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Technical and economic analysis applied in power engineering decision stage

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ABSTRACT

Power engineering construction quality of a country's economic development is of far-reaching significance, but also in the process of the construction of power engineering need to avoid unnecessary risk, for "more, faster, better," the construction scheme of formulation provides the basis. Based on Outlines the characteristics of electric power engineering, this paper expounds the technical and economic application in its decision-making stage, analyses the decision-making process, the content of cost management, technical and economic analysis principle and the basic steps of financial evaluation and on this basis summarizes the investment risks of internal factors, external factors and solutions of common mistake and its decisions to produce process need to follow the basic strategy, aimed at optimization design for the decision of our country's electric power engineering construction to provide theoretical reference.

KEYWORDS

Production capacity; Estimation method; Technical economy; Electric power engineering; Decision phase; Basic strategies.

INTRODUCTION

Any decision making engineering problems need to consider cost, power engineering is not exceptional also, in the process of power engineering decision-making more need to pay attention to the rationalization of cost estimation. This paper studies the electrical engineering decision-making stage of cost management problems, put forward on the basis of the theory of technical and economic optimization scheme of the point of view, and provide theoretical basis for our country's electric power engineering construction.

Study of electric power engineering cost management and the analysis of the decision-making phase of the project research of the efforts of many people. Including: Chen Dan (2013) according to the demand of the electric power engineering construction project, analysis of electric power engineering projects in the feasibility study stage of the content and characteristics of technical and economic analysis, put forward to strengthen the standardization the depth of the technical and economic analysis, and combined with this stage of the common problems and errors, put forward the corresponding solution strategy and thinking[1]. Vivi etc. (2009) for electric power engineering cost management of five stages, analyzes the main factors affecting electric power engineering cost, probes into the whole life cycle cost management in electric power engineering project, the application of in order to reasonable and effective control of electric power engineering cost[2].

In this paper, on the basis of predecessors' research of power engineering decision-making phase of the scheme were analyzed, and put forward the application of technical and economical principle, the concept of quantitative analysis, in order to contribute to the development of our country's electric power engineering construction.

ELECTRIC POWER ENGINEERING TECHNICAL ECONOMY FEATURES OVERVIEW

Liu (2011) point out, along with the accelerating development of economic globalization, our country's power grid operation management system in the reform and development, and promoted our country strong security and reliability of the grid system[4]. The normal operation of the power grid can't depart from the support of scientific power engineering, power engineering classification of main line engineering, communication engineering, and substation project, the project decision-making stage, the need to have technical and economic personnel carries on the budget of the investment, the project bid.

In power engineering budget of the investment, then the scientific planning of the need according to the limited resources, in the decision-making phase will be a lot of scheme comparison and evaluation, finally it is concluded that qualified technical plan, relative to other stage of the technical and economic documents have evident difference, in order to analyze the decision-making phase of the technical and economic, the paper gives the following six power engineering technical and economic characteristics:

1) in the decision-making stage technical and economic documents are presented by an industry-wide standardization documents, has its own norm.
2) the complexity of the electric power engineering has a professional and engineering conditions, it is these engineering complexity determines the various engineering offer budget has its own characteristics, caused the characteristics of the lower reference.
3) in the final plan selection process, usually in power transmission and transformation project comparing comprehensive economic evaluation for the unit as a whole.
4) due to the proportion of ontology engineering costs reduced year by year, caused by external factors influence the project cost is more and more serious.
5) project investment payback period is long.
6) usually with reference to similar engineering history to set up the corresponding indicators.

Zhang village (2008) pointed out that the electric power project feasibility study and economic technical analysis, but also to carry out, implement national technology and industrial policies, strictly implement the relevant laws, regulations, and professional design procedures, in the current national standard, power industry standards within the category of[5].

ELECTRIC POWER ENGINEERING DECISION PHASE AND TECHNICAL ECONOMY ANALYSIS PRINCIPLE

Electric power engineering investment decision analysis

Industry investment decision-making is usually composed of project feasibility research and feasibility study for the audit of two parts, the former is for the purpose of design optimization, which is the purpose of the proposed decision according to the results of the audit. General engineering investment decision-making process, the steps as shown in Figure 1.

