering project has unique characteristics, so a large number of engineering accounting data has not been effectively analysed. In this case, data mining can be widely used to predict the cost of the engineering project. At the same time, through the analysis of the project cost management, the author puts forward the overall cost management system and makes a brief analysis.

Key words: Cost management, Data mining, Engineering project, Economic performance

1. INTRODUCTION

Project cost management is always the top priority of construction enterprise management. Is to ensure the project does not exceed the actual cost of the project budget for the project resource planning, project cost estimation, project budget and project cost control and other aspects of the management process and activities. As the center of cost management of construction enterprises, the profit and loss of project cost is directly related to the benefit, destiny and future of the enterprise (Bronwyn, 2015). Project cost management is an important part of project management. Under normal market conditions, low cost competition is the most competitive means for construction enterprises (Hui, 2015; Lei, 2015). The effective management of the project cost is the guarantee for the construction enterprise to gain profit, which directly affects the economic benefits of the enterprise (Jing, 2015). How to reduce the cost, strengthen the project cost management, improve the efficiency of enterprises, both in theory and in engineering practice have made a lot of useful exploration. However, in the past, the cost management model, the lack of dynamic tracking and management of the project cost and effective management tools, so that the cost management functions can not be achieved.

At present, the construction project cost management in our country there are still some problems, such as project management cost management awareness, pay attention to the construction cost control analysis and ignore other costs, cost calculation management means backward, the lack of scientific basis for forecasting and analysis (Bo, 2015). With the continuous development of our project management, project cost management, the traditional method is gradually by the market economy flood erosion, the formation of effective cost management methods of new projects or not effective in place, leading to problems in project cost management is becoming more and more obvious, we need to seriously study. In this paper, the establishment of the project total cost management system enterprise can track the process of project cost through the network, the realization of project cost supervision and verification (Saad, 2015). The project manager can in the production process, real-time grasp the actual cost formation and control, timely correct the deviation which will happen and has happened, the production cost control within the scope of project cost, to ensure the realization of the target cost, so as to maximize the efficiency of enterprises.

2. APPLICATION OF DATA MINING IN COST ANALYSIS

Data mining can be used to describe and analyse a large number of enterprise data according to the established business objectives. According to the data mining methods can be divided into: machine learning method, statistical method, neural network method and the database method. With the application of computer technology and information technology more and more widely, the enterprise every year to accumulate a large amount of data, in which the large amount of data we can find the valuable knowledge and rules or high level information the basis for decision-making by data mining technology, so that the data warehouse has become a rich and reliable resource for enterprise decision service. The essential difference between data mining and traditional data analysis is that data mining is the premise of mining information and discovering knowledge without explicit assumption. The information obtained from data mining should have three characteristics: unknown, effective and practical. The previously unknown information refers to the information previously unexpected, data mining is to find information or knowledge that cannot be found by instinct, even counterintuitive information or knowledge, dig out more information is unexpected, it may be more valuable.
The process of data mining is mainly composed of three stages: data preparation, data modeling stage, and application stage model.

3. TOTAL COST MANAGEMENT OF CONSTRUCTION PROJECT

3.1. Project cost

Cost is a process cost, it is the monetary form of labor and labor. More generally, cost is the generic form of sacrifice, the synonym of sacrifice. However, in terms of economic activity, not all sacrifices can be directly
reflected in the cash flow. The project cost is the sum of all kinds of expenses in the construction process of the project. The concept of project cost is various, which relates to the quality of construction organization, technology and economic management in project management. Building products have their own characteristics, such as long production cycle, high value, single, according to the characteristics and requirements of project management, in addition to the cost of the concept, the concept of it and budget cost, plan cost and actual cost.

**Figure 3. Cost management**

According to the nature of cost expenditure:

- Contract cost: It is based on the physical quantities of construction projects and the national or local or regional or enterprise budget quota and fee. The average social cost or average cost of the enterprise is calculated and analyzed on the basis of the construction drawing budget to determine the measurement, collection and calculation.

