

Service delivery comparisons on household connections in Taiwan's sewer public–private–partnership (PPP) projects

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Received 21 April 2010; received in revised form 1 September 2010; accepted 23 November 2010

Abstract

With the aim of raising wastewater treatment rate more efficiently than before, the Taiwan government introduced the concept of public–private partnerships (PPP) to develop sewer projects. A sewer project typically involves three components: household connections, collection systems, and the wastewater treatment plant. The household connection is the last-mile of the whole sewer system. Two sewer PPP projects were selected for service delivery comparisons in this paper. While both projects have their similarities and differences, the most significant distinction is that in Case A the responsibility of the household connections resides with the concessionaire, whereas in Case B this is the government's responsibility. To the government, Case A simplifies the interfaces in a PPP project, and subsequently increases the overall wastewater treatment rate as expected, and is one of the ultimate goals for the Taiwan government. Nevertheless, from the investors' perspectives, close to 50% of the anticipated income which was the wastewater volume based in Case A, would be the major factor in financial risk considerations.

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Keywords: Public–private partnership; Sewer; Household connection; Risk allocation

1. Introduction

Privatization has been a popular government reform activity in many countries since the late 1970s as a means of improving public services delivery efficiency and governments' financial positions. In Taiwan, selected government-owned enterprises were privatized since the 1990s, and the private sector was invited to participate in the construction of some public infrastructure projects and taking up partial ownerships. Adopted by some of these projects, particularly those in the water and wastewater sector, were various forms of public–private partnerships (PPP), which were common also in some of the developing countries during the same time (Zhong et al., 2008).

The need to adopt the PPP schemes in Taiwan for sewer projects arose from the government's determination to improve

on the country's poor wastewater treatment rate, which is defined as the percentage of population served by the wastewater treatment plants (IMD, 2007). Over the past 25 years, more than US\$5.85 billion dollars have been invested into constructing 43 municipal wastewater treatment systems for a combined 3.3 MCMD (Mm³/day) wastewater treatment capacity (CPAMI, 2009). However, this has had limited success, and Taiwan is still at least 40% to 50% behind most countries when compared to some OECD countries of similar Gross Domestic Products (GDP) as shown in Table 1 (TIER, 2008), PPP schemes have been proposed as a means of executing more wastewater treatment projects and improving the wastewater treatment rate more rapidly, while giving due considerations to the possible budget constraints faced by the government.

As shown in Table 2, there were 129 municipal wastewater treatment PPP (WTPPP) projects recorded by the World Bank database between 2001 and 2007 (PPIAF, 2008), with a total capital investment in excess of US 3 billion dollars committed. While most of them were now beyond their construction stages

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Table 1
Taiwan's wastewater treatment rate compared with OECD countries.
Data resource: <http://ststs.oecd.org/wbos/index.aspx>, extracted on 2008/12/14 from OECD. Stat.

Country	Wastewater treatment rate	GDP (per head, US\$, current prices, current PPPs)
Czech Republic	80%	21,900
Hungary	64%	18,175
Korea	84%	23,043
Mexico	68%	13,635
Poland	60%	14,671
Hungary	64%	18,175
Portugal	74%	20,876
Slovak Republic	57%	17,833
Turkey	68%	11,535
Taiwan	19.27%	16,201

and operational, such projects cannot be said as being the most common implemented in every country with the exception of China, which alone accounted for 114 of the total number of projects and over 60% of the total capital investments. Choi et al. (2010) also analysed the 254 WTPPP projects in China between 1994 and 2007, and found that the majority (approximately 73%) of them had adopted a BOT model. This was perhaps a result of most projects being new developments at that time.

Further, depending on how each project was managed and structured, the municipal wastewater treatment PPP projects also had its mix of successes and failures. As discussed in

Table 2
Municipal wastewater treatment PPP projects in World Bank database between 2001 and 2007.

Unit: US\$ (millions)

Country	No. of projects (capital investment)			
	Subtotal	Wastewater treatment plant	Wastewater collection	Wastewater collection and treatment plant
China	114 (1848.38)	112 (1796.7)	1 (43.42)	1 (8.26)
Thailand	1 (5.6)	1 (5.6)	–	–
Croatia	1 (298.7)	1 (298.7)	–	–
Poland	1 (16)	1 (16)	–	–
Russian Federation	1 (239.7)	1 (239.7)	–	–
Brazil	3 (59.9)	2 (15.4)	–	1 (44.5)
Chile	1 (6)	1 (6)	–	–
Mexico	5 (457.8)	5 (457.8)	–	–
Venezuela, RB	1 (15)	1 (15)	–	–
India	1 (2.1)	1 (2.1)	–	–
Total	129 (3076.08)	126 (2976.9)	1 (44.42)	2 (54.76)

Abdul-Aziz (2001), a municipal wastewater treatment BOT project in Malaysia overlooked the importance of informing the public about changes to its public services. This coupled with a non-transparent concessionaire selection and bad management of the concessionaire company, resulted in the suspension and termination of the project where the Malaysian government was forced to take over ownership ahead before the concession period expired (Abdul-Aziz, 2001). The Shanghai Zhuyuan No. 1 WWTP, one of the more famous Greenfield projects in China, had a different structure where part of the investment came from the Government. The responsibilities of construction, operation, and maintenance of the infrastructure resided with the project company, and the service price depends on the investment as well as the agreed service levels rather than on the fees charged to the users (Zhong et al., 2008). Chen and Messner (2005) pointed out that PPP should not be considered as a rigid framework, but must have sufficient flexibility to strategically adapt to the local needs, including all aspects of the social, legal, economic, political, and technological (SLEPT) environment (Chen and Messner, 2005).

Since sewer construction and wastewater treatment is considered as a public service provided by the government in Taiwan, the concessionaire in a wastewater treatment PPP project in Taiwan is prevented from directly charging the end users for the provision of its services inclusive of a reasonable profit. Therefore, a payment mechanism similar to those of UK's Private-Financial Initiative (PFI) has been adopted in Taiwan (Lee and Yu, 2009a), where wastewater treatment fees payable to the concessionaire are paid and guaranteed by the government. This subsequently reduces the private sector's financial risks.

A typical arrangement between various stakeholders for a typical WTPPP project in Taiwan is shown in Fig. 1. Similar to many other PPP arrangements around the world, the major entities include the government, the private sector special purpose vehicle (SPV), and the end users. The SPV is also typically funded by a combination of equities and debit financing. However, the Taiwanese arrangement also differs from some of the other countries in several aspects. Firstly, the government does not become a part owner or take up shares in the SPV, and the SPV typically remains wholly private. An SPV pours in investments to build up sewer systems and provide wastewater treatment services for the users. It is also for this reason that a private sector operated SPV cannot directly charge users for its service as previously mentioned, and must rely on the local government to collect the tariffs and levies on its behalf. One further important characteristic is that it has been a central government initiative to promote more WTPPP projects in Taiwan; hence fees payable by the local government are often guaranteed by the central government. This not only provides an additional insurance to the private sector investor, but is also a means of relieving the local government's financial burdens and encouraging it to executing more projects.

A municipal wastewater treatment project typically involves three components: household connections, collection systems, and the wastewater treatment plant. However, most of the 129 projects recorded in the World Bank database included only the

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