

Doing the urban water supply job: from privatization to remunicipalisation and the third pillar of the Performance Based Service Contracts

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Abstract: Privatization (including Public Private Partnerships – PPPs) of water and sanitation services experienced a huge increase during the 1990s as the public sector was not efficient and could not finance the necessary infrastructures. The results of this policy were catastrophic for both the public sector and the consumers. Although there are successful privatization examples in the world there are cases where the water prices increased significantly, people that lost their jobs, the environment polluted and corruption phenomena recorded. A big wave of remunicipalisation followed returning the water services provision from the private sector to the public one. Some of the most well-known cases are reviewed in this paper (Pigeon et al., 2012). But what the water utilities should do when they don't have the resources (money; know-how; expertise) to solve their problems? The Performance Based Service Contracts (PBSC) could be the answer when certain conditions apply. The basic prerequisites include the negotiations on equal terms, avoiding suffocation of any of the parties involved and the long-term deal. Above all the socially fair allocation of water cost is the basis to arrive to successful PBSCs. The paper proposes a model allocating the full cost of the water volume entering the network to the consumers and the water utility taking into consideration the water losses.

Key words: privatization; remunicipalisation; performance-based contracts; water supply.

1. INTRODUCTION

A debate exists for many years regarding the privatization of water services and many researchers favour the one or the other option (private or public water services provision). Privatization of water services experienced a big boost in the 1990s as the public sector is considered to be inefficient and cannot finance public infrastructure projects. The facts show that according to the recent Global Water Supply and Sanitation Assessment 1.1 billion poor people still lack reasonable access to improved drinking water supplies and 2.4 billion lack reasonable access to improved sanitation (WHO & Unicef, 2000). At the same time population and economic growth scenarios foresee that by 2030 the global water requirements would grow from 4,500 billion m³ today to 6,900 billion m³ (2030 Water Resources Group, 2009; Farmer et al., 2012). In this context many policy makers, researchers and other stakeholders consider that privatization is the solution to these problems. There are several reasons reinforcing their view:

1. It is a common fact that the population growth increases the service needs and the pressure set in the water networks. People demand for better services as a result of their way of living improvement. Water networks age and infrastructure works are needed. Thus, the most important reason favouring privatization is the demand for investments.
2. The public sector suffers from bureaucracy and corruption practices preventing the direct and fast production of the expected result, even if financing is not the problem.
3. Water utilities face many problems in day-to-day management and they do not have the time and/or the expertise to design new strategies for the future.
4. The personnel renewal rate is very slow and young specialized people do not join the utilities.
5. Most of the times the private sector can provide the same work cheaper, or a better result with the same budget.
6. Finally, the private contractor is specialized and can provide better services quickly.

On the other hand there are many researchers arguing that water cannot be considered as an economic good since it is connected to the human life and it is considered as a human right. Several privatization experiences have been recorded until today, both successful and unsuccessful ones. The new trend recorded the last ten years is called “remunicipalisation” denoting the return of water services provision from private companies to the public sector. The paper tries to review all these cases and consider another successful pillar: the performance-based contracts (PBSCs). The main prerequisite to any financial tool is the principle of the socially fair water cost allocation.

2. WATER SUPPLY SERVICES PRIVATIZATION

The term “privatization” is widely used. Most of the times it denotes the private sector involvement and can take several forms. Public-Private Partnerships (PPPs) are also a form of privatization, referring to contractual arrangements in which private companies assume greater responsibility and/or risk, especially through concession contracts (Crosslin, 1991).

The PPP types vary according to the size of risk included and its distribution among the partners; the required degree of each partner's specialization in contracts negotiations; the potential consequences for taxpayers; and finally the financing details (Kanakoudis & Tsitsifli, 2012). There are three basic PPP types: Concession, Joint Venture and Hybrid. Their common contents are the long-term legitimate relationship, the full or partial private financing in complex patterns and the presupposition that the main role of the private sector partner is to assure the project financial parameters. The public sector's competence is to assure the public interest determining goals quality and pricing policy, the risk transfer from the public to the private sector partners, combining their best capabilities for mutual benefit (Kanakoudis & Tsitsifli, 2012).

