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Factors influencing the success of BOT power plant projects in China: A review

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ABSTRACT

The rapid economic growth in China has created massive demand for power generation facilities. Build–operate–transfer (BOT) concessions have been granted to attract foreign and private investment. Interest in the BOT scheme for power plant projects has been growing rapidly. BOT projects normally involve a number of parties and usually face a number of constraints. The identification of key factors for Chinese BOT projects helps to accomodate these constraints so that the expected project outcomes can be achieved. A multi-facet qualitative approach is adopted in this research to investigate the factors influencing the success of BOT electric power projects in China. The results showed that there are 14 factors at both macro level and micro level, affecting the success of Chinese BOT projects. The results indicate that the success of China's BOT electric power projects require a combined efforts from all related stakeholders. These findings provide a valuable reference for both policy makers and investors for the future BOT power plant developments in China.

Contents

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1. Introduction

In the past 30 years, China's rapid economy growth has resulted in an average gross domestic product (GDP) growth of 13% annually as shown in Fig. 1 [1]. Even though it was affected by major natural disasters and global financial crisis, China still achieves an annual GDP growth rate of 9% in 2008 [2]. Massive amount of electricity is required to fulfill demands derived from rapid economic growth In China, the demand for electricity is projected to grow by an average annual rate of 4.3% over the period to 2025 [3]. According to the International Energy Agency, Chinese annual electricity consumption will reach nearly 3 trillion kW h by 2020 [4]. Year 2010 added 92.31 million kW h to the total capacity of electricity, reaching 966.41 million kW h [5].

However, substantial capital requirement presents one of critical constraints for the development of power plants in China. As shown in Fig. 2, the investment on electric power increased from 134.4 billion RMB in 1995 to 1188.9 billion RMB in 2010 [6]. By the end of the "Twelfth Five-year period", the installed capacity of China's electric power industry will soar to 1437 million kW, which requires 5300 billion RMB of investment [7]. Indeed, incomplete financing system presents a significant challenge for renewable energy developments [8,9] and affects the project costs significantly [10,11]. As a result, build–operate–transfer (BOT) was introduced as alternative project financing model to motivate private participation in investment [12].

BOT projects in China have drawn attention from both academics and industry practitioners. This is evidenced by a number of papers published in academic journals, professional magazines and books. However, there are limited studies specifically focusing on the BOT electric power sector in China. The aim of this study is to identify factors influencing the success of BOT power plant projects in China. This analysis will assist both the foreign investor and the private sector to make decisions on bidding such projects and to adapt themselves so that exceptional project outcomes can be achieved.

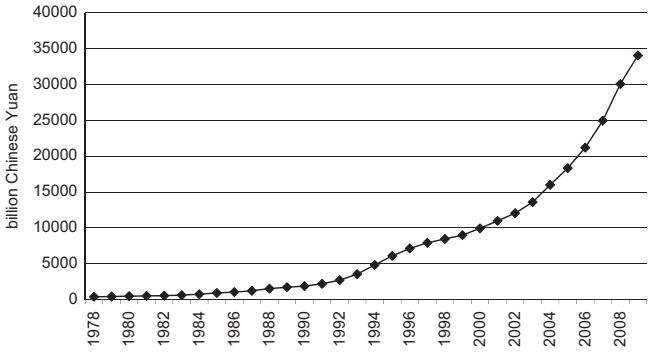

Fig. 1. China's gross domestic product (GDP) growth (1978–2009).

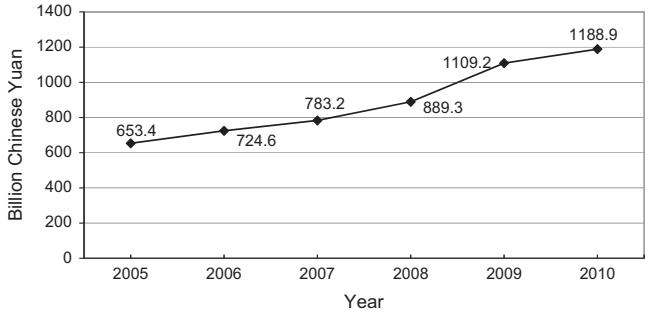

Fig. 2. Investment on electric power in China (2005–2010).

2. Research methodology

A multi-facet qualitative approach is adopted in this study to identify a list of factors critical for BOT power plant projects in China. The study unfolds in a combination of literature survey, review of case study reports and interviews.

2.1. Literature survey

An extensive review of relevant literature was conducted. These include the following three sources:

- Research papers. A systematic search was carried out in major databases by using keywords such as "Build–Operate–Transfer", BOT, critical success factors, risks and performance indicators to search relevant papers that were published 1999–2011. Chinese academic databases were also searched for the local publications.
- Statistical data. The statistical data are retrieved from China Statistical Yearbooks (1996–2010) and International Energy Agency.
- Policy documents. The policy reports include various official reports and regulations published recently by major government authorities including China Energy Development Report, China Insurance Regulatory Commission Ministry of Commerce, Ministry of Finance and State Administration of Taxation, State Council, National Development and Reform Commission and State Administration of Foreign Exchange.

2.2. Review of case study reports

Case studies reports of five typical BOT power plant projects that distribute in five different provinces. They are: Shajiao B power plant (Guangdong provience), Laibin B power plant (Guangxi autonomous region), Zhonghua power plant (Shandong province), Changsha power plant (Hunan province), and Huangqiao power plant (Jiangsu province). These selected case studies reports provide valuable information of BOT practice in China.

2.3. Semi-structured interviews

The objective of interviews is to test the literature survey findings and to develop a framework of factors influencing the success of BOT power plant projects in China. A total of 37 semi-structured interviews were carried out with a range of selected practitioners involved in the Chinese electric power engineering industry. The interviewees were selected from Government officials (11%), Electric power firms (21%), Design institutes (22%), Contractors (24%), Consulting firms (15%) and Financial institutions (7%). All interviews have extensive experience in the electric power industry and BOT related experience.

3. Results

The analysis of the data collected in literature surveys, case study reports review and interviews highlighted a list of 14 factors influencing the success of BOT power plant projects in China. These factors are classified into two levels, i.e. macro level and micro level (project level).