- Target cost: It is on the basis of budget cost, according to the provisions of the contract such as the internal requirements of enterprises in this part, combined with the technical characteristics of the project, natural geographical features, the quality of labor, equipment of standard cost. It is the standard to control the expenditure of the project and the goal of cost management.

- Actual cost: It is the actual construction project construction process, can be included in the cost of the total cost of the sum of. It is a comprehensive reflection of labor cost in project construction activities.

**Figure 4. Cost classification**

The engineering cost is divided according to the financial method:

- Direct cost: Direct cost refers to the cost of the project can be divided into areas for which the project can be directly included in the cost of the project costs, including labor, materials, machinery costs.

---

**Cost Classification**

<table>
<thead>
<tr>
<th>Basis</th>
<th>Cost Types</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Input consumed in the process of manufacturing / providing a service</td>
<td></td>
</tr>
<tr>
<td>Element</td>
<td>Wages paid to the labor involved in the manufacturing process / service providing</td>
<td></td>
</tr>
<tr>
<td>Labor</td>
<td>Costs not attributable to a product manufactured / service provided</td>
<td></td>
</tr>
<tr>
<td>Overheads</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---
Indirect cost: Overhead costs are the costs that cannot be clearly identified in the event of a project, which cannot be directly included in the project and used in certain ways. The purpose of this classification is to facilitate the actual cost accounting of the organization project, including the time limit cost, quality cost, capital cost and engineering change cost.

3.2. Project cost management

A comprehensive enterprise cost management should be reflected in the cost management of the "three" - full, comprehensive, whole process, from the production management process of each link, each process, each department and even the production site of each station operator can participate in cost management at the same time. Emphasizing the importance of scientific cost management and take the initiative to improve the participation of the combination through scientific cost management and full participation in the initiative to improve the consistency to achieve the management requirements and the grass-roots departments pursue. Therefore, the total cost management system is a scientific cost management as the basis, established by the full participation, including the whole process of enterprise management and comprehensive cost management system, and the full collection of wisdom, full play the initiative, make each department staff independently improve continuously reduce costs, make the management and staff of the various departments have reduced the consistency of the costs for the lowest cost under the condition of production management and operation of the organization.

Project cost management is to ensure to meet the quality requirements of the contract period, the premise, the project costs, through the planning, organization, control and coordination, to achieve the predetermined cost goal, and as far as possible to reduce the actual cost. Cost control is a process of scientific management activity, it is mainly through techniques such as construction design and selection, industrial engineering, value engineering, such as economic accounting and management such as the construction organization and management, the rules and regulations and other activities to achieve the intended target, implementation plan cost, reduce the cost of the project.

Figure 5. Total cost management

The main features of the total cost management of the project are determined by the characteristics of the construction products, the production characteristics of the construction products and the operating characteristics of the construction enterprises.

1) Building product features: The final results of the building products as the construction industry, the product itself and its production is different from the unique nature of other social products, these characteristics determine the organizational structure and operation process of construction enterprises, thus will affect the overall cost characteristics of construction enterprises. Considering the characteristics of comprehensive building products and production characteristics, technical and economic characteristics of building products can be used to illustrate the diversity of products including construction and production of disposable products, construction of large volume, high value, long production cycle, liquidity and fixed location production, quality problems.

2) Production characteristics of building products: Any construction project from the project to the completion of the design, approval, bidding, construction and a series of processes, often a few years time, each link has an impact on the cost of the project. The construction products from the drawings into the reality of the work, on the one hand to be affected by the previous work, on the other hand by the construction of the product realization process. Therefore, it takes a long time to collect and...
analyze the total cost data of a building product.

3) **Characteristics of construction enterprises:** Over the years, China has accumulated rich experience in the construction of production technology, scientific production management and construction affairs, building production laws and regulations, the construction enterprise organizational structure and other aspects, and formed a relatively complete system. Quality certification, construction enterprise qualification certification from various aspects of the construction enterprise production and management put forward the standardization of requirements.

