Research on General Cost and Engineering Investment Analysis Method of China National Network Using Computer Information Technology

Nan Xu1,*, Hongwei Yang2, Yan Song3, Zhao Liu4

1,2,3,4State Grid Hebei Economic Research Institute, Hebei, China, 050000

*E-mail: 8569238@qq.com

Abstract. With the continuous progress of the electronic industrial revolution, computer has become an indispensable tool for social progress. At present, computer information technology has been widely used in the field of power grid construction engineering. According to the characteristics of computer information technology, this paper puts forward the method of identifying the general cost and project investment of the national network with the help of information technology.

Keywords: Information Technology, National Network General Cost, Project Investment

1. Introduction
Since entering the 21st century, the world has entered the information age, computer Internet technology has entered thousands of households, closely related to people's daily production and life, whether in work, study or production to provide people with great convenience, so as to ensure the effective improvement of work efficiency, and achieve information sharing in different fields of development in different industries, promote better cooperation among enterprises and achieve win-win results[1]. Therefore, the application and development of computer information technology is one of the important research topics in the present era[2-4]. Project investment decision is the criterion of investment action. Whether the project decision is correct or not is directly related to the success or failure of the project construction, the project cost and the investment effect[5]. However, in the current field of State Grid construction, the investment scale is out of control, the quality of the project appears major hidden trouble, the repeated construction of the project, the low efficiency of the project after the completion of the project, and so on, resulting in a huge waste of project investment. There are many reasons, but the main problem is the decision-making method of construction projects[6]. According to the relevant data, the possibility that the early decision-making work of the construction project affects the investment of the project construction is 35%~75%, while the possibility of
affecting the investment of the project construction in the implementation stage of the project is only 5% and 20%. It can be seen that the early decision of the construction project is not only the primary link of the project investment, but also an important aspect that affects whether the construction project can achieve the expected goal\cite{7}. Rational use of computer technology to identify the national network general cost and project investment analysis, as to save construction investment, so that the maximum benefit of limited funds, we must pay attention to the national network construction project decision-making methods.

2. Application of computer information technology in power grid construction engineering
With the continuous improvement of the development level of modern information technology, database technology has become the representative of new development technology, with the development of the Internet as the basic background. Its application advantages are mainly reflected in: first, can complete the collection of a large number of data in a short time; second, to achieve the collation and storage of big data; third, the use of computers to analyze and summarize the relevant effective data. Under the background of fierce market competition, its application scope has been continuously expanded. Figure 1 shows the relationship between cost and project investment analysis.

![Diagram showing the relationship between cost and project investment analysis](image)

**Figure 1.** Relationship between cost and project investment analysis

2.1. Mastering the laws of computer information technology
Under the background of big data development system, the data distribution has strong regularity. In other words, although the source and organization of the data are very different, after effective integration, there will be a lot of similarities, so that the best sorting method can be found.

2.2. Computer information technology is public
Data can only play its due value under semi-open conditions. The initial stage of database establishment requires the user to register the information and set up a separate account password, so as to realize the effective browsing of the information.
2.3. Computer database technology is isolated
Although in most cases database technology will work with other technologies to accomplish the task together, database technology will not be affected in any way, that is, the software and hardware systems of database technology will not conflict with other technologies, and the logical structure will not change as a result.

3. Computer technology identification of cost and analysis of project investment process
Here, we select 110~500 KV substation project, 110~500 line engineering as an example, introduce the use of computer information technology to identify and analyze the cost investment of national network general engineering, the flow is shown in Figure 2.

**Figure 2.** Computer identification of project cost and investment process

3.1. Cost analysis of substation engineering
(1) Analysis of the general situation of substation projects. Power substation projects are mainly divided into new construction and expansion, generally including 110 KV, 220KV and 500 KV, through the main transformer capacity statistics to obtain the number of projects, from the engineering category dimension to calculate the proportion of new construction, expansion, from the voltage grade dimension analysis of the number of projects. After analyzing the overall cost level of the substation project, the cost level of the new substation project and the extension substation project are analyzed in detail, including the discrete analysis of the cost sample data, and the main reasons for the greater dispersion are analyzed.

(2) The analysis of the investment balance of the substation project is divided according to the voltage grade and the variable capacity, and the investment balance of the new substation project and the extension substation project and the dispersion of the balance rate are analyzed in detail respectively. Analyze the major balance costs of projects with high balance rate and analyze the main
reasons for the balance. The deviation of relative standard variance represents the change of discrete degree of project investment sample data group from budget estimate to settlement stage, which objectively reflects the discreteness of different project balance rate in a certain type of project, that is, the difference of investment balance rate between each project is large.

(3) Analysis of material price level of major equipment in substation engineering. In substation engineering, transformer, circuit breaker, power cable and so on constitute the main equipment of substation engineering, which is an important factor affecting the purchase investment of equipment materials in substation engineering. The proportion of investment in main equipment materials and the price of equipment materials in different years are analyzed, and the main factors affecting the price of main equipment materials are analyzed.

3.2. Analysis of line engineering cost
(1) Analysis of the overall situation of line engineering. Line engineering includes overhead line engineering and cable line engineering. The number and length of line engineering are counted according to line type, voltage grade and traverse section respectively. On the basis of this data, the discrete analysis of the sample data of overhead line engineering and cable line engineering is carried out, and the reasons for the greater dispersion of some projects are analyzed, as shown in Figure 3.

