Cost Calculation Method of Informatization Project in Electric Power Company

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Abstract. With the deepening of power reform, in order to enhance its competitive advantage, power companies must improve their management level and reduce the operation cost through transformation. As an important technical guarantee for the transformation of power companies, informatization can create advantages in management, production, technology and talents for power companies, and it will also become a booster for the transformation construction of power companies at the same time, the cost calculation method of informatization has become the focus of research. Based on this, this paper carries out the research on the cost calculation method of informatization project of power company. This paper uses the methods of literature induction, practical research and comparative research to carry out the research. In the research, through the collection of relevant data, it lays a theoretical foundation for the research of this paper, and makes a comparative analysis of the current informatization project cost of domestic and foreign power companies. In order to meet the needs of the whole cost calculation process, this paper puts forward a simple and easy-to-use capital flow information model, namely delta capital flow information model, according to the cost calculation method of power company informatization project management information system. The research results show that the delta capital flow information model adopted in this paper can lay a solid theoretical foundation and realize the effective correlation between business processes in different development stages. In this model, the proportion of software products will increase to 14.3%, the proportion of services will increase to 18.4%, the proportion of hardware will increase to 32.9%, and the proportion of network equipment will increase to 7.8%.

Keywords: Electric Power Company, Informatization Cost, Calculation Method

1. Introduction

With the reform of electric power management system in China at the end of the 20th century, electric
power companies and other electronic products industries also began to develop rapidly in this period. The division between power plants and power grids has made the functional division of electric power management more and more refined and specialized, and the policy support and capital investment for the informatization construction of electronic products industry have increased rapidly [1-2]. Under the background of further optimizing the optimization and rational allocation of China's clean energy resources, the problems of big data interconnection and industry cooperation in the field of information technology application are becoming more and more prominent, the production of big data in power enterprises is also increasing, and more and more energy enterprises begin to pay attention to resource integration and normalization [3-4]. The cost budget management in the informatization project scheme is an important part of the project information management, which is an important basis for the approval of financing, financial control and project declaration by the local government [5-6]. The lack of pricing method and basic basis will increase the difficulty of it cost management and reduce the scientificity. The lack of rationality and enforceability of budget will also bring audit risk [7-8].

In the research on the method of calculating the cost of the information project of the electric power company, many scholars have studied it and achieved good results. For example, Emma Thirkell analyzed the relationship between project investment and safety assessment cost, using the principle of normal transformation and normal formula, established a variable linear regression model based on normal transformation and a transformation composed of power functions and arithmetic transformations [9]. In order to improve the budget management level of the company's informatization project, Sanjay Bhasin proposed to establish a standard cost system, a calculation support software system for the budget quota, and analyze how to best implement the cost model system [10] for the project budget, including the early stage.

In order to better carry out the research, this paper first expounds the problems existing in the process of information project cost budgeting of power companies, including the lack of unified standards for project classification, the difficulty of accurate measurement of software R &D workload, the insufficiency of compilation basis, and the lack of evaluation standards. Then it introduces the delta capital flow information model, and takes feasible measures to solve these problems The relevant calculation formulas are put forward and the main cost calculation methods are listed. We also made an in-depth analysis of the data obtained from the survey.

2. Research on Cost Calculation Method of Informatization Project of Power Company

2.1. Problems in The Process of Information Project Cost Budgeting of Power Companies

(1) There is no unified standard for project classification

At present, the relevant government departments have not classified the information construction projects, but there are still many ways and methods to classify according to the purpose and nature of the construction projects. The difference between the classification of non fixed projects and the content of projects results in the significant difference in the composition of project costs. Although China Southern Electric Power Company and Inner Mongolia electric power company have also released the company's information planning cost calculation template, and these standards are still in the primary stage, the preparation of information technology budget has been standardized to a certain
extent, including project budget and calculation standard, quota budget, etc.

