

Public Provision for Urban Water: Getting Prices and Governance Right

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Public sector monopolies are often associated with inefficiencies and inability to meet rising demand. Scholars attribute this to fundamental problems associated with public provision: (1) a tradition of below-cost pricing due to populist pressures, (2) owner–regulator conflicts of interest, and (3) perverse organizational incentives arising from non-credible threat of bankruptcy, weak competition, rigidities, and agency and performance measurement problems. Many governments worldwide have shifted to private provision, but recent experience in urban water utilities in developing countries has shown their limitations because of weak regulatory regimes compounded by inherent problems of information, incentives, and commitment. This article examines the paradoxical case of the Phnom Penh Water Supply in Cambodia to illustrate how public provision of urban water can be substantially improved by getting prices and governance right. Findings have implications for the search for solutions to provide one billion people worldwide with better access to potable water.

Introduction

Public sector monopolies in developing countries are often associated with inefficiencies and inability to meet rapidly growing demand. Studies estimate the annual losses from inefficiencies and unsustainable pricing policies to be nearly equal to the annual investment in infrastructure (The World Bank 1994). Developing countries have experimented with ways to improve the performance of public sector monopolies including the grant of financial autonomy, corporatization, and performance management contracts. However, these experiments were largely unsuccessful (The World Bank 1995).

Scholars suggest that poor performance can be attributed to three fundamental incentive problems associated with public provision. First, governments in developing countries often succumb to populist pressures to keep prices below cost even though these subsidies do not benefit the poor (Harris 2003). Second, public enterprises are faced with conflicts of interest because the owner is also the same as the regulator, and as a result,

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performance contracts cannot be credibly enforced (Shirley and Nellis 1991). Third, public enterprises are faced with perverse organizational incentives arising from non-credible threat of bankruptcy, weak competition, agency problems, rigidities, and performance measurement problems (Stiglitz 2000; Weimer and Vining 1998).

Poor performance, deteriorating fiscal conditions, and pressure from donors have forced many developing countries to involve the private sector in the provision and financing of goods and services previously provided by the public sector. For instance, from 1990 to 2001, developing countries had seen over \$755 billion of investment inflows in 2,500 infrastructure projects (Harris 2003). However, the robustness of the privatization paradigm has been challenged by macroeconomic crises faced by developing countries.

In the case of urban water supply, recent experience has also shown the limitations of privatization. For instance, from 1990 to 2001, only 5% of the total private investment in all infrastructure projects in developing countries went to water investments. Most investors prefer to invest in middle-income countries (50%) compared to low-income countries (18%) where the need for water investment is greater (Estache and Goicoechea 2005). More critically, about 37% of all private investments in the water and sanitation sector worldwide became distressed (or were cancelled or renegotiated), including those of the largest concessions, which accounted for 80% of these commitments (The World Bank 2006). Shirley (2006) attributes this to weak regulatory regimes compounded by inherent problems of information, incentives, and commitment.

Given the limitations of privatization and the important and widespread role of public provision in urban water supply in developing countries, it is important, then, to ask how the performance of urban public water utilities in developing countries can be improved. This article attempts to answer this question using the case of the Phnom Penh Water Supply Authority (PPWSA) in Cambodia. PPWSA's case is interesting for two reasons: First, Cambodia—after going through 30 turbulent years of war, genocide, revolution, invasion, and coups d'état—is one of the poorest countries in the world and is challenged in terms of governance capacity. Second, most publicly owned urban water utilities worldwide are widely known for their inefficiencies, unresponsiveness to their customers, and inability to meet rising demands. Publicly owned urban water utilities typically face problems of information, incentives, and commitment as indicated by non-credible threat of bankruptcy, weak competition, rigidities, and agency and performance measurement problems.

This case illustrates how PPWSA has tried to overcome these two challenges. For instance, PPWSA's performance in terms of water availability, coverage, customer service, water quality, and staff efficiency is much better than most urban utilities in developing countries. It has even outperformed privatized utilities in England and Wales in terms of keeping water losses down to 5% compared to 10% in the latter.

This article argues that PPWSA essentially solved these problems by getting its fundamentals right in terms of prices and governance structures and, in the process, substantially improve its performance.

The rest of the article is organized as follows. In the next section, the literature on public and private provision is briefly reviewed, including a discussion of problems inherent in urban water supply. The case of PPWSA is then justified, described, and analyzed. The article ends with conclusions and policy implications.

Public and Private Provision

This section briefly reviews the theoretical and empirical literature on public and private provision. First, the incentive problems inherently associated with public provision is reviewed, as well as the potentials and limitations of alternative solutions such as independent state-owned enterprises (SOEs) and regulated private provision. Second, the inherent problems in urban water supply such as problems of information, incentives, and commitment are examined, which some scholars suggest have impeded efforts at privatization of urban water.

Public Provision

The economic rationale for public provision has to do with the perceived problems of public goods, positive externalities, natural monopolies, and issues involving equity in distribution (Weimer and Vining 1998, 74). However, as earlier pointed out, there are at least three fundamental incentive problems associated with public provision: (1) a tradition of below-cost pricing due to populist pressures, (2) non-credible enforcement of performance contracts in cases of regulator-owner conflicts of interest and multiple and conflicting goals, and (3) perverse organizational incentives arising from non-credible threat of bankruptcy, weak competition, agency problems, rigidities, and performance measurement problems.

