Available online at www.sciencedirect.com
ScienceDirect
International Journal of Project Management 34 (2016) 1102 – 1111
International Journal of Project Management
www.elsevier.com/locate/ijproman

Incentive mechanism for inhibiting investors' opportunistic behavior in PPP projects

Jicai Liu [a,*], Ruolan Gao [b], Charles Y.J. Cheah [c], Jian Luo [d]

[a] *Department of Construction Management, School of Economics and Management, Southwest Jiaotong University, Chengdu, Sichuan Province, 610031, P.R. China*
[b] *School of Economics and Management, Southwest Jiaotong University, Chengdu, Sichuan Province, 610031, P.R. China*
[c] *School of Business, Management and Social Sciences, Quest International University Perak, Malaysia*
[d] *Power China South Construction Investment Co., LTD, 518000, P.R. China*

Received 8 September 2015; received in revised form 7 March 2016; accepted 31 May 2016

Abstract

In public-private partnership (PPP) projects, private investors may engage in opportunistic behavior to pursue self-interest. In this paper, based on the contractual relationship between the government and private investors in PPP projects, principal-agent models in the presence of opportunistic tendencies in private investors were constructed to analyze the incentive mechanism for inhibiting investors' opportunistic tendencies in PPP projects. The results show that investors with opportunistic tendencies would be more inclined to invest an optimal level of productive efforts after acquiring a higher proportion of benefits allocation in the project output. Likewise, an increase in incentive intensity would help to lower the level of opportunistic behavior adopted by investors. For investors who are armed with opportunistic tendencies, there exists an optimal level of opportunistic behavior in order to maximize their benefits, and contrary to intuition it is not always the case that a higher level would be better for them. The findings contribute new insights into the development of incentives mechanism between the government and the private investors to collectively work toward creating a "win-win" contract and curbing potential opportunistic behavior.

Keywords: PPP projects; Opportunistic behavior; Principal-agent; Incentive mechanism

1. Introduction

The public-private partnership (PPP) scheme, a cooperation between the public sectors especially the government, and private enterprises, is a project financing measure for building public services such as infrastructure (Abadie and Howcroft, 2004). Many governments around the world are trying to use the expertise and funds from the private sectors to reduce their infrastructure deficits; in this regard, researchers around the world are trying to explore the implementation and operation of PPP (Chan et al., 2010; Cheung et al., 2012; Grimsey and Lewis, 2002; Osei-Kyei and Chan, 2015). However, the goals of the government and private investors in a PPP project are different. Government tries to maximize social and public interests, whereas private investors try to maximize their own interests, probably enticing investors to take opportunistic behavior that harms the project in their pursuit of self-interests especially during the operational period. For example, before the handover, the investors of Shajiao B Power Plant of Shenzhen ignored required refurbishment and upgrading of equipment and technology in the plant and solely pursued a high generating capacity. This eventually resulted in abnormal damage to the equipment in the power plant (Li, 2011).

Therefore, in a PPP project, this kind of behavior exhibited by private investors does seriously harm public interests and affect

* Corresponding author at: No. 111, North Section 1, 2nd Circle Road, Chengdu 610031, China.
E-mail address: jicailiu@126.com (J. Liu).

http://dx.doi.org/10.1016/j.ijproman.2016.05.013
0263-7863/00/

the success of a project. It is critical to understand and determine the ways to motivate private investors and to govern the development of PPP project participants to prevent the occurrence of opportunistic behavior of private investors. The essence of PPP projects is the contractual relationship formed among the involved parties, which clarifies rights, responsibilities, and benefits allocations of all participants and the reasonable division of the surplus from the project (Chen and Wang, 2010; Almarri and Blackwell, 2014). From the contractual perspective, research on different incentives of PPP projects had been conducted previously. Jensen and Stonecash (2005) emphasized the importance of intrinsic motivation in the outsourcing service incentives of public sectors. Ho (2006) constructed a game theory model to analyze the intensity and influencing factors of government relief PPP projects and also investigated the mechanism of subsidies and the range of transfer payments. Through investigating four PPP projects of Asian countries, Van Reeven (2008) found that government subsidies largely affected the financing of PPP projects. Wu et al. (2013) constructed game models for both the public and private sectors in PPP projects based on the incentive ideas and induction mechanism of the Stackelberg game and also solved the corresponding countermeasures of effective compensations and the optimal government compensation mechanisms. Gao et al. (2014) analyzed the compensation mechanism of the government to private investors in the project's operation phase when the demands for the PPP project declined. Lohmann and Rötzel (2014) discussed the opportunistic behavior of PPP projects during the contractual negotiation phase.