(2) **Software R & D workload is difficult to accurately measure**

Project construction is of great significance for general engineering projects, while information construction projects, especially software development projects, are of great significance, which belongs to intellectual work. At the same time, due to the lack of user demand, demand, scope, schedule, project cost and other projects are constantly changing, which makes it difficult to accurately estimate project funds or budget in advance.

(3) **The preparation basis is not sufficient, the budget is not rigorous and standard**

When organizing and compiling the cost of an engineering project, it is necessary to make an accurate classification of all kinds of costs, and correctly explain the use of specific funds, workload and the basis, methods and methods for calculating other costs. However, in the actual work and study, because of the defects in the technical basis of project budgeting, there are some problems in the information age, such as the basis of project budgeting is not comprehensive, the data is not detailed, and the budget guidance is poor.

(4) **The lack of evaluation criteria affects scientific decision-making**

In the stage of submitting project application, there are many problems in project budgeting, such as large number of employees, false report of working hours, etc. at the same time, due to the lack of corresponding budget standards, false increase of personnel costs, etc., the construction site or the third-party organization has no reference basis in reviewing the project cost, and can only reduce the project cost proportionality according to the actual situation. This kind of extensive budget review and evaluation method is not conducive to making scientific decisions on project investment, nor to promoting sustainable development and improving the management level of the company.

2.2. **Delta Capital Flow Information Model**

Based on summarizing the objectives of information cost measurement and management and the characteristics of capital flow, this paper puts forward the capital flow information model measurement and management information cost measurement and management delta information cost model. Capital flow is the same as delta river. Delta river network is dense, or converges or diverges, and finally appears in different countries and places. At each stage, there will be energy consumption, such as evaporation of water, seeping into the riverbed, which flows around the lake and other lakes. During the contract signing and payment phase, the company will be transferred as follows:

1) **Budget balance.** If the contract is signed according to the project budget, or direct supply and other non contract expenditures, there will be a gap in the amount, that is, the budget balance is generally greater than or equal to zero, but it can also be negative, which means that it exceeds the budget. To meet the budget, the key depends on whether the company's management is rigorous.

2) **Contract balance.** There are two cases of contract balance: one is the deduction caused by incomplete performance of the contract; the other is related to a certain period of time. For example, in a two-year contract, there is no full payment in the first year, which is an annual booking phenomenon.
The traditional information cost management only focuses on the implementation of delta capital flow information, which is represented by enterprise information, but ignores the capital flow management files. In order to realize horizontal information penetration, it is necessary to know whether the node business belongs to information technology, but also whether the node business belongs to information capital flow.

The essence of capital flow is the direct relationship between starting and ending points. In calculation, it is not usually regarded as a separate functional part, but is related to the start or end of business elements. Given the order of the starting point and the ending point, only the connection to the ending point is meaningful. The specific method is: increase the number of business management modules corresponding to the node, record the business objects corresponding to the initial node, and enter the budget and the amount granted in the node.

2.3. Relevant Calculation Formula

The calculation formula of software function point is as follows:

$$DE_{(\text{Man \cdot day})} = FP \times FPTC/8$$  \hspace{1cm} (1)

$$FP = UFP \times VAF$$ \hspace{1cm} (2)

$$UFP = \sum (EI \times C_x) + \sum (EO \times C_x) + \sum (EQ \times C_x)$$ \hspace{1cm} (3)

The adjustment factor of the function point can be calculated with the calculation formula of VAF:

$$VAF = (\sum (DI) \times 0.01) + 0.65$$ \hspace{1cm} (4)

3. Experimental research on the cost calculation method of informatization project of electric power company

3.1. Research Materials And Experimental Design

This system is designed for the management of information project. Project management refers to the effective management of all the work involved in the project through the understanding of the project as a whole. The advantage of the relationship system of electric power information project lies in the comprehensive, convenient retrieval and sharing of information. According to the actual situation of the system requirements analysis, system requirements include the project management object and system function. Project management objects include personnel management, document management and information retrieval, and then their functions are analyzed. Based on the system software architecture, the system structure is designed to realize the personnel management function, document management function, information retrieval function, project communication function and project implementation management function, and the application of project management system is introduced.