In Concession, the private partner is in charge of the project exploitation, maintenance and management for the whole concession period; is responsible for every construction/renovation/expansion; is self-financed during the concession period; is responsible for the provided services; determines their value and directly collects the money from the services users; and finally may initially pay an amount of money to the state. On the other hand the public sector is responsible for the configuration of the performance criteria, reassures that the above criteria are respected by the private sector, sets the prices and the quality and finally holds the ownership of the public assets. The concession period (which lasts more than 25 years) is based on the contract requirements. Concession is the most common PPP type/category in everyday life. In Joint Venture, the Partners are equally responsible and owners of the provided services/projects. Joint Venture represents an alternative to the pure privatisation, as private sector participation is less than 100%. The Partners form a new company or they are co-owners of an existing one that is independent from the public sector. The public sector represents the final regulator and an active shareholder of the company, can participate in the profits distribution of the project, and reassures the greater political efforts acceptance, while the private sector often takes the responsibility to deal with everyday project management. The Hybrid PPP forms (B.O.T., O.M., O.M.M.) are following.

During the last 25 years of PPP projects implementation experience on international level, various PPP forms have been developed. Their differences mainly derive from the “job allocation” between the public and the private partner, the distribution of the risks among them and who finally owns the property of the assets-service (Table 1, Table 2 and Table 3). The most common PPP forms are the B.O.T. (Build-Operate-Transfer), the B.O.O.T. (Build-Own-Operate-Transfer), the D.B.F.O. (Design-Build-Finance-Operate), the B.T.O. (Build-Transfer-Operate), the B.O.O. (Build-Own-Operate), the B.B.O. (Buy-Build-Operate), the L.R.O. (Lease-Rehabilitate-Operate), the B.O.L.T. (Build-Own-Lease-Transfer) the O.M. (Operation & Maintenance Private Services Contract) and the O.M.M. (Operation, Maintenance & Management Private Services Contract). In B.O.T.s (or B.O.O.T.) the project belongs to the public (or the private), the private partner builds, maintains and operates the project, there is a predefined contract period by the end of which the private partner transfers the project operation (and the ownership) to the state and finally the private partner is responsible for a part or the whole of the project financing. In D.B.F.O.s the private

partner designs, builds, maintains and operates the project, while is responsible for the whole of the project financing, there is a predefined management period, the state pays the private partner for the provided services during the contracting period and finally the private partner transfers the ownership to the state (this is the common contracting model for infrastructure and public assets development, when the commercial exploitation potentials are initially unknown and limited). In B.T.O.s the private partner designs, builds, maintains and operates the project, is responsible for the whole of the project financing, after the project completion, its ownership is transferred to the state and finally there is a predefined leasing period. In B.O.O.s the project is of social character and belongs to public entities while the private partner designs, builds, maintains and operates the project and is responsible for the whole of the project financing. Finally, there is a predefined long operation period. In B.B.O.s the state sells existing public utilities to the private partner, aiming at further investments (renovation, expanding) on these utilities, the private partner is responsible for the whole of the project financing and operates the project in the form of a state supervised profit-making public utility. In L.R.O.s the state owns the project, while the private partner rents existing utilities from the state, is responsible for the whole of the project financing, is responsible for the project operation and exploitation. Finally, there is a predefined leasing period. In B.O.L.T.s the private partner is responsible for project financing, rents the project from the state by leasing, while the state regularly pays the private sector in order the project ownership to be gradually transferred to the state, as at the end of the contracting period the state owns the project or it buys it in a predefined (in the leasing contract) price. Finally, during the leasing period the public or the private partner is in charge of the project operation. In O.M.s the state owns the project, assigns the private partner to operate and maintain the project but holds the ownership and the management. Finally, in O.M.M.s there is an integrated services contract, where the state owns the project and assigns the private partner to operate, maintain and manage the project while holds the ownership.

