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Public-private partnership for municipal water supply in developing countries: Lessons from Karnataka, India, Urban Water Supply Improvement Project

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1. Background

Scarce and poor-quality municipal water is arguably one of the most pressing problems facing developing countries, including India, where only 64% of the population has access to individual water connections or to water stand posts[1] and water supply ranges from 1–six hours per day, with a per-capita supply of as little as 39 l per day (HPEC, 2011). Theft, leakage, and un-billed water use account for 74% of the non-revenue water supplied in urban areas; only 4% of water use is metered (ASCI, 2010); and only 30 to 35% of water-supply-related operations and maintenance (O & M) expenses are recovered from user charges (HPEC, 2011). All these performance indicators fall well short of the Government of India's service benchmarks: 100% water coverage, a 24/7 water supply of 135 l per capita per day, 100% cost recovery, 100% metering, and a maximum of 15% non-revenue water (MoUD, 2010a).

Taking into account the current backlog in water delivery projects as well as future population increases, an estimated US$174 billion are needed over a 20-year period (2012 to 2031). This includes US$64 billion for capital expenses and US$110 billion for O & M (HPEC, 2011). Expenditures are projected to be, on average, US$8.5 billion per year.[2] In addition to the significant financial burden and chronic funding shortfall, at least two other sets of factors—political and institutional—have contributed to poor-quality water service.

Pandering for votes, political actors at the state- and local-government levels have shown a marked proclivity either to not charge for water or to under-charge. This has led to a lack of funds for developing and maintaining water infrastructure, resulting in severe negative impacts that are mainly borne by low-income households—the very constituency the under-charging purportedly benefits. Low-income households have to pay a disproportionately large proportion of their income for privately supplied water to secure reliable access that ought to be provided by civic entities, a phenomenon shared by several developing countries (Fuest & Haffner, 2007). Institutional dysfunction is also a factor. The fragmented administrative structures and low technical and managerial capacity of the relevant organizations are responsible for poor water delivery.

To meet India's water delivery challenges, experts have suggested a variety of approaches, such as decreasing the proportion of non-revenue water, covering 100% of O & M expenses through user charges,[3] and the use of public-private partnerships (PPP) (HPEC, 2011; Sankhe et al., 2010). The PPP model for infrastructure delivery is often employed for one or more of the following reasons: a) to attract private investment for developing a project (capital funding); b) to benefit from private-sector technical expertise; and c) to realize gains from private sector operational and management efficiencies.

Furthermore, several central government programs and policies have stressed the need to encourage private-sector participation and to explore financially sustainable ways to develop urban infrastructure, such as the Jawahar Lal Nehru National Urban Renewal Mission (Vidyarthi, Mathur, & Agrawal, 2017). While the overall performance of such measures at the national level has been mixed, the potential signaled by the contagion effect of a few examples is noteworthy. For example, the PPP model for water supply employed by three cities in Karnataka—Belgaum, Gulbarga, and Hubli-Dharwad—has encouraged water delivery reforms in other cities in Karnataka and in Nagpur, Maharashtra. Through a review of the Karnataka PPP project—the Karnataka Urban Water Supply Improvement Project (KUWASIP)—this paper seeks to identify lessons that India and other developing countries can learn as they invite private-sector participation in the urban water sector. These lessons assume special importance, at least for India, because KUWASIP is among the first externally funded urban water projects and was developed as a pilot project whose success could impact the extent of use of similar PPP models nationwide (Walters, 2013).

The remainder of this paper is divided into five sections. The first section provides an overview of the use of PPP in the urban water sector in India and globally. The second section describes the case study—KUWASIP. The third section reviews the extant literature to

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[1] Public water spigots or water posts shared by community members.

[2] At 2009–10 prices, at the rate of 1 US$ = 50 Indian Rupees (Rs.).

[3] One-hundred-percent recovery of O & M expenses for water supply was one of the Jawahar Lal Nehru Urban Renewal Mission's (JNNURM) mandatory reforms (MoUD, 2010b). JNNURM was India's largest central-government-funded urban finance and reform program.

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identify criteria for evaluating KUWASIP. The fourth section evaluates KUWASIP based on the evaluation criteria identified in the preceding section. The last section concludes by synthesizing the lessons learned for improvements to the PPP model in urban water projects.

2. Evolution of urban water PPPs in India

This section reviews the evolution of urban water supply PPP projects in India and situates India's experiences in relation to similar projects in the global context.

The evolution of urban water PPPs in India can be divided into two phases. The first phase (1991–2000) began immediately after the beginning of India's economic liberalization process. During this phase, PPP projects focused on securing private sector funding for bulk water infrastructure capital projects through long-term concessions such as Build-Own-Operate-Transfer (BOOT) or Design-Build-Finance-Operate (DBFO). Indeed, the DBFO model was used for India's first large water PPP project, the Tirupur Water Supply Project (ILFS, 2005). Most of these projects, including the Tirupur Water Supply Project, failed, primarily due to poor design, lack of financial viability, lack of cooperation from local governments, and strong public and political opposition to the “privatization” of a basic infrastructure—water—and to increases in water tariffs. The current phase, which began in 2001, has witnessed a shift in focus—from persuading private partners to fund capital-intensive bulk water augmentation projects to focusing on gains in efficiency and coverage of water distribution or service delivery (Aziz & Shah, 2012; World Bank, 2014). Consequently, the PPP model has shifted from primarily long-term (20-, 30-year term) BOOT- or DBFO-type contracts to a mix of long-term concessions and short- to medium-term (2- to 5-year term) management contracts. This post-1990 growth in water PPPs, as well as their shift toward a mix of contract types, has occurred globally as well (Fuest and Haffner, 2007). Furthermore, many water PPPs awarded in developing countries during the 1990s that included long-term concessions with private funding were cancelled (Marin, 2009), and across the world there are several examples of the re-municipalization of hitherto privatized urban water delivery infrastructure, notably, water infrastructure systems in Paris, France; Dar-es-Salaam, Tanzania; Buenos Aires, Argentina; and Hamilton, Canada (Kanakoudis & Tsitsifli, 2014).