![Figure 3. Precision of investment sample analysis](image)

(2) Analysis of investment balances in line projects. The balance rate of line engineering can be analyzed in detail according to the dimensions of voltage grade, traverse section, etc. The overall balance, the balance rate and the balance rate of each part of line engineering cost, and the main reasons for the balance are analyzed.

(3) Price level analysis of major equipment in line engineering. The analysis of the price of the main equipment materials is carried out according to the voltage grade. In addition, the price of the main equipment materials in different years is compared vertically, the influencing factors of the large range of price changes are analyzed, and the sensitivity of the total investment of the line engineering to the main equipment materials is analyzed.
4. Suggestions for optimizing computer information technology to identify general cost analysis and engineering investment methods of national network

4.1. Strengthening the control of key links in the design phase
According to the analysis of engineering cost data at home and abroad, in the life cycle of the project, the design stage has the greatest influence on the cost of the project, so it is necessary to further improve the power grid planning ability, plan the project construction work ahead of time, consider the factors that have great influence on the project construction ahead of time, make early planning, early negotiation and early solution as possible, and eliminate the situation that the project cost has great change due to uncertain factors. In addition, it is necessary to strengthen the feasibility study stage and the preliminary design stage to investigate the field situation, to grasp the actual situation of the external environment as comprehensively as possible, and to avoid the situation that a large number of changes occur due to the lack of site investigation. In addition, it is necessary to perfect the selection of technical schemes and the evaluation mechanism of cost.

4.2. Forming regional cost control standards
In the project cost management, the control of the project cost is usually completed by means of evaluation, and the evaluation efficiency will be greatly improved if the evaluation is based on evidence. According to the premise of voltage grade and technical condition, the overall cost control standard is first formed, and within the scope of the overall cost control standard, each region forms the local cost control standard according to its own characteristics. There are many transmission and transformation projects every year, based on the local cost management standard, the cost personnel of the project management department can also use this standard to improve the supervision efficiency of the project cost.

4.3. Extending the bidding benefit of major equipment material frame
From the conclusion of cost analysis, it can be seen that when the purchase quantity of some equipment material reaches a certain quantity, it shows the economic benefit of scale brought by the large-volume frame bidding of equipment material.

4.4. Focus on the effective application of cost analysis results
The ultimate goal of cost analysis is to provide real data support for the cost management of power transmission and transformation projects, but at present, the cost analysis still mainly stays in the cost analysis itself, and lacks the conclusion of cost analysis to be widely used. The valuable experience of project cost has not been effectively used to guide the cost management work. According to the cost analysis and optimization design standard, the general design, general equipment, general cost and standard technology of power grid engineering are the general standards for the design and construction of power grid transmission and transformation engineering. Because of the continuous updating of technology and the dynamic change of market supply and demand, the general standard also needs to be constantly changed to meet the needs of construction management of power transmission and transformation projects and to optimize the design standard by cost analysis. The general standard is applied to the construction scheme and the real cost data in the actual project to analyze, and the general standard optimization experience is summarized through the analysis of multiple sample data, so as to improve the general applicability of the general standard, so as to achieve the purpose of effectively controlling the cost.
4.5. To establish a scientific calculation method of construction cost
In the calculation of construction cost, we should draw lessons from the advanced and mature experience of foreign countries and establish a database based on the collation and analysis of completed project cost information on the basis of a series of perfect systems and means, such as indirect control of government, dynamic management of cost and unified contract text management, so that the determination of construction cost has the characteristics of dynamic, scientific and accurate.

4.6. Improving the accuracy of future operational costing
When calculating the future operating cost, we should first define the category of future operating cost. Future costs are mainly divided into two categories. One-time costs include: reconstruction costs, overhaul costs, etc.; recurring costs include: maintenance costs, repair costs, management costs, etc. and each cost category is divided into some sub-categories until the cost function can be defined. Then the calculation method of each cost is given. This method is not only very operable, but also accurate.

5. Conclusion
In order to control the cost of the project, we should start with every stage of the project, widen the scope of management, analyze the problems, and actively seek the countermeasures. We should take the project cost identification and investment analysis as a regular work to carry out, constantly adjust the working ideas, keep up with the times, innovate and use computer information technology, cost identification and speculative analysis methods will certainly rise to a new level.

References
[1] Wang Yingjie. A Study on the Combination of Computer Technology and Information Technology [J.] China Science and Technology Investment, 2016(12).
[2] Chang Xiaogang. Discussion on General Cost Management Model of Power Grid Construction Project [J]. Engineering Construction and Design, 2018, 398(24): 253-254.
[3] Yang Jie, Zhang Lin. Analysis on Investment Decision Method of Construction Project [J]. Journal of Shandong Youth Management Cadre College: Youth Work Forum, 2010.
[4] Hu Wenhai. Development Direction and Application of Computer Information Technology [J]. Coal Technology, 2013(06): 228-229.
[5] Liu Zhenya. State Grid Company Power Transmission and Transformation Project Typical Cost :2006 Edition. kV Substation Division [M]. China Electric Power Press, 2006.
[6] Wang Zhen. Design and Implementation of State Grid Engineering Cost Analysis and Technical Economic Assessment System [D]. Jilin University.
[7] Wu Huayun. A Special Report on the Cost Management of Power Construction Project of State Grid Company [J]. Electricity construction, 2009, 030(012): insert 4- insert 7.