The long tradition of below-cost pricing among public enterprises in many developing countries can be traced, in theory, to two features of representative forms of government (Weimer and Vining 1998, 166–190). First, concentrated interests—labor unions, urban poor groups, political parties—have strong incentives to monitor and lobby politicians to keep costs low. As a result, too much weight is likely to be given by politicians to these groups' costs and benefits. Second and corollary to the first, because of electoral cycles, politicians maximize their electoral chances by pandering to populist pressures to keep prices below cost, particularly when the poor are affected. These two incentive structures in a representative form of government in turn help sustain the tradition of below-cost pricing.

Public provision in developing countries is also faced with a fundamental problem of conflict of interest when government acts as both the regulator and owner of public enterprises (Shirley and Nellis 1991). Consequently, public enterprises are faced with multiple and conflicting objectives, for instance, balancing commercial with social and political objectives. In addition, despite granting public enterprises financial autonomy in exchange for performance targets, enforcement of performance contracts including threats of hard budget constraints are not credible because of conflict of interest of the government, being both the regulator as well as the owner of the enterprise.

Many of these dilemmas can be framed as a series of agency problems (Sappington and Stiglitz 1987). Briefly, these problems arise because principals do not exactly have the same interests as their agents and because it is costly for the principals to monitor their agents. Agents have more information about their activities than their principals, which allows them to pursue their own interests to some extent. The principal then faces the task of creating organizational arrangements that minimize the sum of the costs of the undesirable behavior of agents and of the activity undertaken to control it.

While agency loss is universal in all organizations, several factors make them a more serious problem for public bureaus than private firms (see Weimer and Vining 1998, 193). These factors include difficulty of valuing outputs and performance and the lack of competition among public bureaus. The difficulty of valuing outputs and performance makes it difficult to determine the optimal sizes of public bureaucracies and results into varying degrees of x-inefficiencies and allocative inefficiencies. In addition, lack of competition gives public agencies weaker incentives to innovate, as—unlike private firms—they are not driven out of existence for failure to do so. This lack of competition eventually leads to varying degrees of dynamic inefficiencies.

Scholars of public administration, on the other hand, offer a more nuanced view of the distinctive characteristics of public bureaucracies but do not differ fundamentally in their conclusions from those of public choice scholars. Rainey (2003), in a summary of the distinctive characteristics of public bureaucracies, notes that the absence of markets for outputs and reliance on government appropriation lead to lower incentives to achieve cost reduction, operating efficiency, and effective performance. This also leads to lower efficiency in allocating resources because of greater information asymmetries and goal ambiguity, multiplicity, and conflict. Public managers also face greater diversity and intensity in political influence and therefore have greater needs for political support from client groups, constituencies, and formal authorities to obtain appropriations and authorization for actions.

There is a large body of evidence to support these theoretical assertions about the inefficiencies and pathologies of public bureaucracies in developing countries. In the case of public water utilities, these inefficiencies

are particularly chronic. In a study of 50 water utilities in 19 countries in Asia, for instance, the average non-revenue water (NRW), a widely used measure of efficiency, or water that has been produced but is eventually lost before it reaches the customers due to leaks, theft, unbilled consumption, and inaccurate metering, stood at 60% (McIntosh and Yniguez 1997). In Latin America, a survey of six publicly owned and operated water utilities in major cities showed that NRW goes up to as much as 51% (Shirley and Menard 2002), while in Lagos, Nigeria, it runs up to as high as 90% (for a debate on the use of NRW as a measure of efficiency, see Lambert 2003).

These inefficiencies eventually translate into higher costs to consumers, a waste of taxpayers' money from unproductive investments, and a loss of a valuable resource where water is scarce (Asian Development Bank 2003). It also critically affects the ability of these utilities to finance the expansion of their operations, which in turn partly explains why one billion people in developing countries worldwide still lack access to safe drinking water.

To deal with these bureaucratic dilemmas, economists usually recommend either the creation of autonomous SOEs or shift to regulated private provision or ownership (Weimer and Vining 1998). However, as shown in the next section, these solutions have their limitations and collateral consequences.

Government Corporations. Government corporations differ from bureaucratic supply in terms of their autonomy and therefore should be superior, theoretically, in terms of dynamic efficiency. However, evidence suggests that they also suffer from the same set of pathologies confronting other public bureaucracies. The reason for this, according to scholars of public choice and political economy, is that the justification for government intervention in market failures rests on the untenable assumption concerning the altruism and competence of government agents. The more realistic view, according to these scholars, is that these politicians and state bureaucrats pursue their own utility rather than that of the public interest (Buchanan, Tollison, and Tullock 1980; Downs 1967; Niskanen 1971).

In this view, SOEs suffer from excessive political intervention because they are useful in keeping politicians in power (Boycko, Shleifer, and Vishny 1996; Campos and Esfahani 1996). Consequently, large SOE sectors in developing countries can be a drag on the economy for two reasons: first, because of the aggregate impact of inefficient operations at the micro-economic level, and second, because of negative repercussions on growth arising from large fiscal and current account deficits because of the size of the SOE sector (The World Bank 1995).

The central theoretical argument, articulated by Buchanan (1972), is that a system of control that relies heavily upon the agent's internalization of the public interest's objectives is unlikely to produce good performance. Sappington and Stiglitz (1987) frame this in terms of the principal-agent problem. The agent (SOE management) has more information than the

principal (government) and can choose how much effort to expend. The principal can only observe outcomes and cannot measure accurately the effort expended by the agent and sort it out from other factors affecting productivity. The challenge is to design an efficient contract that motivates the agent to be productive. However, the problem is that the SOEs have multiple principals who may not have the authority, capacity, or motivation to monitor the SOE. At the same time, measuring performance is especially difficult because SOEs are typically expected to pursue a number of commercial and noncommercial objectives.