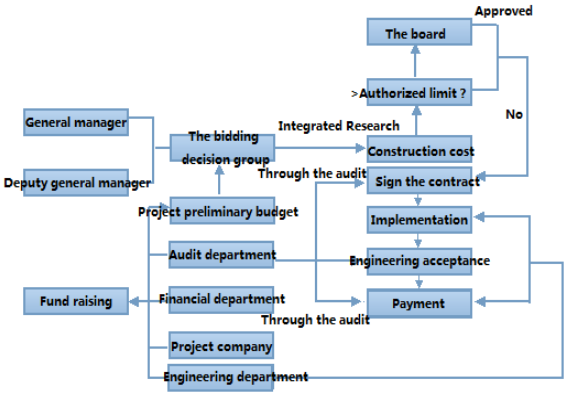

Figure 1 : Engineering type investment decision flow chart

By shown in Figure 1 of the general engineering investment decision-making process, in the electric power project investment decision-making stage, project cost management of the five main contents are as follows:

1) need to determine the main factors influencing the power engineering project investment decision-making.

2) the estimation of electric power project decision-making phase of investment.

3) power engineering project decision-making stage for economic analysis, analysis of the content includes the basic requirements and financial evaluation, the basic requirements in the technical and economic method is used in the dynamic analysis, quantitative analysis, the whole process of analysis, macro efficiency analysis, value analysis and forecasting analysis, can use in the financial evaluation method of technical and economic profit ability analysis, the effect of foreign exchange and solvency analysis, etc.

4) on the research of power project of social benefit and economic evaluation.

5) on electric power project decision-making phase of the risk management plan is put forward.

Technical economy analysis principle

In power engineering decision-making phase of investment estimation, need to use the method of technical and economic analysis, the estimated project construction from the starting to the amount of funds needed for the production of the whole construction.

The main content of fixed assets investment estimate of the project is estimated and circulating funds of estimation, and fixed capital consists of static and dynamic parts two links, static parts including basic reserve funds purchase expense of equipment and tools, and other engineering and

construction costs, dynamic part is included in the price increases in the course of the construction of power engineering project reserve funds and loan interest. The calculation of circulating funds as shown in type (1) :

Working capital = Current assets - current liabilities (1)

In formula (1) current assets are equal to sum of receivables, inventory, cash and prepayment, working capital current year accrual is equal to current year working capital and last year working capital difference, each item working capital average occupation percentage is equal to turnover and turnover times ratio.

Fixed assets dynamic part is a smaller quantity with respect to static part, so in electric power engineering decision phase fixed assets estimation, it mainly estimates static part, generally adopts unit production capacity estimation method and production capacity index method, as formula (2) shows:

$$\begin{cases} C_2 = \left(\frac{C_1}{Q_1}\right) \times Q_2 \times f \\ C_2 = C_1 \times \left(\frac{Q_2}{Q_1}\right)^n \times f \end{cases} \quad (2)$$

Among them, unit production capacity estimation method is mainly used to new project or device estimation, and production capacity index method adapts to unknown engineering designing information when only learn technological process and scale, generally contractor adopts production capacity index method to carry on fixed assets static part estimation.

For working capital investment estimation method, it mainly has itemize detailed estimation method and indicators expanding estimation method, from which itemize detailed estimation method has been explained in formula (1), indicators expanding estimation method is as formula (3) shows

Annual working capital amount= annual cost cardinal number ×each kind of working capital rate (3)

Financial evaluation basic steps are as Figure 2 shows.

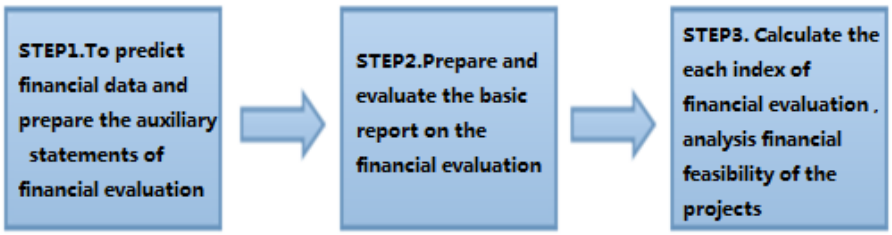

Figure 2 : Financial evaluation basic steps

ELECTRIC ENGINEERING FEASIBILITY DECISION PHASE INVESTMENT RISK ANALYSIS AND BASIC STRATEGIES

Investment risk analysis

Mountains, etc. (2011) pointed out that, along with our country reform of electric power system, the dependence of the electric power industry to government weakened gradually, the market will play a greater role, for investors, is an opportunity and risk coexist[6]. Need investors to invest in electric power project, therefore, more rational, on the basis of considering the profit, but also consider the risk of loss,

and in the analysis of the risk loss, cannot leave the technical support of economic theory, the theory can effectively avoid unnecessary losses, for it represents the promotion enterprise's competitiveness and ability to resist risks. In order to provide electric power project feasibility study and reasonable measures to avoid risks, you first need to understand the risk factors, this section for the internal risk and external risk analysis, in order to circumvent measures of foundation are put forward.