While there are enough differences among the various PPP forms, all of them maintain a least common content with the following elements: (a) long term relationship; (b) total or partial private financing, often with complex forms; (c) private sector primary role ensuring the economic parameters of the project in contrast to the public sector role ensuring the public interest (determining the goals, the quality and the pricing policy); (d) risks allocation between the public and the private sector, to whom the management of precarious factors is being moved to. In the traditional “public projects” the management of these factors burdens the public sector (Kanakoudis et. al, 2005 a,b,c).

It is common knowledge that water consumption increases with income level (Figure 1) (Prasad, 2006). A survey in developed and developing countries revealed that poor people pay a higher part of their income for water services (Table 5 – Prasad, 2006; Smets, 2004). It is accepted as international practice that the amount of money a household should pay for water must not exceed 5% of its income (Prasad, 2006). Water pricing becomes a significant issue and the design of water bills should take into consideration several issues.

Table 1. Allocation of key responsibilities under the various options for PPPs (UN, 2005)

Choice	Financing	Operation - Maintenance	Commercial risk	Property owner	Duration (years)
Service Contract	Public	Public & Private	Public	Public	1- 2
Management Contract	Public	Private	Public	Public	3 - 5
Concession	Private	Private	Private	Public	25 – 30
PFI/DBFO	Private	Private	Public & Private	Public & Private	20 – 30
Privatisation	Private	Private	Private	Public & Private	-

Table 2. Roles' allocation between Public & Private partners (Kanakoudis et al., 2005 a;b)

PROJECT PHASES	TRADITIONAL WAY	PPPs
Project planning and specifications' determination	Public	Public
Preparation of the necessary studies	Public	Private
Construction	Public	Private
Financing	Public	Private
Operation	Public	Private
Provided services' responsibility	Public	Private in the Public

Table 3. Risks and their distribution (Kanakoudis et al., 2005 a;b)

Base risks	Background risks	Expenditure risks (construction, maintenance, operation)	Implementation methods	Risk transfer degree (Public → Private)
Technical Economical Financial Management Income	Political, , legal, regulatory, monetary, macro-economic, force majored	preparation, social acceptance, planning, construction, repair, replacement, management, technical operational risks	Traditional Outsourcing PPP Privatisation	Min ↓ Max

Table 4. Allocation of key responsibilities for PPPs' options (Stottman, 2000; Budds & McGranahan, 2003)

	Service contract	Management contract	Lease / affermage	Concession	BOT-type	Divesture
Asset ownership	Public	Public	Public	Public	Private/ public	Private
Capital investment	Public	Public	Public	Private	Private	Private
Commercial risk	Public	Public	Shared	Private	Private	Private
Operations/ maintenance	Private/ public	Private	Private	Private	Private	Private
Contract duration	1-2 years	3-5 years	8-15 years	25-30 years	20-30 years	Indefinite

