

Analysis of Electric Power Company Infrastructure Construction Management Strategy based on the Whole Life Cycle

Changgen He, Jianping Zhao, Yang Gao

State Grid Xinjiang Electric Power Corporation, Urumqi, Xinjiang Uygur Autonomous Region, 830011, China.

Abstract

The development of electric power company cannot leave the construction of infrastructure. The management concept based on the whole life cycle can effectively improve the infrastructure management level of electric power companies. This paper, starting from the management status of electric power company infrastructure and aiming at the problems in the management process, gives the corresponding strategy from the angle of the whole life cycle, so as to enhance the infrastructure construction of electric power company management ability and lay a good foundation for the future development of electric power company.

Keywords

Infrastructure Construction Management; The Whole Life Cycle; Electric Power Company; Strategy Analysis.

1. Introduction

With the proposal of green and low-carbon development requirements, all industries have carried out a new round of management upgrading, trying to contribute to the realization of the "double carbon goal". As an important pillar of social and economic development, improvement of management level in electric power industry is of great significance to the effective use of resources. Infrastructure construction is the main driving force for the development of electric power companies, so the analysis of their management strategies is of great research significance.

Electric power company infrastructure construction management refers to the project infrastructure construction management unit or department make full use of relevant resources of the enterprise in order to achieve the overall goal of power grid project construction, according to the power grid project construction process system and under certain social, economic, environmental and other complex constraints, apply the knowledge, skills, tools and technologies related to power grid infrastructure to the whole process of power grid project construction and management with systematic and scientific management methods and means, and the expected construction, service and comprehensive development goals are finally achieved [1]. As an advanced management concept, the whole life cycle management can manage infrastructure construction projects comprehensively and purposefully, and maximize the utility of assets by considering and analyzing the whole process from planning and design to scrapping and suspending production. At present, scholars have conducted researches on it. For example, Wang et al. [2] analyzed the cost management of power grid construction project from the perspective of the whole life cycle management by referring to relevant books. Jin et al. [3] constructed the digital twin solution for the whole life cycle of offshore wind power engineering, BIM (Building Information Modeling) technology as the core, to implement the intelligent of the whole life cycle, innovation of the digital and information technology application, helping offshore wind power projects reduce costs and

increase efficiency. Through the analysis of relevant literature, it can be seen that the whole life cycle theory has universal applicability in the field of engineering management, and it has research value to analyze the infrastructure construction management strategy of electric power company based on it.

The infrastructure construction of electric power company has its unique nature. Based on the consideration of its particularity, this paper analyzes the current situation of infrastructure construction management of electric power company, then, analyzes the infrastructure construction management strategy of electric power company through the concept of the whole life cycle, and provides a new path for the future development of electric power company.

2. Current Situation of Infrastructure Construction Management of Electric Power Companies

At present, there are some common problems in the management of infrastructure projects in China in terms of cost, risk, quality and schedule, which have caused hidden dangers for the operation and maintenance and security of the later stage of the project [4]. Infrastructure construction projects of the electric power industry is facing similar problems. First of all, in the quality management level, the current electric power infrastructure projects for the construction of the team lack of certain literacy project management theory, management strategy and its execution are lack of scientific, high efficiency, organization and management is usually easy to form a complex network, some opportunistic people at will to compress the cost of construction, jerry-built, which is easy to lead to the emergence of shoddy engineering, causing serious adverse impact on the reputation of the enterprise. Then in staff management level, the electric power infrastructure sector as an administrative institution, the main function is to help government departments to provide social services and is different from for-profit businesses, so it is largely dampened the enthusiasm of employees, and institutions for staff appraisal mechanism behind makes employees can not get the realization of self-worth and development and the enthusiasm for production within the enterprise has been greatly reduced. In addition, in terms of cost management, generally speaking, cost, technology and schedule are closely related. However, the reality is that most of China's power infrastructure projects have low technical content. If the cost cannot be guaranteed, it will be difficult to improve the technical level, which will easily lead to the occurrence of management chaos [5].

In addition, with the implementation of national policy, makes the power supply units become the subject of the implementation of the investment project construction operation, but with the absence of the responsibility system for the benefit of form a complete set, as well as the particularity of the power supply unit, which leading to the investment of distribution network project is not rigorous and systematic, emphasizing incremental investment as well as neglecting stock and tapping potential, input regardless of output, investment regardless of return for problems. It is not conducive to the overall optimal development of power companies, and the level of lean management also needs to be improved. In addition, with the construction of new power system with new energy as the main body, the state's support for the development and construction of new energy is increasing. The development and construction of new energy will enter a new round of high-speed development period, which requires the construction of power grid to accelerate simultaneously, but because of the mismatch between the construction cycle of power grid and the construction cycle of new energy, the pressure of power grid construction will further increase. In addition, the growth rate of new energy is higher than that of electricity load, resulting in prominent consumption pressure of new energy, and the construction of flexible adjustment resources such as supporting energy storage facilities also needs to be strengthened.

3. Strategy Analysis

The whole life cycle is a universal concept widely used in politics, economy, environment, technology and many other fields. Basically, it can be defined as the whole process from Cradle to Grave. The widely used fields include product whole life cycle theory, industry whole life cycle theory and so on. It mainly expounds the whole development process of products and industries from growth, maturity to recession [6].