Boycko, Shleifer, and Vishny (1996), however, argue that managerial discretion problems are usually minor relative to political discretion problems. They suggest that the critical agency problem that explains the inefficiency of public firms has to do more with the agency problem of politicians rather than that with managers. Other scholars take a more nuanced view than the public choice principal-agent perspective. Vickers and Yarrow (1988, 7–44), for instance, suggest that while ownership matters in a broad sense, managerial incentives are a product of a complex set of interactions among factors such as type of ownership, degree of product market competition, and the effectiveness of regulation.

For others, public ownership is not inherently less efficient than private ownership. The conventional view of inefficient government enterprises usually stems from their isolation from effective competition rather than ownership *per se* (Caves and Christensen 1980). However, as Shirley and Nellis (1991) suggest, while ownership in theory may not affect efficiency, in practice—based on two decades of experience with SOEs in developing countries—ownership almost always matters. The reason for this, they suggest, is that politicians cannot resist interfering in public enterprises regardless of the barriers they erect to prevent such intervention. They also find that the use of performance measurement is a critical component of success, but it has to be coupled with management autonomy and linking pay for performance.

An elaboration and extension of the agency problem is offered by scholars of transaction cost and property rights (Coase 2005; Williamson 1975). These scholars suggest that SOEs should be seen as a nexus of contracts between management, labor, suppliers, politicians, and other stakeholders. Information asymmetries between contractors, incompleteness of contracts, and the costs of monitoring and enforcement make transaction cost an important unit of analysis (Williamson 1975).

However, as Williamson (1975) notes, all complex contracts are unavoidably incomplete because human agents are boundedly rational. Because of the incompleteness of contracts, uncertainties in long-term arrangements, plus the possibilities for opportunism, rational actors select institutional arrangements (markets, hybrids, and hierarchies) to effectively monitor their agents and thereby reduce uncertainty and lower transaction costs. From this perspective, governance can be considered as the means by which to infuse order among principals and agents and

thereby mitigate conflicts and eventually to realize mutual gain among parties.

Regulated Private Provision. The conventional policy prescription on urban water supply shared by most economists can be summarized as follows (see Shirley 2006, 3–7): (1) urban water supply should be treated as a private good and priced to cover costs, including investment and externalities; (2) utilities should be operated under state regulation to assure access and quality usually through price regulation; (3) poor consumers should be subsidized through means-targeted subsidies; (4) management of water utilities will be more efficient under private operation; and (5) various forms of competition (for the market and in the market) could further spur efficiency.

Under pressure from donors, many developing countries went ahead to privatize their water utilities with expectations of improving efficiencies and reducing fiscal burdens. Thus, out of 147 developing countries in 2004, 35% had some private participation in water and sanitation (Estache and Goicoechea 2005).

However, recent experience—as earlier noted—has shown several limitations of privatized provision for water: (1) private investment in water is relatively small compared with total private investment in the infrastructure sector; (2) private investors prefer doing business in middle-income countries compared to low-income countries; (3) more than one-third of all private investments in the water and sanitation sector worldwide, accounting for 80% of all investments, became distressed or were cancelled or renegotiated, including those of the largest concessions. The World Bank (2006) has noted that these renegotiations or cancellations of water contracts have raised concerns over the viability of private participation in water, particularly in concessions with significant investment commitments.

Various studies have also attempted to compare the performance of private and public water utilities. For instance, Estache and Rossi (2002), using econometric models for a data set of 50 utilities in 19 countries in Asia, found that efficiency is not significantly different between public and private firms. Other econometric studies have come out with conflicting findings (see Estache, Perelman, and Trujillo 2005).

However, Shirley (2006) notes that these statistical studies on water supply reform are contradictory and suffer from lack of information on the local determinants of outcomes. Comparative studies lack counterfactuals or controls in initial conditions; prices are measured in nominal terms without reference to costs; and many studies make unsubstantiated claims about affordability, scarcity, and profits. Likewise, very few serious studies examine prices, affordability, and profitability. Because of these limitations in the literature, Shirley suggests the need for prioritizing case studies that can provide for a more nuanced understanding of the performance of water utilities than what statistical studies can provide.

Public administration scholars have also critically examined the efficiency claims associated with privatization in general. Haque (1996, 194), for instance, summarizing evidence from case studies and macroeconomic data, questions the efficiency claims by proponents of privatization and calls attention to their adverse implications to responsiveness, accountability, and equity. Cook and Kirkpatrick (2000), reviewing the evidence of privatization in developing countries, likewise suggest that privatization works better in competitive markets but less so in noncompetitive ones.

However, more recently, institutional economists suggest that four facts about water supply would explain why few countries with weak institutions have successfully followed the conventional advice of economists. The following section explores this argument.

Problems Inherent in Urban Water Supply

Shirley (2006) argues that some inherent characteristics of water—being essential, local, mysterious, and dull—would require a particular logic in the design of water institutions and policies, ignoring which could make a difference in the success or failure of governance reforms. Shirley highlights the case of water privatization in Buenos Aires, Argentina to show how failure to consider the political and institutional implications of these characteristics of urban water supply could adversely affect the outcomes of reform.

As Shirley suggests, water being essential to life implies the need for (1) a set of institutions that allow voters to hold politicians accountable for ensuring affordable supply, (2) contractual rules that protect consumers from abuses of monopoly power, (3) a regulatory framework that enforces contractual rules, and (4) subsidizing water supply to poor households on grounds of equity. Water source, being local in origin, implies the need for contractual mechanisms that mediate conflicting local and national political interests and reasonably allocates costs and benefits across interest groups. It also implies the need for a regulatory framework reasonably independent from short-term political pressures and able to withstand regulatory capture. Water, being dull—that is, with lower rates of return compared with other infrastructure—implies the need for institutions that can solve the problem of credible commitment to ensure investors of a reasonable rate of return on their investments.