3.2. The Main Cost Calculation Method Includes The Following Steps

Information system construction cost:
(1) The cost of information system construction includes the cost of software development adjustment, the cost of software application adjustment, the cost of system integration, the cost of system training, the cost of transition to implementation, etc. The calculation type of each individual cost is as follows: labor cost = unit labor cost × adjustment factor.

(2) The workforce analysis structure (WBS) is used to break down the workload of application software, integration, training and migration, and expert methods can be used to review the rationale.

(3) Information construction projects also involve many other types of expenditures, including planning fees, supervision fees, consulting fees, remuneration of bidding agencies, assessment fees, integration fees, security assessment fees, third-party testing fees of software systems, etc.

4. Research and Analysis on the cost calculation method of informatization project of electric power company

4.1. Experimental Research and Analysis of Informatization Project Cost of Electric Power Company

The informatization company and three power companies have signed three informatization projects of power company a, B and C. the corresponding costs of the three projects are the same, and there are no special process requirements. The funds spent on different costs of the three projects are shown in Figure 1:

| Table 1. Information project cost table |
|----------------------------------------|
| **Project** | **Project A** | **Project B** | **Project C** |
| Raw material | 680 | 685 | 675 |
| Labor cost | 930 | 770 | 1200 |
| Manufacturing cost | 504 | 700 | 600 |
| Special fees | 700 | 500 | 604 |
| Power cost | 505 | 605 | 553 |
Figure 1. Information project cost table

According to the statistical data analysis in Figure 1, although the companies corresponding to the three projects are different, the cost types corresponding to the projects are the same. Therefore, in the informatization projects of power companies, the largest cost is labor cost, which is 9.3 million yuan, 7.7 million yuan and 12 million yuan respectively, followed by raw material cost, which is 6.8 million yuan, 6.85 million yuan and 6.75 million yuan respectively, and the rest is in different power companies. The proportion of information projects in the division is different.

4.2 Research And Analysis on The Prospect And Opportunity of Market Consumption Demand of Information Industry of China’s Power Companies

With the development of smart grid construction of China State Grid Corporation and China Southern Power Grid Corporation, the informatization investment of power companies will increase. The scope of IT solutions for power generation enterprises is shown in Table 2:

Table 2. Proportion of IT solution scale and market scale of power companies

| Solution                                | Scale /10 million yuan | Market share / % |
|-----------------------------------------|------------------------|-------------------|
| Power grid production management system | 5.35                   | 6.2               |
| Plant level information monitoring system | 6.07                   | 7.8               |
| Management information systems          | 6.21                   | 7.2               |
| Marketing management system             | 12.26                  | 14.3              |
| Enterprise resource management          | 15.74                  | 18.4              |
| Solution                                      | Market share / % | Scale /10 million yuan |
|----------------------------------------------|------------------|------------------------|
| Automatic control system                     | 28.03            | 32.9                   |
| Other                                        | 11.44            | 13.2                   |

**Figure 2. Proportion of IT solution scale and market scale of power companies**

As shown in Figure 2, by comprehensively promoting the smart network construction of State Grid Corporation of China and China Southern Power Grid Corporation, it will drive the development of informatization investment. The proportion of software products will increase to 14.3%, the proportion of services will increase to 18.4%, the proportion of hardware will increase to 32.9%, and the proportion of network equipment will increase to 7.8%.

5. Conclusion

With the rapid development of BIM Technology, it has driven computing cloud, Internet of things, mobile Internet, big data, chain, artificial intelligence and other information technology. The supporting role of information technology in the company's production and operation will be more and more important, and the investment in production and operation will also be more and more large. The establishment of the standard system of power company's informatization will improve the existing project cost calculation methods improve, implement it project quota management, constantly improve accuracy, standardization and ease of use of computer design, in the accumulation of a large number of basic data; further deepen the research of computer program standardization pricing system, improve its applicability.

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