In summary, distribution of benefits per se has been studied previously, following a particular compensation mechanism between the government and the private investors. Rare attention is paid to the impact of opportunistic tendencies on such benefits distribution. Indeed, the final output of a PPP project not only depends on the productive efforts of the participating parties in the project but is also affected by various external uncertainties. Investors could possibly attribute the low efficiency of the project to these uncertainties, therefore leveraging on a reasonable excuse to avoid government punishment for their own opportunistic behavior. A PPP project generally has a long duration, during which investors with opportunistic tendencies may engage in opportunistic behavior in the project, especially during the operational period. This requires the government to consider the opportunistic tendencies in private investors when negotiating the franchise right and design a more reasonable contractual structure so that opportunistic behavior displayed by investors can be mitigated through proper incentive mechanisms.

As mentioned above, the vast majority of investors have the tendency to carry out opportunism in their pursuit of self-interests. Faced with the investors' opportunistic tendency, the government needs to formulate appropriate incentive mechanism to constraint private investors to prevent opportunistic behavior. The objective of this paper is to analyze the incentives of investors with opportunistic tendencies using the principal-agent theory, which helps to formulate the basis for decision-making by the government and the private investors. This paper is organized as follows. First, a comprehensive review of literature on opportunistic behavior and incentive mechanism for opportunistic behavior is presented. This is then followed by analyzing the principal-agent relationship between the government and investors. Then, principal-agent models in the presence of opportunistic tendencies in private investors are constructed to analyze the incentive mechanism for preventing investors' opportunistic tendencies in PPP projects, followed by discussions of the models. To illustrate the feasibility and the application of the models, a numerical example is presented. Finally, the paper concludes with some summary findings.

2. Literature review of incentive mechanism for opportunistic behavior

PPP refers to the mutual cooperation between the government and private enterprises or private funds that is formed based on a particular project in which the rights and obligations of all parties are determined in the form of a contract and also the private enterprises can reap reasonable profits while providing high-quality facilities and services to the public (Cumming, 2007; Ke et al., 2010a,b; Li and Zhang, 2002). However, the goals of the government and private investors in a PPP project are different; the goal of the government is to maximize social and public interests, i.e., to meet the needs of the public and improve public benefits through the PPP project, whereas the goal of private investors is to maximize their own profits, which means that over the course of the whole project, investors are primarily concerned with their own interests and consider how to increase revenue, reduce costs, and improve profit returns from the project. Thus, private investors naturally have the tendency of opportunistic behavior. They are also endowed with the conditions to adopt such opportunistic behavior: (1) the ownership and management right of PPP projects are separate, which are usually run and maintained by private investors before the transfer of assets; (2) the investors grasp more information and that the extent of public sector involvement is relatively low, which leads to information asymmetry between investors and the government, causing the investors to take opportunistic actions especially during the operational period. Therefore, almost every investor has an opportunistic tendency, and the difference is the degree to which the opportunistic tendency will be transformed into an actual opportunism behavior.

Opportunistic behavior is a kind of common behavioral phenomenon in social-economic activities (Mohamed et al., 2011; Church et al., 2014; Brookes et al., 2015). Xiong and Li (2013) ever pointed out that the opportunistic behavior would gradually increase under the circumstances of an asymmetric information environment generally. Lan et al. (2013) argued that preventing the opportunistic behavior could keep the cooperative relationship healthy and sustainable. Brookes et al. (2015) analyzed opportunistic behavior in hospitality franchise agreements from the agency and social exchange theoretic perspectives through a qualitative study of Turkish hospitality franchisees. A model of opportunistic behavior was developed which explained how franchisee behavior was influenced by the behavior of franchisors. Actually in the construction field,