Furthermore, the monopoly characteristics of water supply imply the need for price, quantity, and quality regulation. Optimal regulatory design, in turn, calls for a politically independent public body to set rates and monitor performance based on objective and verifiable information with a neutral and independent appeals process (Armstrong, Cowan, and Vickers 1994). Shirley (2006) also suggests that water, being mysterious—that is, missing information is pervasive—makes it difficult for consumers to differentiate whether the water they drink is contaminated or not. It is also costly for utilities to locate leakages in underground pipes, and in

many cases, they may not even know their locations. This implies the need for investors to invest in information prior to signing of privatization contracts and establishing mechanisms for metering and tariff setting.

In theory, many of these problems inherent in water supply can be mitigated, depending on the design of regulatory contracts. Shirley and Menard (2002) examined the hypothesis that a regulatory contract for water supply will be more likely to achieve its goals when three conditions are met: (1) information asymmetries between regulator and manager are reduced, (2) sufficiently high-powered incentives are provided to motivate the managers to comply with the contract's objectives, and (3) both parties provide credible signals of their commitment to abide by the contract and credible enforcement provisions are established.

Shirley and Menard further find that the introduction of a regulatory contract that met the three conditions of reducing information asymmetry, heightening incentives, and signaling credible commitment generated significant efficiency gains. They also find that contract design can substitute for some of the weaknesses of a country's institutions, but privatization of water utilities in cases of weak regulation can be risky. This partly explains why 30% of all private investments in water and sanitation worldwide from 1990 to 2006 became distressed, renegotiated, or were cancelled.

In summary, theory and evidence suggest that publicly owned and operated water supply agencies—whether as public bureaus or as SOEs—are inherently faced with varying degrees and types of inefficiencies because of various bureaucratic pathologies such as limited competition, information asymmetries, incomplete contracts, and inflexibilities. On the other hand, privatized provision and ownership of water supply also suggests its limitations because of regulatory failures compounded by problems of information, incentives, and credible commitment, which arise from the characteristics of water being essential, local, dull, and mysterious. In between these failures of hierarchies and markets are paradoxical cases of successful hybrid solutions in institutionally adverse settings. The case of PPWSA in Cambodia is used as an illustrative example.

Cambodia and PPWSA

Fieldwork

A team of local researchers was fielded in Phnom Penh, Cambodia from April 15 to May 30, 2007 to undertake a series of in-depth structured interviews with PPWSA's top management. The interviews focused on its organization and management, including its finance, operations, and personnel. For instance, the team sought to understand the nuances of its operations—how customers get their homes connected to piped water; the process of reading, collecting, and paying water bills; how customers are educated and the mechanisms for customer feedback; the rationale for its water tariff structure; and how very poor households are provided access to potable water.

The team also probed the changes that have been introduced at PPWSA overtime, including changes in organizational structure and staffing patterns, operating systems and procedures, and management information systems. The team also focused on policies and practices in human resource management including hiring, promotion, and firing practices; training and incentive structure; and prevention of administrative corruption.

Equally important, the team probed the leadership style of its top management through an in-depth interview with its Director General. The team focused on various challenges faced by PPWSA and how these were dealt with, including persuading politicians of the necessity for tariff rate increases, dealing with political interventions in personnel matters, as well as dealing with corrupt officials in the agency.

While these key informant interviews provided the team with a good insight into PPWSA, the team was well aware of possible problems of self-reporting bias. Thus, the team went about looking for independent information and went through a process of triangulation to improve the robustness of its findings and enhance its internal validity. Thus, the team went around two slum areas in Phnom Penh to interview PPWSA's poor customers. The team randomly chose women respondents because they are usually the ones who are responsible for providing water supply to the household. The team asked questions about the reliability of water supply, its quality and price, their views about the overall service of PPWSA, and how they view the benefits of having access to potable water. In addition, the team also interviewed the staff and collected independent data from a key donor agency of PPWSA, the Japan International Cooperation Agency. The team pored over archives, evaluation studies, and reports both from PPWSA and from donors and of Cambodia as a whole to better understand the context.

Single case studies, however, are always limited in terms of external validity. However, if it is part of a comparative research and theory-building program, such as the purpose of this study, interesting case studies have a key role to play (King, Keohane, and Verba 1994). If there are other single observations gathered by other researchers against which it can be compared, it is no longer a single observation. This is when researchers examine a small number of observations within single cases and make disciplined comparisons among them. Disciplined comparison of even a small number of comparable case studies, yielding comparable observations, can sustain causal inference.

Another major advantage of an in-depth case study is that the development of good causal hypothesis is complementary to good description rather than being competitive with it. Framing a case study around a hypothesis may lead to a more focused and relevant description and improve construct validity, even if the study is ultimately thwarted in its attempt to provide even a valid single causal inference.

Indeed, the need for a diagnostic approach based on careful case studies has been widely articulated by an increasing number of scholars of political economy, governance, and institutional economics. For instance, Grindle (2004) has also implicitly advocated for a more diagnostic approach to temper the formulaic prescription of advocates of good governance. Ostrom (2005) has consistently criticized the polemics of markets and hierarchies, tragedy of the commons, the prisoner's dilemma, and the inevitability of the Leviathan solution. Araral (2006) has noted the propensity of economists to wonder why good economics is not seen as good politics for which Shirley (2006) blames the failure of economists to appreciate the importance of political, historical, and institutional contexts. More recently, Rodrik (2006) has also called for an explicitly diagnostic approach to replace the Washington consensus' "rules of thumb," which he argued failed because it is not grounded either on economic theory or with the realities of a country.

