



Research Article

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Technical economy analysis application in electric power engineering decision phase

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ABSTRACT

Electric power engineering construction merits have profound significances in a country economic development, and in electric power engineering construction process, it also needs to avoid unnecessary risks, provides basis for “achieve greater, faster, better and more economical results” construction scheme making .On the basis of overviewing electric power engineering features, the paper states technical economy application status in its decision phase, focuses on analyzing decision flow, cost management contents, technical economy analysis principle and financial evaluation basic steps, on this basis, it summarizes investment risk internal factors , external factors , planning common mistakes and its decisive plans generation process basic strategies that need to follow, with an aim to provides theoretical references for Chinese electric power engineering construction decision optimization designing.

Key words: Production capacity, estimation method, technical economy, electric power engineering, decision phase, basic strategies

INTRODUCTION

Any engineering type decision making should consider costs, electric power engineering also has no exception, in electric power engineering decision making process; it needs to pay more attention to cost reasonable estimation. The paper studies on electric power engineering decision phase cost management problem, put forward opinions of applying technical economy theory to optimize its schemes, which provides theoretical basis for Chinese electric power engineering construction.

For electric power engineering cost management researching and its decision phase scheme analysis researching, many people have made efforts. Among them, Chen A-Dan(2013)targeted at electric power engineering construction projects' demands, analyzed electric power engineering project technical economy analysis contents and features in feasible research phase, put forward requirements of strengthening normative technical economy analysis depth, and combined with the phase common problems and mistakes, she provided corresponding solution strategies and thoughts [1]; Wang Ting and others(2009)targeted at electric power engineering cost management five phases, analyzed electric power engineering main influence factors, explored full life circle cost management application in electric power engineering projects, in the hope of reasonable and effective controlling electric power engineering cost [2].

The paper based on formers' research, analyzes electric power engineering decision phase scheme making, and proposes ideas of applying technical economy principle to make quantitative analysis, in the hope of making contributions to Chinese electric power engineering construction development.

Electric power engineering technical economy features overview

Liu Gang and others (2011)pointed out that with economic globalization development speed constantly accelerating ,

Chinese power grid operation management system were constantly reforming and developing , and further powerful upgraded Chinese power grid system safety and reliability [4-9].Power grid normal operation cannot do without scientific electric power engineering support, electric power engineering classification mainly has line engineering, communication engineering and power transformation engineering , in these engineering decision phase, it needs technical economic staff to make investment budgeting on them that is project quotation [10, 11].

In electric power engineering investment budget, it needs to make scientific programming according to limited resources, in decision phase, make comparison and evaluation on numerous schemes, and finally get technical planes that conform to conditions, with respect to other phases technical economic files, it has relative remarkable differences, in order to analyze decision phase technical economy, the paper puts forward six electric power engineering technical economy features:

In decision phase presented technical economy files, they are industrial standard files and have self quota.

Electric power engineering has technical professionals and engineering conditions complexity, just these projects complexity decides each project quotation budget has its own features, and causes lower references features.

In final scheme evaluation process, generally it takes transmission and transformation project totality as unit to make comprehensive economic evaluation comparison.

Due to project ontology cost occupied proportions reduce by year, it causes external factors impact on engineering cost becomes more and more serious.

Project investment payback period is long.

Generally reference historical similar scale projects corresponding indicators to set up.

Zhang Cun(2008)pointed out electric power engineering feasibility researches and economical technical analysis should carry out national technical , industrial relative policies, seriously execute relative laws, regulations as well as professional designing disciplines, and carry on in current national standard, electric power industry standard range [5].

ELECTRIC POWER ENGINEERING DECISION PHASE AND TECHNICAL ECONOMY ANALYSIS PRINCIPLE

Electric power engineering investment decision analysis

Generally industrial investment decision is composed of project feasibility research and auditing on feasibility researching, the purpose of former is to make scheme designing optimization, and the purpose of the latter is providing decision according to audit results. General engineering type investment decision process has steps as Figure 1 shows.

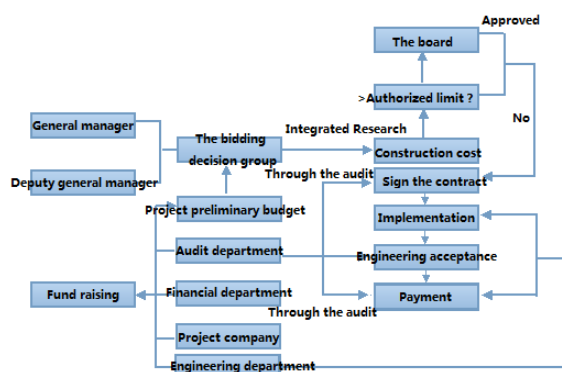


Figure 1: Engineering type investment decision flow chart

By Figure 1 showed general engineering type investment decision flow, it is clear that in electric power engineering investment decision phase, project cost management main contents have five points as following:

It needs to define electric power engineering project investment decision influential main factors. Make estimation on electric power engineering decision phase investment.