The whole life cycle of electric power infrastructure is generally divided into five stages, including planning and design stage, bidding stage, construction stage, operation and maintenance stage and scrapping and recovery stage respectively from the initial stage to scrapping and recovery stage. According to the project management theory, the management of infrastructure construction mainly includes project cost management, schedule management, quality management and so on. In this paper, based on the whole life cycle of electric power infrastructure, corresponding management strategies are given from the five aspects of cost, schedule, quality, system and technology, so as to improve the infrastructure construction management level of electric power companies.

3.1. Cost management strategy

The electric power industry is an asset-intensive industry, and a large amount of capital is applied to the construction of infrastructure. For the construction of electric power infrastructure, the cost control of engineering projects is quite important. Considering from the Angle of the whole life cycle, from planning and design for cost control of the first phase, project in addition to comply with the company's overall layout accord with the local government policy. Then through the analysis of the associated demonstration project, reducing the occurrence of overlapping project again, from the initiation stage will try our best to avoid invalid use of funds. Then, in the design stage of infrastructure construction projects, the depth of exploration and design is increased to reduce the design changes in the later stage, so as to provide a good foundation for the cost management during the construction period. In the project construction stage, the Internet of Things, BIM and other technologies can be used to strengthen the management of construction units, strengthen the inspection of equipment and materials, hidden works, and improve the efficiency of capital use. In the operation and maintenance stage of the project, the operation and maintenance plan should be made to reduce the failure rate of the equipment, increase the economic life of the equipment and achieve the efficient use of funds by formulating appropriate equipment inspection plan.

3.2. Schedule management Strategy

Electric power company in the infrastructure construction in the process of one of the main factors that affect the construction period is likely to face a lot of design change, so in the progress of management in the process of considering power infrastructure of the whole life cycle, starting from the project, feasibility study and design integration, to speed up the project examination and approval efficiency, shorten the project cycle. In the preliminary design stage, in addition to the feasibility of construction, we also need to consider the operation and maintenance of the later stage of the project, so as to achieve the overall optimal.

3.3. Quality management strategy

The infrastructure construction of electric power companies generally requires high quality, so quality management also plays an important role in infrastructure construction management. In the case of considering the whole life cycle, the quality of equipment and the problems of later operation and maintenance were taken into account during the design, and the quality control was carried out throughout the whole process. While considering the economy, the design standard was improved and the pressure of later operation and maintenance was

reduced. In the construction stage, PDCA quality control system is adopted to strengthen the supervision of construction units and ensure the quality of infrastructure construction. In the operation and maintenance stage, the management and protection of infrastructure should be mainly strengthened. Many facilities are scrapped in advance because of the lack of late management. In addition, a clear responsibility system should be set up in the maintenance of equipment, and the maintenance responsibility of equipment should be assigned to individuals, which can strengthen the responsibility consciousness of managers and enhance the service cycle of equipment.

3.4. System building strategy

Reasonable institutional arrangement will improve the efficiency of cooperation among all parts of the electric power company, improve the management level of infrastructure construction, and promote the company to enter a new stage of development quickly. From the view point of the whole life cycle, the electric power company's infrastructure needs of multiple departments in harmony. From the early stages of project development plans to late operation and maintenance, cross functional work frequently. If there is no reasonable work system, is easy to cause the phenomenon of unclear responsibilities between departments, after the problems easy to appear the phenomenon of mutual shuffle, among departments. It is not conducive to the construction of the project and the development of the company. Therefore, a reasonable working system is an important guarantee for the infrastructure construction and even the healthy development of the company.

3.5. Technology introduction strategy

In the future, the development of the electric power industry will take new energy as the main body to carry out a large number of supporting facilities construction, which puts forward new requirements for the infrastructure construction level of the electric power company. At the same time, the emergence of a new generation of information technology, such as the Internet of Things and big data, will also affect the infrastructure construction management level of the electric power company. Introducing the new generation of information technology actively such as the Internet of Things and big data can help the management of infrastructure construction.

4. Conclusion

The infrastructure construction of electric power company has a great influence on its development. At present the electric power company's infrastructure construction management level has the space to improve in many aspects. Based on the whole life cycle theory, this paper puts forward corresponding strategies to improve the infrastructure construction management level of electric power companies from the five dimensions of cost, schedule, quality, system and technology, which provides a new path for the improvement of infrastructure construction management level of electric power companies and provides a foundation for the future development of electric power companies.

References

- [1] Wang Jingyi, Liu Yuhuan. Research on the connotation and core elements of world-class power grid infrastructure management [J]. China power enterprise management, 2021 (15): 80-81.
- [2] Wang Dy, Li Shuai, Jiang Xue, Ge Chao, Fu Yishu, Li Jiayu. Research on power grid construction project cost management from the perspective of the whole life cycle management [J]. Journal of solar energy, 2021,42 (09): 483-484.
- [3] Jin Fei, ye Xiaodong, Ma Fei, Teng Yan. The whole life cycle digital twin solution for offshore wind power engineering [J]. Water conservancy planning and design, 2021 (10): 135-139.

- [4] Chen Lingxin, Liang Kun. Application of project management theory in infrastructure project management [J]. Enterprise science and technology and development, 2020 (12): 97-99 + 102.
- [5] Zhou Yonghui. Analysis on the application of project management theory in power infrastructure project management [J]. Labor security world, 2015 (33): 38-39.
- [6] Jiang Xun. Research on the whole life cycle management of physical assets of h power generation company [D]. Shandong University of Finance and economics, 2018.