1) internal risk: the risk mainly including engineering construction, the product the credit of the buyer, operation maintenance and the partner's credit, etc., to avoid these risks, investors will be able to do well the engineering construction and operation maintenance, choose to focus on the development of credit good partners and good credit to buy customers, therefore, this kind of risk is the risk can be controlled and transfer large categories.

2) external risk: the risk including the main content is the exchange rate changes, product sales, cost of financing, financial structure of fuel supply, the law changes and environmental protection, etc., as a result of these risks is the project of external categories, namely the market risk, in the actual decision analysis in certain market risk can be through the transfer of business contract, there are also some risk is difficult to avoid.

Therefore, in order to succeed in the new market competition, the need to technical and economic analysis of risks, avoid risks, on the basis of the results of the analysis in order to make positive response to power the profit of the project.

Basic strategies

Due to electric power engineering feasibility decision phase technical analysis has five kinds of common mistakes as TABLE 1 shows; it needs to make basic strategies constraints on them, and provides more standard and correct evidence for electric power engineering.

TABLE 1 : Electric power engineering feasibility decision phase common mistakes table

Mistake type	Detailed explanation
Irrational margin	Irrational margin causes generally are caused by designers' insufficient professional ability, and ignorance of engineering margin rationality, so that will appear consequence of feasibility cost being so high.
Device material expenses increase	Electric power engineering device material during prince being taken into calculation, calculate according to estimated price, and will appear respectively listing it in other projects expenses without following requirements, so that will appear engineering expenses increasing phenomenon.
Technical economy analysis depth is shallow	In electric power line engineering sub project cost estimation on projects, it will appear careless mistake that without following stipulation and depth requirements, let final decision files to generate larger errors, and bring inconvenience into decision phase.
Lack of deeper consideration of equipments expense	In electric power engineering used equipment, it often will appear transportation and materials circulation price rising factor that lacks of sufficient consideration, in transportation scheme making, it appears non-optimal schemes, these will cause excessive waste on practical expense.
Other mistakes	Except for above four kinds of mistakes, in electric power engineering construction, it will appear some other aspects mistakes, as misestimating bank loan interests and so on.

Just based on TABLE 1 showed regular occurred common mistakes, to do a good job in electric power engineering feasibility decision, it should follow certain basic strategies, as Figure 3 shows.

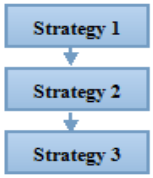

Figure 3: Electric power engineering feasibility decision phase basic strategies; Strategy1. Strict with rendering and bidding procedures, ensure to select excellent contractor; Strategy2. Ideally improve emphasis on technical economy analysis; Strategy3. Establish electric power engineering database and information network platform.

CONCLUSION

In this paper, first of all, this paper summarizes the electric power engineering technical and economic characteristics, in power engineering for technical and economic decision-making phase of the analysis made to elicit.

Then, analyzing the decision-making phase of the electric power engineering analysis and economic analysis principle, it is concluded that the engineering investment decision-making flow chart, analysis of the electric power project investment decision-making phase of the project cost management of the five main content, provides the technical and economic analysis of the quantitative indicators for direction, at the same time power engineering decision-making phase of investment estimation algorithm is given and the basic steps of financial evaluation and for power engineering decision-making scheme based on technical and economic analysis to provide a theoretical basis.

Finally, summarizes the investment risks and basic strategy formulation, internal risk and external risk factors is given, and analyzes the common electric power project feasibility study of decision-making phase of the five types of errors, the decisions need to be formulated in compliance with the three basic strategies.

Through the discussion of this article, it is concluded that the technical and economic feasibility study of decision-making in power engineering has important application value, may, by way of quantitative engineering decisions provide positive Suggestions of risk aversion.

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