Contemporary Political Context

Cambodia's contemporary political history has been summarized authoritatively by Kamm (1998) as "30 turbulent years of war, genocide, revolution, invasion and coup de etat." This unfortunate twist of history included (1) the U.S.–Indochina war (1961–1973), which Cambodia was dragged into because of its proximity to Vietnam; (2) the genocidal Khmer Rouge Regime (1975–1979)—partly an offshoot of the U.S.–Indochina war—which subsequently pursued a Stalinist–Maoist form of social engineering and decimated close to a quarter of Cambodia's population; (3) the Vietnamese invasion to oust the Khmer Rouge and their subsequent occupation (1979–1989); (4) a new constitution in 1991 and the election of a new government in 1993; and (5) the unstable coalition politics and coup d'états in the late 1990s.

However, since 1999, the country has returned to normalcy, with the economy showing encouraging progress and growth, and political conflicts have been channeled into the electoral arena. Nonetheless, Cambodia still faces formidable challenges as a post conflict country (U.S. Department of State 2006). Its annual average per capita income (2006) is estimated at less than \$448 with close to 40% of the entire population living below the poverty line. Cambodia remains heavily reliant on foreign assistance, with about half of the central government budget coming from donor assistance. Attracting foreign direct investment is also difficult due in part to the unreliable legal environment. Like most post-conflict countries, Cambodia's Human Development Index and most of its governance indicators—particularly government responsiveness, effectiveness, transparency, citizen participation, regulatory quality, among others—are ranked at the bottom quartile of international league tables. It is against this difficult context that paradox of the PPWSA is examined.

PPWSA: Brief History

The origin of the PPWSA dates back to 1895 when the first water supply system was established in Phnom Penh under the auspices of the French colonial regime. When the French left in the 1950s, PPWSA became an agency attached to the Phnom Penh Municipal Government. In 1993, the year when the Cambodian government was formed and a new constitution was ratified, the state of Phnom Penh's water supply was dismal. Less than half of the city was served despite the fact that water scarcity is not a problem—the source being the Mekong River—but its distribution network was very limited with only 280 km of pipes. Water pressure was very low, which made service unreliable.

At most, customers only managed to get 10 hours of water a day. Illegal connections were rampant as were leaks and system losses, which contributed to as much as 72% NRW. Only 12% of its 27,000 customers had water meters and collection ratio is only 50%. In addition, PPWSA has a large bureaucracy with 22 staff per 1,000 connections. Because of these factors, PPWSA was constantly operating in the red with its expenditures twice as high as its operating income. Its business model was clearly not sustainable.

In June 1996, the parliament passed a law on SOEs that defined the scope of their operation and supervision and granted them independent legal status and financial autonomy. This was followed up with a decree in December 1996, establishing PPWSA as an autonomous public enterprise—no longer as an attached agency of the city government—and with a mandate to operate according to commercial principles.

Much of these reforms were influenced by donors who played a vital role in the rehabilitation of PPWSA. In 1993, shortly after the formation of the Government of Cambodia, Japan helped prepare a master plan study that would become the blue print for its rehabilitation. Japan was a major donor in Cambodia. Its grant-in-aid to PPWSA alone amounted to \$66.3 million from 1993 to 2004 (PPWSA 2005). France was also instrumental in the initial phases in the improvement and expansion of a water treatment plant and distribution network, in addition to helping in the computerization of PPWSA's operations. The Asian Development Bank (ADB) and the World Bank provided concessional loans to PPWSA to expand its service to urban and peri-urban areas. Along with the United Nations Development Fund, the World Bank provided soft loans and grants to build PPWSA's technical, financial, managerial, and commercial capacity. Crucial investments were also made in terms of customer research and education, which paved the way for a better understanding of customer's willingness to pay and increasing their sense of responsibility in reducing NRW.

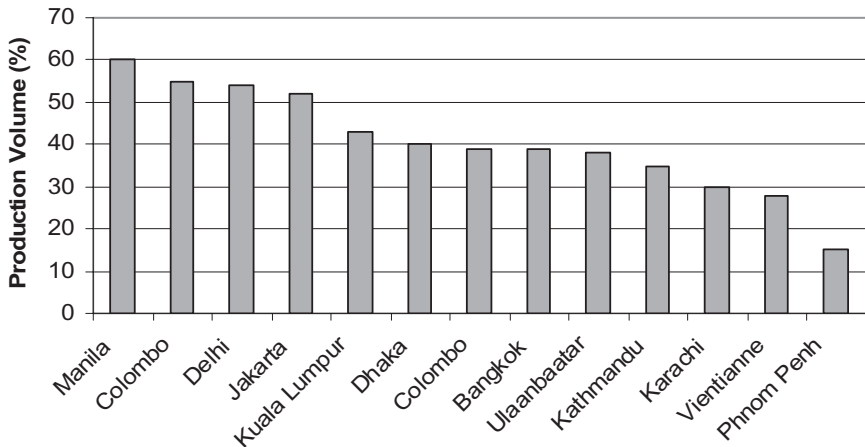
As Table 1 illustrates, PPWSA's transformation is remarkable. From 1993 to 2004, its production capacity increased by 262% to 235,000 cubic meters per day. Its service coverage increased by 70% and its distribution network (km of pipes) increased by 287% to 1,084 km. The number of households and establishments with piped water connections has

TABLE 1
PPWSA's Transformation (1993–2004)

Indicator	1993	2004	Difference	% Change
Production capacity (m ³ /day)	65,000	235,000	170,000	262%
Coverage (%)	50	85	35	70%
Distribution network (km)	280	1,084	804	287%
Supply pressure (bar)	0.2	2	1.8	900%
Supply duration (hour/day)	10	24	14	140%
Number of connections	26,881	120,000	93,119	346%
Number of staff/1,000 connections	22	4	-18	-82%
Illegal connections/year	300	5	-295	-98%
Metering ratio (%)	12	100	88	733%
Collection ratio (%)	50	99.9	50	100%
Non-revenue water (NRW) (%)	72	15	-57	-79%
Total income (billion riels) (US\$1 = 9,000 riels as of May 2006)	0.7	34	33	4,757%
Operating expenditure (billion riels)	1.4	9.4	8	571%

Source: PPWSA (2005).