![Figure 6. Project Cost Control](image)

**Figure 6. Project Cost Control**

### 4. TOTAL COST MANAGEMENT SYSTEM

**4.1. cost management system**

The cost of the project is composed of labor cost, material cost, mechanical cost, indirect cost, and the cost of the project management system. Therefore, research on key system overall project cost management is the scientific system arrangement, establish the cost management mechanism is reasonable, the implementation of the whole process of project cost dynamic control of cost management system.

![Figure 7. The cost management system](image)

**Figure 7. The cost management system**

The total cost management of construction projects should be consistent with the characteristics of the construction industry, the production characteristics and the characteristics of construction enterprises. Due to the large differences in the industry, the actual cost of the project is beyond the planned cost significantly, learn from other industries or enterprise cost management system is unlikely. Project total cost management features are mainly reflected in the following aspects.

1) **The project cost accounting and hierarchical imputation:** Construction enterprises to implement project management, under the guidance of the construction of the project under the guidance of a number of project department, each project independent accounting, so the cost accounting should also be in the enterprise and project department two levels. The two levels are both independent and interrelated,
when the end of the year, the quality of the report, the enterprise should be the organic summary of the project. The establishment of specialized cost schedule for collection of cost sources, on the relation between firm level cost corresponding with this source to find out
2) Stage cost control and feedback: Due to the long production cycle, the cost data collection work is longer. The complete cost data of an engineering project will have to wait until the end of a project warranty. Therefore, the cost control of the stage is the premise of carrying out the comprehensive cost management. On this basis, the establishment of cost accounting is more scientific and perfect.
3) Cost accumulation in single project: The single project cost accumulation for accounting and analysis.

4.2. The significance of project cost management
Carrying out the overall cost management is an important way to ensure the product quality and improve the economic efficiency, but also is an important means to promote the further development of the project management
- Lead the business leaders to pay attention to cost control and support the implementation of the overall cost management: Through the full cost accounting, business leaders can master the share of the cost, can see the existing specific product cost and cost management, and the impact on the economic efficiency of enterprises, to support the implementation of comprehensive cost management, improve the overall level of cost management.
- Promote the improvement of product quality: The cost of prevention and identification is a measure of the cost paid by an enterprise to improve the quality of the product. Improve the cost of prevention can effectively prevent the occurrence of quality problems, so the comprehensive cost management will promote the improvement and improvement of product quality.
- Can control and improve economic benefits: As a company engaged in the production, the pursuit of profit units, only with a lower cost to produce higher quality products, in order to achieve as much economic benefits. At present, a lot of construction enterprises in our country the quality of the cost of loss of large unexpected. It is of practical significance to carry out the overall cost management and reduce the total cost.
- Contribute to the scientific development of enterprise internal quota, improve market competitiveness: Due to the influence of different factors, such as the management level of the enterprise, the quality of personnel, the arrangement of the system and the strength of the enterprise, the actual cost of the construction enterprise is different. To carry out a comprehensive cost management can make full use of the advantageous resources, accurately grasp the cost elements of the project, the scientific development of enterprise internal quota, continue to lower the minimum cost of enterprises in an invincible position in the fierce competition in the market.

5. CONCLUSION
In normal market conditions, low cost competition of construction enterprises is an important means of competition, and the project cost effective management, construction enterprise profit guarantee, directly affect the economic efficiency of enterprises. How to strengthen the project cost management and improve the efficiency of enterprises, both in theory and in engineering practice have made a lot of useful exploration. In the previous project cost management model, the lack of the dynamic tracking of the project cost management and effective means of comprehensive management, making the cost management functions can not be achieved. Based on the analysis of cost management mode of engineering project, introduces the concept of cost from the system function, the overall cost management of project elements, process and information integration and other four aspects of the construction of the overall project cost management system, the operation of the system and the principle of cost planning, cost control, cost accounting the process and cost analysis of overall cost management as the main line, dynamic analysis of the running system of comprehensive cost management of engineering project.

REFERENCES