Make economic analysis of electric power engineering project decision phase, analysis contents include basic requirements and financial evaluation, in basic requirements, used technical economic methods are dynamic analysis, quantitative analysis, full process analysis, macroscopic efficiency analysis, value analysis and prediction analysis, in financial evaluation, technical economy methods that may use are analysis of profitability, analysis of foreign exchange gains, analysis of debt paying ability and so on.

Make evaluation on researched electric power engineering project social efficiency and national economy.

Put forward pre-arranged planning on electric power engineering project decision phase risk management.

Technical economy analysis principle

In electric power engineering decision phase investment estimation, it needs to apply technical economy methods to analyze its estimation project from preparation and construction as well as fulfilling construction and putting into operation required whole construction capital investment

Engineering project investment estimation contents mainly are fixed assets estimation and initial working capital estimation, and fixed assets are composed of static part and dynamic part two links, from which static part includes facilities and tools acquisition expenses, basic budget reserve and engineering construction other expenses, dynamic part includes electric power engineering construction process increased budget reserve and loan interest. Initial working capital calculation is as formula (1) shows:

$$\text{Working capital} = \text{Current assets} - \text{current liabilities} \quad (1)$$

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

$$\text{Annual working capital amount} = \text{annual cost cardinal number} \times \text{each kind of working capital rate} \quad (3)$$

Financial evaluation basic steps are as Figure 2 shows.

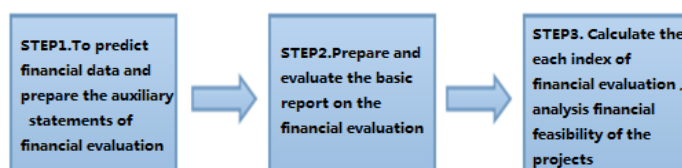


Figure 2: Financial evaluation basic steps

ELECTRIC ENGINEERING FEASIBILITY DECISION PHASE INVESTMENT RISK ANALYSIS AND BASIC STRATEGIES

Investment risk analysis

Gao Shan and others(2011) pointed out with China electricity system reformation, electricity industry dependence on government has gradually weakened, market will perform larger and larger effects, for investors, challenge and risk are concurrent [6]. Therefore, it needs investors investment on electric power engineering project to be more rational, on the basis of considering profits, it also should take risk loss into consideration, and in analysis of risk loss, it cannot do without technical economy theoretical support, apply the theory can effective avoid unnecessary loss, and make contributions to its representative enterprises competitiveness and anti-risk capacity promotion. In order to provide reasonable risk avoiding measures for electric power engineering feasibility decision, firstly it needs to learn risk factors, the section analyzes internal risk and external risk, in the hope of building basis for proposing circumvention.

Internal risk: The kind of risk mainly includes engineering construction, product purchaser credit, operating maintenance and cooperative partner credit so on, if it wants to avoid these risks, investor can make self-alignment on doing well in engineering construction and operating maintenance, selects cooperative partners with good credit and focuses on developing purchasing clients with good credit, therefore, the kind of risks is main risk type that can control and transfer.

External risk: The kind of risk included contents are mainly exchange rate fluctuation, products sale, financing cost, financial structure fuel supply, modification of law and environment protection so on, due to these risks are project external types that are market risks, in practical decision analysis, some market risks can be transferred through commercial contract, and some risks are hard to avoid.

Therefore, in order to achieve success in brand new market competition, it needs to make technical economy analysis of risks, avoid risks on the basis of analyzing results, in the hope of making positive response for electric power engineering project profits.

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 price 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.

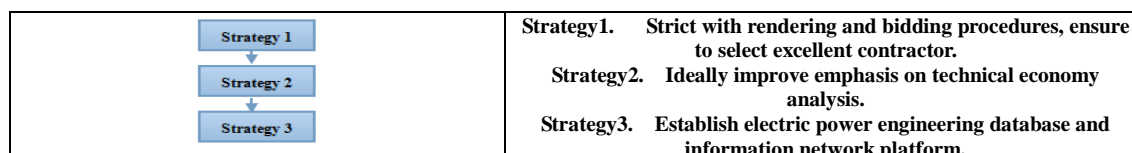


Figure 3: Electric power engineering feasibility decision phase basic strategies

CONCLUSION

The paper firstly overviews electric power engineering technical economy features, makes derivation of technical

economy analysis in electric power engineering decision phase.

Then make analysis of electric power engineering decision phase decision analysis and economic analysis principle, get engineering type investment decision flow chart, analyze electric engineering investment decision phase engineering cost management five main contents that provides orientations for technical economy analysis quantization indicators exploration, and meanwhile provide electric power engineering decision phase investment estimation algorithm and financial evaluation basic steps, which provides theoretical basis for technical economy analysis-based electric power engineering decision phase scheme making.

Finally, summarize investment risk and basic strategies making, provides internal risk factors and external risk factors, analyze common electric power engineering feasibility decision phase five kinds of mistakes, and make three basic strategies that decision making needs to follow.

By the paper statement, it gets technical economy has important application values in electric power engineering feasibility decision phase, it can provide positive suggestions for engineering decision risk aversion by quantitative ways.

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