FIGURE 1
Non-Revenue Water in Selected Asian Cities



Source: ADB (2003, chap. 9).

increased by 347% to 120,000 units, 100% of which are metered compared to 12% in 1993.

Critically important, NRW—a barometer of efficiency—dropped from 72% in 1993 to 15% in 2004 (Figure 1). Compared to other utilities in Asian cities, this is a significant efficiency achievement for PPWSA, considering the institutionally adverse setting it operates in compared with its counterparts from Asia. This is particularly notable when compared with the best

of the privatized water utilities in England and Wales, which have managed to achieve an NRW of around 10%.

This substantial reduction in PPWSA's NRW had important multiplier effects. For instance, water used to be available only for 10 hours a day in 1993, but by 2004, it has become available 24 hours a day, seven days a week. Consequently, because of reliable water service, its collection efficiency has increased by almost 100% from a low of 50% in 1993.

Illegal connections used to be rampant in 1993 with more than 300 cases per year reported—with connection rights usually sold by PPWSA's staff. In 2004, this was down to only five cases a year. These efficiency improvements also came about along with improvements in personnel efficiency. In 1993, the ratio of PPWSA's staff per 1,000 connections used to be 22:1,000, but by 2004, this has improved to 4:1,000. Of its 536 full-time staff, 78% are assigned in water supply with the rest in corporate services.

As a result of these substantial improvements in its operational efficiency and because of hard budget constraints, which have forced PPWSA to keep its operating costs as low as possible, its operating income has increased by 40 times to 34 billion riel (US\$ 377.7 million) in 2004. Consequently, this has enabled PPWSA to embark on service-expansion programs to increase its service coverage in adjacent areas around Phnom Penh and even begin to assist other provincial utilities in Cambodia. From the standpoint of financial analysis, PPWSA indeed can be regarded as a relatively efficient water utility. In contrast, most public water utilities in developing countries are faced with financial deficits. Coupled with lack of autonomy and political interference, among others, internal cash generation of water utilities in developing countries has steadily declined from 34% in 1988 to 8% in 1998 (Tortajada 2006, 238).

In addition, compared with other water utilities in Southeast Asia, Cambodia has done reasonably well in terms of availability, coverage, customer service, water quality, and staff efficiency (Table 2). For all of these accomplishments, PPWSA has been internationally recognized and heralded as a role model among public water utilities in developing countries. In 2004, it was awarded by the ADB as one of the top water supply utilities in Asia. In 2006, it was awarded the Ramon Magsaysay Award for public service, the equivalent of the Nobel Prize in Asia.

What Made PPWSA Successful?

What explains the successful performance of PPWSA? How has it succeeded in an otherwise highly dysfunctional setting? Like most post-conflict countries struggling to rebuild, Cambodia's governance indicators are ranked by the World Bank at the bottom quartile, for example, in terms of government effectiveness and voice and accountability. Government effectiveness measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility

TABLE 2
PPWSA Compared with Water Utilities in Southeast Asia

	PPWSA (2004)	Average for 46 Water Utilities in Southeast Asia
Staff efficiency (no. of staff/1,000 connections)	4	7.57
Staff salary (percent of per capita gross national income)	504	252
Training budget as percent of total operating budget	3	1.96
Water availability (% of time water is available on a 24-hour basis)	100	95
Water quality (% of time chlorine tests passed)	96	89
Service coverage (%)	100	72
Customer service (no. of complaints/1,000 connections)	50	171

Source: Southeast Asia Water Utilities Network (2005).
 PPWSA, Phnom Penh Water Supply Authority.

of the government's commitment to such policies. Voice and accountability, on the other hand, measures the extent to which the country's citizens are able to participate in selecting their government, as well as freedom of expression, association, and free media.

In particular, how has PPWSA addressed the fundamental incentive problems of below-cost pricing, owner-regulator conflict of interest, and perverse organizational incentives arising public provision? In particular, how has it addressed the problems non-credible threat of bankruptcy, weak competition, rigidities, and agency and performance measurement problems? In addition, how has it addressed the problems of information, incentives, and commitment inherent in urban water supply? This section argues that PPWSA essentially solved these problems by getting the fundamentals right in terms of prices and governance structures and, in the process, substantially improved its performance.

Getting Prices Right

The first crucial element to PPWSA's success is to get prices right through tariff reforms. Before reforms started in 1993, the paradigm among policymakers was that water should be treated as a pure public good and thus, government should be responsible for its provision and financing. Under this paradigm, tariff was highly subsidized below cost and all domestic customers charged a flat rate regardless of consumption.

