Research on the Framework Construction of Three-dimensional Cost Standard System of Power Grid Engineering based on the Computer Technology

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Abstract. In the process of power grid construction, the pressure of project cost management is increasing gradually. With the continuous updating of information electronic system, people have higher and higher requirements for power grid engineering. The construction task of power grid engineering is more important. Standards for grid engineering have been revised to a higher level. The construction cost of power grid project is also increasing year by year. After years of research and practice, researchers found that the construction of three-dimensional cost standard system is the main opportunity to help power grid engineering improve the overall level. Based on the computer technology and three-dimensional structure of power grid and the actual characteristics and application of power grid engineering, this paper describes the main standards for the construction of power grid engineering cost system. Finally, the guarantee of its future development is put forward.

Keywords: Power Grid Engineering, Cost Standard, System, Computer Technology

1. Introduction

The service work of state grid enterprises is the extension and continuation of government functions in the industry. In order to support the establishment and development of national grid engineering, China has issued a number of cost standards. They have laid a solid foundation for the establishment of the cost standard of practical power grid application.

The establishment of cost standard is an important pillar for the improvement of cost management level. The establishment of an effective cost standard system can consolidate the management system of power grid projects and further promote the construction of power grid projects. Generally speaking, a complete cost management system includes system framework, system table and cost standard. A comprehensive and unified system framework is the most solid foundation in the construction of cost
standards\textsuperscript{[1-3]}. It is also a powerful guarantee to improve the cost management of power grid projects.

2. Definition of the scope of power grid engineering and cost standard

2.1. Definition of the scope of Power Grid Engineering

Through the comprehensive analysis of State Grid Corporation and fixed station service platform, the determination of the research scope of power grid engineering belongs to the plan of State Grid. It also belongs to the service scope of the quota station. According to the management methods implemented by the State Grid, we can find that the construction and installation costs also belong to the definition of the grid. However, the revenue projects of marketing can’t be included in the framework system according to the actual situation.

2.2. Definition of the scope of cost standard

Generally speaking, the construction of the system aims to better support and serve the cost of power grid engineering. In the power grid industry, engineering valuation refers to predicting and determining the cost of engineering construction in accordance with legal procedures. Some people think that the scope of cost standard only includes pricing content, pricing method and engineering measurement standard\textsuperscript{[4]}. However, others believe that the laws and regulations and bidding documents in the project pricing activities should also fall within the scope of cost standards. Therefore, we can find that the cost standard is not clearly defined. In the normal work process, we can predict and determine the cost according to the actual situation.

3. The construction of the framework of the cost standard of Power Grid Engineering

3.1. Determination of basic standards

The level of different cost standards is different. Moreover, some cost standards have the phenomenon of repeated definition and cross definition. The diversification of the forms of pricing standards will cause the inconvenience of pricing standards in practical application\textsuperscript{[5]}. Therefore, it is necessary to build the basic rules and standards. The establishment of basic rules should include terminology standards, equipment division standards and engineering division standards.

3.2. Determination of hierarchy of Engineering

According to the main characteristics of China's engineering standard management, we can use the three-dimensional structure of engineering theory to divide the system into three levels. According to the difference of engineering object and type angle, engineering type standard is divided. According to the pricing volume and main expenses formed by logical thinking, the pricing content standard is divided. According to the process and main stage of engineering work, the standard of life cycle is divided.

3.3. Determination of type division of pricing content

The type division of pricing content should include the main principle, type division and system framework division. The division principle should be scientific and reasonable. It should be divided according to the clear logical relationship. The classification should include the specification of rules,
the definition of cost standard, the limitation of quota, the statistics of price information and the limitation of technical and economic indicators. The system framework should include grid infrastructure and grid production.

4. Construction of cost system table of Power Grid Engineering

4.1. Determination of attribute unit

According to the main characteristics of the pricing standard of electric power engineering, we need to adjust the main format of the system table appropriately (see Table 1). In order to show multi-level features and consider the needs of application personnel's screening function, we should add attribute feature cells according to the scientific and practical nature of the system.
### Table 1. Parameter table of attribute unit

| Attribute unit       | Option                                      |
|----------------------|---------------------------------------------|
| Voltage level        | 0.4kV, 10kV, 20kV, 35kV                    |
| Project category     | Transformer substation                      |
| Preparation status   | Published                                   |
| Standard construction| Merge and revise published information       |
| Name of preparation unit | Standard name of enterprise               |

4.2. Definition of pricing standard system table of Power Grid Engineering

Standard system table plays a very important role in cost management activities. The verification standard of the system table should be consistent with the internal system standard of the enterprise. The project of system table shall include system table number, standard number, standard name, issuing department and other information.

4.3. Limitation of numbering rules of standard system table

The numbering rules of pricing standard system should follow the design rules of national standards. In this way, it is convenient for people to use information means to filter unit attributes and provide corresponding electronic extraction functions (see Table 2). In the process of numbering, we usually use the form of four levels of seven-character combination code for editing.

### Table 2. Numbering rules of cost standard system

| Option    | Project code | Type code | Evaluation code | Sequence code |
|-----------|--------------|-----------|-----------------|---------------|
| framework| A value      | A value   | Two values      | Three values  |
| Hierarchy| First        | Second    | Third           | Fourth        |
| Example   | X            | X         | XX              | XXX           |

5. The future development of power grid engineering valuation mark

5.1. Construct the corresponding management mechanism

In order to apply the pricing standard to the actual work, we need to establish a good management mechanism. This mechanism can adapt to the future development of power grid engineering. The practical application value of the standard system can be realized by establishing the coordination mechanism with the project pricing standard system[^6]. It can promote the sustainable development of the standard system.

5.2. Building the corresponding talent training mechanism
The development of the cost standard system of power grid engineering needs the assistance of excellent talents. Without the supply of talents, the development of power grid engineering has been in a bottleneck period. It is essential for the sustainable development of the pricing standard to build a corresponding talent training mechanism and a high-tech power grid engineering team.

5.3. Construction of information security mechanism

The ideal state of pricing standard should include the concentration of data resources, engineering information, management information and business management. We can build an information management platform and dynamic monitoring system to achieve a high degree of unity of data, business and management information. This can greatly improve the work efficiency of project pricing management.

6. Conclusion

With the emergence of the information age, the establishment of power grid engineering is imminent. The main characteristics of China's power grid construction are tight time and heavy task. According to a large number of experimental research and scientific analysis, we can find that the establishment of a three-dimensional cost standard system is conducive to the realization of the scientific power grid project.

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