Although the shift in focus toward management contracts resulted in reduced private investment in the water sector, there have been benefits from tapping the private sector's technological, operational, and management expertise: cost savings, better revenue collection, and service delivery improvements. Furthermore, because the water infrastructure under management contracts is still public-sector-owned, these projects do not elicit as much opposition as projects that fully privatize water infrastructure (World Bank, 2014). Water management contracts are also popular in developed countries. For example, water supplies managed by private companies served 33% of Spain's population in 2008. An additional 13% of the population was served under a mixed-ownership PPP model where capital was provided by both the public sector and the private company (Valinas, Gomez, Pandiello, & Zaporozhets, 2015).

The PPP project discussed below—KUWASIP—is an example of a second-phase PPP project that involved private sector participation in the re-construction and operation and management of an urban water supply system.

3. Case study: KUWASIP

KUWASIP covers the three cities of Belgaum, Gulbarga, and Hubli-Dharwad. Fig. 1 provides the location maps. Approximately two million people live in these cities (World Bank, 2010). Typical of the situation in cities across Karnataka, these three cities suffer from intermittent and inadequate water supply. For example, in the first half of the 2000s, city residents received water for only a few hours once every three to five days (GoK, 2011). The situation was worse in Hubli-Dharwad, where water was supplied for only two hours every 15 days in the summer of 2002 (Sangamaeshwaran, Madhav, & D'Rozario, 2008). During this period, the Government of Karnataka (GoK) formulated the Karnataka Urban Drinking Water and Sanitation Policy, 2002. The policy encouraged the state government to work with urban local bodies (ULBs), such as municipal corporations, to provide universal water coverage in all urban areas in the state and to encourage private sector participation in the form of PPPs to improve urban water service (GoK, 2010).

In 2003, GoK partnered with the World Bank to commence the design and implementation of a demonstration project—KUWASIP—to ensure continuous water supply (24/7) in selected zones of the three cities of Gulbarga, Hubli-Dharwad, and Belgaum. These zones covered more than 10% of the cities' population, for a total coverage of approximately 230,000 people (World Bank, 2015).[4] KUWASIP's main objectives included a) demonstrating the feasibility of providing adequate, continuous, and good-quality water to all segments of the population and b) demonstrating the advantages of a 24/7 water supply over an intermittent water supply (World Bank, 2010).[5] As a larger policy objective, it was hoped that KUWASIP's success in meeting these objectives would provide a road-map for addressing the water needs of all urban areas in the state and the country.

3.1. Implementation process

At a cost of US$51.5 million, KUWASIP was funded jointly by the GoK (US$12.03 million) and the World Bank (US$39.5 million) (World Bank, 2011). The project was structured as a PPP among state agencies, the three cities' local governments (municipal corporations), a private concessionaire (Compagnie Générale des Eaux, or Veolia), and non-governmental organizations (NGOs) such as the Rural and Urban Development Association (RUDA). The Karnataka Urban Infrastructure Development Company (KUIDFC), a state-level public-sector company, served as the nodal agency (SIUD, 2012).

A state agency, the Karnataka Urban Water Supply and Drainage Board (KUWSDB), was responsible for ensuring adequate supply of bulk water to the private concessionaire. Toward that end, KUWSDB undertook projects such as the replacement of water mains, construction of pump stations, and upgrades to water treatment plants. The three cities' municipal corporations allowed Veolia access to their water distribution systems, and transferred to Veolia the management and operation of the water supply system in the demonstration zones. The local governments retained the power to set tariffs, collect bills, and connect or disconnect water connections. Veolia developed a financial investment plan (FIP) for rehabilitating the water distribution network in the demonstration zones, implemented the rehabilitation projects, and ran water supply operations for four years,[6] which included addressing consumer complaints in a time-bound manner, establishing a billing system, and training the ULB staff deputed to Veolia. In collaboration

[4] The 2011 populations of Gulbarga, Hubli-Dharwad, and Belgaum were 533,587; 943,788; and 488,157; respectively; for a combined total of approximately two million (Census of India, 2011).

[5] The critics of 24/7 water supply argue that continuous water supply leads to wasteful over-consumption of water, loss of water through leakage, and very high water charges for consumers. They also argue that this method strains already-limited water resources because more bulk water is needed for a 24/7 water-supply system. The proponents of 24/7 supply highlight several advantages, including better quality water resulting from continuous high pressure in the pipes, which reduces seepage from the surrounding soil. Further, they argue, a 24/7 water supply reduces water consumption because consumers do not have to store water; a significant proportion of stored water is thrown away. Finally, in the absence of an adequate municipal water supply, consumers rely on dubious-quality, privately supplied, expensive water, and/or pay high electricity charges to pump ground water (often illegally).

[6] Veolia was awarded the contract in 2005. The rehabilitation projects were undertaken in 2006 and 2007. The 24/7 water distribution commenced in April 2008, and the two-year operation period ended in March 2010. Thereafter, Veolia was awarded a two-year extension (World Bank, 2010).