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Research on Comprehensive Optimization of Power Grid Investment Efficiency Based on Evaluation Index System

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Abstract: *This article elaborates from the following aspects in order to improve the economic operation level of the power system and promote better economic development. Aiming at the current power grid evaluation system that tends to focus on a certain aspect and lacks related investment efficiency and benefit analysis, the theory of power grid investment efficiency and benefit is studied, and the ideas and principles for the construction of the evaluation index system are proposed, combined with the relevant evaluation system of the power grid company And development needs, construct an evaluation index system for grid investment efficiency and benefit, and provide reference for relevant departments to study investment efficiency and benefits.*

Keywords: *Power grid investment; efficiency benefit; multi-dimensional; index system*

1. Introduction

At present, the grid evaluation system only focuses on a certain aspect of construction necessity and safety, and lacks the system construction and evaluation of the investment efficiency and benefits of grid construction projects [1-3]. In the past, the allocation of investment in many regions was based only on history. The simple calculation of data and several indicators shows that precise investment cannot be made according to the weak links and actual needs of various regions, resulting in a lot of ineffective investment, and making cities and counties with weak power grids even weaker. Therefore, it is urgent to build a scientific, reasonable, comprehensive and effective investment efficiency and benefit evaluation index system [4-7].

2. Summary of the Theory of Grid Investment Efficiency and Benefit

The efficiency and benefit of power grid investment are the main indicators to measure investment income, which refers to the relationship between the results of power grid investment and the investment occupied or consumed. The benefits of power grid investment generally include financial benefits, national economic benefits and social environmental benefits.

2.1 Financial benefits of grid investment

The financial benefit of power grid investment refers to the comparison result of the input and output of power grid investment projects. What investors care most about the investment projects is whether the investment activities can be profitable. Under normal circumstances, the economic benefits of grid investment can be quantified by comparing input and output.

2.2 National economic benefits of power grid investment

The national economic benefits of grid investment are mainly for the policy or strategic grid investment. We should not only evaluate its financial benefits, but also consider its strategic significance and social benefits.

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2.3 Social and environmental benefits of power grid investment

The social and environmental benefits of power grid investment refer to the social and environmental effects of the construction and operation of investment projects, which are generally measured by quantitative and qualitative indicators, mainly qualitative indicators. The main consideration for the financial benefits of grid investment is the direct economic benefits of grid investment to grid companies. The national economic and social benefits are mainly derived from the national economy.

Consider the social benefits brought by power grid investment from the perspective of overall economic and social development.

3. Ideas and principles for the construction of the index system

3.1 General idea

As an operating enterprise, the power grid company is profit-making. In order to maintain its long-term development, the power grid investment project must consider its financial profitability. Therefore, the evaluation index system needs to consider the financial benefits of power grid investment; in addition, power grid investment projects are multifaceted, and investment benefits not only come from the improvement of the power grid itself, but also involve the impact of power grid investment projects on society. Therefore, the evaluation index system also needs to consider its social benefits. The construction of this index system will comprehensively consider the financial and social benefits of power grid investment, combine the typical evaluation indicators of power grid companies and related regions, and comprehensively use correlation analysis and analytic hierarchy process to optimize index selection and construct scientific and reasonable evaluation indicators system.

3.2 Construction principles

Grid investment efficiency and benefit evaluation is a comprehensive evaluation of grid investment efficiency and benefits in all aspects. Among them, the investment efficiency and benefit evaluation index system is the basis for comprehensive evaluation. Its construction principles mainly include the following points:

3.2.1 Principle of practicality

The selection of indicators should be closely related to the strategic objectives of the enterprise and the connotation of power grid investment projects. It can cover the strategic objectives of power grids at all levels, and truly describe the efficiency and benefits of power grid investment projects, which can be used to guide power grid investment and management improvement [8].

3.2.2 Reliability principle

The source of the statistical indicators involved in the indicator system must be very reliable and highly available. The indicators that are very important but difficult to obtain temporarily can be retained, and statistics can be performed after the grid company system is complete.

3.2.3 The principle of comprehensiveness

The indicators in the indicator system should comprehensively reflect all aspects involved in the efficiency and benefit of power grid investment, and be able to reflect the effect of investment from different dimensions.

3.2.4 The principle of independence

When setting various indicators in the system, it is necessary to avoid overlapping concepts and eliminate deviations in conclusions caused by repeated recording of similar data.

3.2.5 The principle of hierarchy

As the evaluation index system covers a wide range and rich content, the indicators need to be set up in a hierarchical structure, which is conducive to expressing the internal connections of the indicators, clearly expressing the meaning of different indicators, and improving the evaluation effect.

3.2.6 Uniqueness principle

The acquisition channel for each indicator must be unique, and the relevant calculation methods and

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calibers must also be unique to avoid affecting the results.

3. Index system construction

There are concepts such as internal benefit, external benefit, direct benefit and indirect benefit in the efficiency benefit of power grid investment. There are both differences and connections between them [2]. In the design of this system, considering the integrity of grid investment evaluation and the benefit difference of different indicators, combined with relevant documents, the indicator system is divided into three categories: basic indicators, revised indicators and evaluation indicators. Among them, the basic indicators refer to the direct benefits that can be brought to the power grid itself, which can be measured by financial data, including the costs and benefits of power grid investment projects. Modified indicators refer to indirect benefits that cannot be used to directly evaluate the economic benefits of power grids, and can be converted into economic indicators for comparison in some ways. Evaluation indicators are indicators other than the above two indicators, mainly qualitative indicators, reflecting the different effects of power grid investment. According to the construction ideas, principles and index classification of the index system, combined with the hierarchical relationship between the indexes, the construction of this index system mainly considers the construction of the two index levels of the first-level index and the second-level index. The first-level indicators mainly consider the economic benefits, technical level, coordinated development of the power grid, and social benefits. The second-level indicators are specific evaluation indicators that are decomposed one by one from these four first-level indicators. The efficiency of the grid investment this time The construction framework of the benefit evaluation index system. According to the system framework, taking the 220 kV power grid as an example, combining the actual situation of the power grid, using the method of combining correlation analysis and analytic hierarchy process to carry out the screening and integration of indicators, and constructing the 220 kV power grid project investment efficiency evaluation index system. The selection of indicators is mainly considered from the four dimensions of power grid economic benefits, technical level, coordinated development of the power grid, and social benefits. The focus is on the security, economy, and equipment utilization efficiency of the power grid, which can more comprehensively reflect the 220 thousand The main efficiencies and benefits generated by the investment in the high-voltage grid.

4. Conclusion

This paper studies the power grid investment efficiency and benefit theory, puts forward a general idea and principle of constructing a grid investment efficiency benefit evaluation index system, and builds a grid investment efficiency benefit evaluation index system based on the relevant grid evaluation index system. Combining actual needs, using a combination of correlation analysis method and analytic hierarchy process, the screening and integration of indicators were carried out, and a 220kV power grid investment efficiency and benefit evaluation index system was constructed. The system constructed in this study can evaluate the efficiency and benefit of power grid investment from multiple dimensions, and provides a reference for relevant departments of power grid companies to analyze the efficiency and benefit of power grid investment, and is conducive to maximizing investment benefits.

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