In 1996, the political leadership of Cambodia took a paradigm shift by considering urban water as a commercial commodity to be priced according to the principles of cost recovery. As a result of this paradigm shift,

TABLE 3
Tariff Structure

1996			2002		
Consumer	Block m ³ /month	Tariff riel/m ³	Consumer	Block m ³ /month	Tariff riel/m ³
Domestic	0–15	300	Domestic	0–7	550
	16–30	620		8–15	770
	31–100	940		16–50	1,010
	>100	1,260		>50	1,270
Government	Flat rate	940	Government	Flat rate	1030
Commercial/ industrial	0–100	940	Commercial/ industrial	0–100	950
	101–200	1,260		101–200	1,150
	210–500	1,580		210–500	1,350
	>500	1,900		>500	1,450

Source: PPWSA (2005).

PPWSA established a tariff structure based on cost recovery and differential pricing among and within domestic, government, and commercial/industrial consumers. The extent of cross-subsidies by commercial/industrial consumers to domestic consumers was likewise reduced from about three times in 1996 to about its half in 2002 (Table 3).

It is argued here that this paradigm shift can be seen a pragmatic and calculated win-win political move on the part of Cambodia's leadership, a case of good economics as also being good politics. The convergence of good economics and good politics, in turn, is a result of several factors (Chan 2007). First, given Cambodia's fiscal condition, the old business model was clearly unsustainable in meeting current and future financing requirements for water services given the high rate of migration to Phnom Penh from the provinces. Second, research has shown that low income households from Phnom Penh who had no access to piped water were actually paying private water suppliers as much as four times what it would cost to have piped and treated water delivered to them. Third, urban poor communities have been mobilized by PPWSA to petition the political leadership about their willingness to pay for water tariff at cost-recovery levels provided that there will be substantial improvements in coverage, water quality, reliability, and price.

PPWSA's experience, in fact, reinforces some important lessons learned from the experience of water reform in other developing countries. These lessons, in turn, have important and far-reaching implications for reforming public water utilities in developing countries. First, the urban poor often pay higher prices for untreated water from private suppliers. Second, they are often willing to pay for connection charges and piped water services if affordable financing models are made available to them. In the case of Cambodia, this included socialized and deferred payment schemes

for connection charges, graduated tariff based on level of consumption, minimal transaction cost in bill collection, among others.

Finally, it was not difficult for PPWSA and Cambodia's political leadership to credibly commit to substantial improvements in water service for a number of reasons:

First, it is easier for politicians to enter into political bargains of improving water service in return for tariff reform at cost recovery levels if the water agency is capable of delivering on the promise. Having leverage on key appointments in the water utility is an important guarantee for the politician to take the risk of conditional tariff reform. In much of the literature on the political economy of water, this arrangement is criticized as detrimental to the professional management of the utility. However, if politicians are to make a credible political bargain, then, appointment powers are important in solving the political commitment problem.

Second, the political bargain can be made much more credible when the water system is already undergoing rehabilitation and when the benefits of reform are already visible and appreciated by customers. In contrast, many policy reform efforts fail because of failure to appreciate the importance of pacing and sequencing of reform. In many water reform projects, consumers are first asked to pay for higher tariff in return for promise at service improvement. In an institutional setting rife with corruption and lack of transparency, such bargains are non-credible and are doomed from the start. In the case of Cambodia, although corruption is known to be endemic, the explicit gesture of political leaders to lead by example in paying their water bills had an important psychological effect in ensuring the credibility of the political bargain.

Finally, Cambodia's constitutionally mandated multiparty elections and the requirement for a two-thirds vote in the National Assembly to form a coalition government have given Phnom Penh's urban poor more political salience than in the past. Under this set of rules, political parties have strong incentives to win over Phnom Penh's urban poor, but this is not easy given the number of major political parties involved. For instance, in 1996, Cambodia had its first election for members of its national assembly in which three major political parties competed along with several minor parties. However, no party won a two-thirds majority to form the coalition government, and the ruling Cambodia People's Party was forced to enter into a coalition with other parties. It was in this context in 1996 that the petition by the urban poor for substantial improvements in coverage, water quality, reliability, and price in exchange for their willingness to pay for at cost-recovery levels became a politically salient issue. It does not necessarily mean that politicians are always responsive to the interests of the poor, but the presence of multiparty elections, a regular electoral cycle, and the two-thirds majority needed to form a coalition government gives the poor a leverage to have their votes count.

Getting Governance Structures Right

While getting prices right is a necessary condition to improve the performance of PPWSA, it was not sufficient. The second crucial element is to get its governance structures right. While top leadership at PPWSA is subject to political pressures, this does not necessarily mean unregulated political meddling in its operational decisions. Several features of PPWSA's governance structure temper the effects of political meddling: (1) the conversion of PPWSA from an attached bureau of the City Government of Phnom Penh to an autonomous public corporation with its own charter and governing board; (2) granting it with the authority to operate based on commercial principles, including autonomy in finance and personnel, use of commercial accounting principles, and budgets funded by user charges; and (3) adopting an effective performance measurement and management system through *ex-ante* and *ex-post* alignment of contracts, with performance and an information technology (IT)-driven operating system reinforced by a progressive human resource management practices.

First, the conversion of PPWSA into an autonomous corporation enabled it to escape from the rigidities associated with public bureaus. The grant of financial autonomy came with the expectations for financial discipline. Given Cambodia's very tight fiscal conditions, PPWSA can no longer expect subsidies from the government, save for credit guarantees when it borrows from donor agencies. Credible hard budget constraints can serve as a proxy for credible threat of bankruptcy similar to private firms.

Second, allowing PPWSA to operate on commercial principles strengthens the mechanisms for accountability in several respects. For instance, it helps clarify what it is accountable for (commercially viable water service), to whom it is accountable to (consumers and its board of directors), and how it will be made accountable (performance measurement, commercial accounting principles, and tying budgets to user charges).

Third, the adoption of performance measurement and management system was crucial to PPWSA's success, particularly in reducing and maintaining NRW to 15%, improving bill collection, cost reduction, and improving its overall financial performance.

