



Evolution of public–private partnership models in American toll road development: Learning based on public institutions' risk management[☆]

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Abstract

Over the past few decades public-private partnership (PPP) models adopted by governments for infrastructure development throughout the world have evolved continuously. This article develops a dynamic framework which argues that PPP models evolve when some of the critical success factors (CSFs) for PPP are changed/improved over time based on project sponsors' risk management. The framework consists of four elements: CSFs for PPP, rising risks due to poorly addressed CSFs, the corresponding risk management to change/improve the CSFs, and consequently changed PPP models. Here, CSFs for PPP contain three aspects: external environment, internal project characteristics, and partnership-related factors. The framework is empirically explored with a multiple-case analysis of six toll roads developed in the United States since the late 1980s. The results demonstrate a two-phase evolution of PPP models in the studied context, confirm the theoretical framework, and find that public institutions' risk management can effectively explain the PPP evolution.

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1. Introduction

In the past few decades, governments at all levels across the world have been actively exploring a variety of public-private partnership (PPP) strategies for the delivery of public infrastructure and services, driven by growing public demand for infrastructure and services coupled with public sector financial shortfalls and the need for greater efficiencies in project delivery and operations. PPP refers to a contractual agreement formed between public and private sector partners, by which the private partners play a greater than traditional role to design, construct, finance, operate, maintain, or renovate a facility or system (Bovaird, 2004). Notably, PPP is different from privatization. In PPP, the public sector would sign a service contract with the private

sector and retain a substantive role in project development. In the case of privatization, public assets are sold to private operators and subsequent government involvement is minimal unless regulation of the post-privatized entity is necessary. There are many specific models of PPP, defined by stages of project delivery and the involvement of private expertise, finance, or other resources. Most common ones include Design-Build-Finance (DBF), Build-Operate-Transfer (BOT), Design-Build-Finance-Operate-Maintenance (DBFOM), and so on (Zhao, 2011).

Notably, PPP models adopted in a field tend to change over time. For example, the state of Victoria, Australia utilized various PPP models to deliver public hospital care during the period 1997–2004. A Build-Own-Operate (BOO) model was adopted for earlier projects with private partners assuming full responsibility for service provision (including financing and ownership), while later projects shifted to a Build-Own-Operate-Transfer (BOOT) model with private partners providing only ancillary services and not keeping ownership of the assets (English, 2005). This is not an isolated incident. Evolution of PPP models has

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been documented in infrastructure-based social services delivery in Europe (Almqvist and Hogberg, 2005), local government service provision in the United States (US) (Hefetz and Warner, 2004), and a variety of other contexts throughout the world (Miranda and Lerner, 1995; Warner and Hebdon, 2001).

Literature has studied why PPP evolution takes place from different perspectives. Scholars studying local government service provision tend to agree that it is mainly for the purpose of seeking more efficient, high quality, and innovative service delivery in a changing context (Hefetz and Warner, 2012; Lavery, 1999; Sclar, 2001; Warner and Hebdon, 2001). While economists argue that incomplete contracts of PPP projects might have accounted for PPP changes. Because of project complexity and uncertainty, the long term of partnership, and a wide variety of risks that might impact partnership (De Bettignies and Ross, 2009), infrastructure PPP projects are likely to have incomplete contracts, which must constantly be revised and/or renegotiated as time goes on, leading to changes of PPP models (Klein et al., 1978; Williamson, 1985). Meanwhile, private developers of infrastructure which own the production technology have strong bargaining power relative to government and might go cherry-picking: they fully involve themselves in the most profitable projects while put less effort into other projects (Koppenjan and Enserink, 2009; Van Ham and Koppenjan, 2001), resulting in the use of different PPP models.

Less well understood is how the evolution of PPP models proceeds and what the nature of the evolution process is. These questions are of particular importance to the US. The nation is experiencing severe funding shortages in infrastructure. The American Society of Civil Engineers (ASCE, 2013) estimates the investment needed for renewing America's infrastructure by 2020 to be \$3.6 trillion, yet no funding source is projected to have the capacity to provide sufficient funds. With the encouragement of the federal government, some states have been experimenting with a variety of PPP models as alternatives to traditional project financing and delivery. A better understanding of PPP evolution will not only increase our knowledge and awareness of the dynamic nature of PPP adoption, but also provide valuable information to public administrators seeking more effective and efficient service delivery. This study focuses on these questions for public infrastructure services in general and toll roads in the US in particular. To the author's best knowledge, this is the first empirical analysis to study the process of PPP evolution in infrastructure development.

This paper is organized as follows. The next section reviews literature on government restructuring and critical success factors (CSFs) for PPP. The author then develops a dynamic framework of PPP evolution and empirically explores the framework with a comparative case analysis of six toll road projects developed in the US since the late 1980s. The paper concludes with a discussion of the implications of the results for PPP development and recommendations for future studies.

2. Literature review

2.1. Government restructuring

Governments adopt a wide array of delivery alternatives through using both private and public sector mechanisms to

provide public infrastructure and services. The decision of changing the form of service delivery, also called government restructuring, is complex, which balances efficiency goals with public values and attends to the competitiveness of both public and private markets for government services (Hefetz and Warner, 2012; Warner and Hebdon, 2001). Literature has extensively studied the factors determining the decision of changes in service delivery, including efficiency, incomplete contract, monitoring difficulty, service quality, fiscal stress, wealth, and leadership capacity (Hebdon and Jalette, 2008; Savas, 2000; Sclar, 2001; Warner and Hebdon, 2001; Williamson, 1985).

However, empirical knowledge about how the changes in the form of service delivery take place has been fairly limited. For example, Local Government New Zealand (LGNZ, 2003) reported that New Zealand, an early and radical innovator promoting extensive privatization, enacted a new local government law in 2002 to reverse privatization and reassert a government role (Warner, 2008). Martin (2002) also found that the United Kingdom, another early leader in practicing privatization, experienced a similar process of reversing privatization through the political changes brought by the election of Tony Blair in 1997, including a "best value framework" campaign. In addition, learning literature suggests that policy changes may take place through institutional internal learning arrangements, which consist of certain institutional structures, procedures, customs, rules and incentives that support the learning process (Busenberg, 2001; Huber, 1991; Popper and Lipshitz, 1998). Despite the increasing interest in government restructuring, a coherent conceptual framework has not been developed to systematically examine the evolution process of service delivery.

2.2. Critical success factors (CSFs) for PPP

This study intends to explain PPP evolution. To do so, we must first identify critical success factors (CSFs) for PPP, which refer to the key areas of activity where favorable results are absolutely necessary for management success of PPP projects (Hwang et al., 2013) and can influence the selection of a PPP model for a project in practice. CSFs for PPP have been extensively studied from different perspectives, such as for winning BOT contracts (Gupta and Narasimham, 1998; Tiong, 1996; Tiong and Alum, 1997) and for the purpose of formulating and building effective partnerships (Chan et al., 2010b; Chou et al., 2012; Ng et al., 2012; Zhang, 2005).

Prominent in this literature are studies that consider a full range of external and internal factors which might facilitate or impede PPP implementation. Zhang (2005) develops a CSFs package for improving PPP procurement protocol to achieve a win-win relationship. The package contains five groups of CSFs, namely: (1) favorable investment environment, (2) economic viability, (3) reliable concessionaire consortium with strong technical strength, (4) sound financial package, and (5) appropriate risk allocation via reliable contractual arrangements. Each of the five includes a number of CSFs. In a study on international construction joint ventures, Ozorhon et al. (2007) suggest that the external environment under which the ventures operate and internal project-related factors have a positive effect

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