

Evaluating schedule delay causes for private participating public construction works under the Build-Operate-Transfer model

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Abstract

Project delivery method of Build-Operate-Transfer (BOT) increases the commencement probability of public construction works through private investments. Public construction works worldwide that adopt the BOT model as their project delivery method are increasing gradually. Although many BOT projects have been implemented at various stages, some projects encounter major obstacles for advancement. This study attempts to identify the delay causes in various stages of BOT projects. Opinions of BOT participants' replies are solicited using two questionnaire surveys. Those outcomes are analyzed using by traditional statistical methods and structural equation modeling method. Study results reveal that the stage of 'negotiation and signing of concession agreement' is the most essential stage, in which 'improper contract planning,' 'debt problem' and 'uncertainty on political issues and government-finished items' are the most significant delay causes. Identified causes of delay can be used to prevent the postponement of future BOT projects.

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1. Introduction

Build-Operate-Transfer (BOT) this is a project delivery method similar to DBFO (Design-Build-Finance-Operate) whereby the contract team acquires ownership of the facility until the end of the contract term at which time ownership of the facility is returned to the original public sector contracting agency (Federal Highway Administration, 2006). BOT increases the commencement probability of public construction works through private investments, and brings the development of related industries. BOT is a typical model of public-private partnerships (PPPs), which is a contractual agreement between a public agency and a private sector entity. In the United States, there are many models for PPP implementation, including (1) Build-Operate-Transfer (BOT) or Build-Transfer-Operate (BTO); (2) Build-Own-Operate (BOO); (3) Buy-Build-

Operate (BBO); (4) Contract Services (Operations and Maintenance; and Operations, Maintenance and Management); (5) Design-Build (DB); (6) Design-Build-Maintain (DBM); (7) Design-Build-Operate (DBO); (8) Developer Finance; (9) Enhanced Use Leasing (EUL); (10) Lease-Develop-Operate (LDO) or Build-Develop-Operate (BDO); (11) Lease/Purchase; (12) Sale/Leaseback; (13) Tax-Exempt Lease; and (14) Turnkey (United States General Accounting Office, 1999). Despite facing various challenges for commencing with public construction works, above models acquire extra resources through private participation.

As is widely recognized among governments worldwide, PPPs can advance the commencement of public construction works. However, many complex problems may slow down their implementation speed and even diminish the interests of private sector entities. Among the several key success factors (KSFs) that have been collected by the National Council for Public-Private Partnerships in the United State include (1) statutory and political environment; (2) public sector's

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organized structure; (3) detailed business plan (contract); (4) guaranteed revenue stream; and (5) stakeholder support (National Council for Public–Private Partnerships, 2008). It is known that there is not a set formula or an absolute fool-proof technique in crafting a successful PPP, each of above KSFs is involved in varying degrees for every PPP. Therefore, it is required to determine the obstacles for implementing PPPs in detail. Determining key delay causes is important to prevent them appearing in the future. Although previous studies have discussed several KSF and impeding factors, however, they focused on the factors either inherent in BOT model or imposed by the macro legal, political and economic factors, those out of control of the private sector entity or authorized government agency (Chen and Doloi, 2008). This study evaluated the delay causes in a micro level, i.e., in every stage for implementing BOT projects, in which the private sector entity or authorized government agency has the ability to deal with.

Large public construction works in Taiwan that adopt the BOT model as their project delivery method are increasing gradually. Despite the successful selection of a promoter and subsequent advancement into the build and operate stages, some projects incur delays in the tendering and negotiation stages after major problems are encountered. This study attempts to identify the causes of delay in public construction works from the perspective of the lifecycle of a BOT project by using the results of two questionnaire surveys in Taiwan.

2. Promotion of private participation in Taiwan

2.1. Act of promotion of private participation

The act for promotion of private participation in infrastructure projects (the PPP act) in Taiwan (Public Construction Commission, 2000), which was promulgated on February 9, 2000, espouses the spirit of vigorous innovation and, from the aspect of creating benefit, establishes partnership relations between the government and the private sector. The main features of the PPP act include the following:

- **Embodying general-type legislation:** the act applies alike to all types of industries, sectors, and development plans; it maintains flexibility of articles, and expands the delegation of administrative authority to the government officials implementing the projects.
- **Embodying civil contract concept:** the act adopts the principle of civil contracts under which rights and obligations between the government and private sector shall be stipulated in the concession agreement to reflect the partnership spirit of equal cooperation and create “win–win” investment conditions.
- **Maximizing private participation:** not only is the scope of infrastructure development in which private participation is permitted extremely broad and the methods of participation diverse, but private entities may also

carry out their own planning of proposals for participation in infrastructure projects; this allows the private sector to discover investment opportunities, and to give full rein to its creativity in planning investment projects.

- **Maximizing government carefulness:** in the interest of completeness, feasibility studies and preliminary planning should be conducted for all infrastructure projects which the government plans for private participation; from the viewpoint of private sector, the feasibility of private investment should be evaluated carefully and, in consideration of the special characteristics of the infrastructure project, commercial incentives should be incorporated in the formulation of the preliminary plan.

Following promulgation of the PPP act, many public agencies have encouraged private sector entities to invest in public projects. As of the end of 2008, private investment totaled nearly 382 billion NT dollars (about \$US 11.5 billion) (Public Construction Commission (PCC), 2009a).

2.2. Models of private participation

There are many models allowed by private participation in Taiwan (Public Construction Commission, 2000), including the following:

- **Build-Operate-Transfer (BOT) model:** the private institution invests in the construction and operation of the infrastructure project, and upon expiration of the operation period, transfers the ownership to such project to the government.
- **Non-compensable Build-Transfer-Operate (Non-compensable BTO) model:** the private institution invests in the construction of the infrastructure project and upon completion of the building, relinquishes the ownership to the government without compensation. The government then commissions the operation of the infrastructure project in question to the same private institution. Upon expiration of the operation period, the right to operate reverts back to the government.
- **Compensable Build-Transfer-Operate (Compensable BTO) model:** the private institution invests in the construction of the infrastructure project and upon completion of the construction; the government acquires the ownership through the payment of the construction expenses, either by a lump sum payment or by installment payments. The government then commissions the operation of the infrastructure project in question to the same private institution. Upon expiration of the operation period, the right to operate reverts back to the government.
- **Rehabilitate-Operate-Transfer (ROT) model:** the government commissions the private institution, or the private institution leases from the government, existing facilities for operation after making renovations or expansions. Upon expiration of the operation period, the right to operate reverts back to the government.

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