To reduce NRW, for instance, it employed a combination of performance measurement and management tools, social contracts with communities, and IT. It deployed a dedicated team of trained technicians whose contracts and performance rewards were then tied to the actual reduction of NRW. In 2006 alone, the performance rewards received by these technicians amounted to 25 times their annual salaries. In addition, PPWSA forged social contracts with village associations, which were then mobilized to report theft and leakages to reduce NRW in exchange for subsidized connection fees. Customer complaints and feedback on low

water pressure—an indication of leakages—served as a crucial monitoring device for PPWSA and were promptly attended to.

Furthermore, technological solutions were extensively employed to reduce NRW by locating leakages underground using instruments that periodically measure water pressure. Drops in water pressure are clear indications of leaks, and the teams of technicians worked around the clock to monitor water pressure. Another technical solution to the problem of missing information and to minimize the problem of unbilled customers is the adoption of policies prescribing for 100% metering of customers and investing in the automation of its customer database.

Finally, and equally important, it adopted an integrated accounting and management information system linking the customer database with the billing, collection, payroll, accounting, and auditing systems. This IT enabled performance measurement and management system is at the centerpiece of the operating system at PPWSA. Collectively, these instruments—performance based contracts, social contracts, and technology-driven management information systems (IT), along with efforts at physical rehabilitation—proved highly effective in reducing NRW from 72% in 1993 to 15% in 2004.

In addition to reducing NRW, this IT-based operating system made it easier to undertake performance measurement and management, itself crucial to the success of PPWSA. Because of the ease of measuring key performance indicators such as reduction in NRW and bill collection, it was also relatively easy to tie performance with rewards and effectively manage individual and organizational performance in general. For instance, PPWSA has developed a performance reward system similar to those employed in progressive private corporations. These include performance awards and bonuses as well as nonmonetary awards such as personnel recognition and foreign study tours. In addition, the performance measurement and management system at PPWSA has also substantially reduced administrative corruption, owing to the built-in mechanisms of checks and balances in the system and reinforced by norms of integrity set by its top management. The efficacy of PPWSA's leadership, in fact, was recognized internationally with the Ramon Magsaysay Award—Asia's equivalent of the Nobel Prize—in 2006 for government service.

Progressive human resource management practices also played a key role to PPWSA's success. For instance, PPWSA conducts an open selection process for staff recruitment, followed by a provisional on-the-job training/internship and another year of provisional contract before staff becomes a regular employee. Compared with their counterparts from other developing countries, PPWSA is fortunate that its management is relatively autonomous in terms of personnel matters. Its employees are also nonunionized, which gives management leverage on personnel matters particularly on personnel dismissals. Salaries of PPWSA personnel are, on average, five times more than their counterparts in other

government agencies in Cambodia. The high level of motivation among its staff is also the result of a comprehensive system of staff development program. Among 47 water utilities in Southeast Asia, PPWSA spends the most in terms of staff training and international study tours. About 9% of its total staff attends trainings annually for an average of 12 days a year. Altogether, it spends about 3% of its total operating costs for staff training or the equivalent of 16% of its direct labor costs.

Conclusion and Implications

Public provision and production for urban water in developing countries are often associated with inefficiencies and inability to meet rapidly growing demand. These problems are often attributed to at least two reasons: (1) a tradition of below-cost pricing due to populist pressures, and (2) perverse organizational incentives arising from non-credible threat of bankruptcy, weak competition, rigidities, and agency and performance measurement problems.

However, recent experience with private provision and production of urban water has shown the reluctance of investors to invest in urban water supply. The reason has to do with weak regulatory regimes compounded by inherent problems of information, incentives, and commitment. From 1990 to 2001, only 5% of the total private investment in all infrastructure projects in developing countries went to water investments. Given these limitations and the widespread role of public provision in urban water supply and with one billion people lacking access to potable water, the matter of how to improve the performance of public water utilities in developing countries then becomes an important question.

This article has argued that the case of PPWSA offers insights and practical answers to these problems. The key lesson to be drawn from this case is that the provision of urban water is likely to be more effective, efficient, and able to meet increasing demand if the utilities can get their fundamentals right in terms of prices and governance.

Getting prices right through tariff reform requires adoption of cost-recovery pricing and tying budgets to user charges. Getting prices right, in turn, was the result of good politics converging with good economics, which can result from a combination of factors such as fiscal problems, the political benefits of substantially reducing the cost of water supply, improving service duration and coverage, the expressed willingness to pay by the urban poor, and the ability of politicians to enter into credible political bargains because of donor support. Public entrepreneurship and leadership could play a particularly important role in facilitating the convergence process.

Getting governance right, on the other hand, requires three things: (1) autonomy as a public corporation to enable the utility to operate more flexibly; (2) operation of the utility based on commercial principles including in critical areas such as finance and personnel, accounting, and bud-

getting, particularly application of user charges; (3) implementation of performance measurement and management system through *ex-ante* and *ex-post* alignment of performance and social contracts aided by an IT-driven operating system and reinforced by progressive human resource management practices. Donors can also play an important role in getting prices and governance right and ensuring the continuity of reforms by aligning their financing, technical assistance, and monitoring functions to these objectives.

More case studies on urban water reform would have to be done to enable more comparative analyses to answer an important question of how to provide one billion people in developing countries better access to potable water. The use of diagnostic approach based on analytic case studies as illustrated in this article is widely supported by an increasing number of scholars of political economy, governance, and institutional economics, for instance, by Grindle (2004), Ostrom (2005), Rodrik (2006) and Shirley (2006).

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