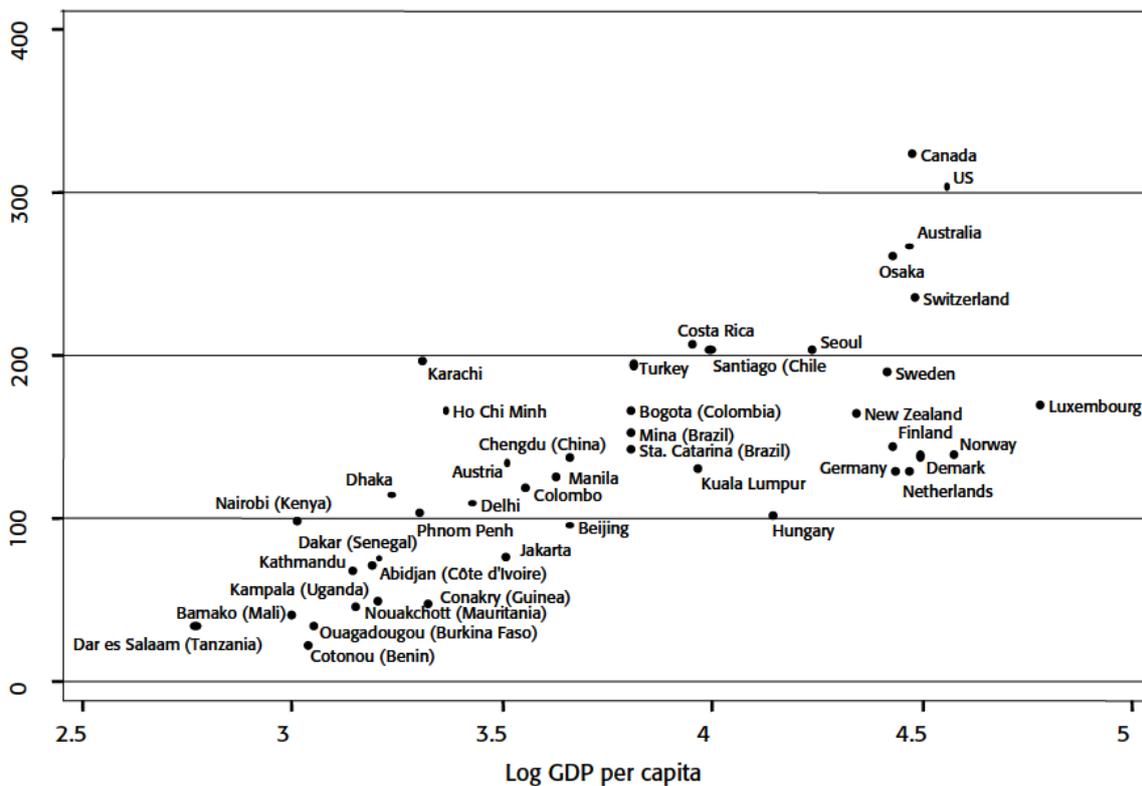


Figure 1. Water consumption and income levels (Prasad, 2006).

Table 5. The percentage of income households pay for water (Prasad, 2006; Smets, 2004)

Countries / part of the population	% of income households pay for water	Countries / part of the population	% of income households pay for water
Developed countries	0.5-2%	The Netherlands	1.3%
Germany (total)	1.3%	Mexico (the rich)	0.8%
Germany (Minimum salary)	3.4-5.2%	Mexico (the poorest)	5.2%
France (total)	1.2%	UK (the poorest 1% of households)	10%
France (Minimum salary)	3.4-5.2%		

3. EXPERIENCES AND LESSONS LEARNT

Provision of water services was initiated by private companies in most developed countries in Europe (Prasad, 2006). According to Prasad (2006) over 90% of the world's population is served by

public water utilities, while there is a 3-5% of the world's population being served by the private sector (OECD, 2003; Rodriguez, 2004; Budds & McGranahan 2003). When water services are provided by the public sector the main funding sources include Taxation, borrowing and user fees. The private sector investment in infrastructure for water and wastewater noted its highest values in the 1990s (Figure 2) ranging in 2012 in about US \$4 billion (World Bank data: <http://ppi.worldbank.org>). There are only a few international private companies dominating the global market (Suez, Vivendi, SUAR, RWE-Thames) (Prasad, 2006).

Has privatization succeeded? It is common knowledge that it has not achieved the expected benefits (Budds & McGranahan, 2003). Only a few privatization attempts succeeded while most of them failed to achieve the expected results (Prasad, 2006). The main problems caused are corruption phenomena and bribery (Davis, 2004; Prasad, 2006), water price increases, environmental pollution and many jobs lost (Prasad, 2006). Additionally in some cases the private companies did not manage to fulfil their contractual obligations (Prasad, 2006). In other cases the privatization projects were cancelled (10 projects in 10 years 1991-2001 according to World Bank) (Harris, 2003). According to Harris (2003) the main reasons are the conflicts caused due to high prices and the phenomena of non-payment.

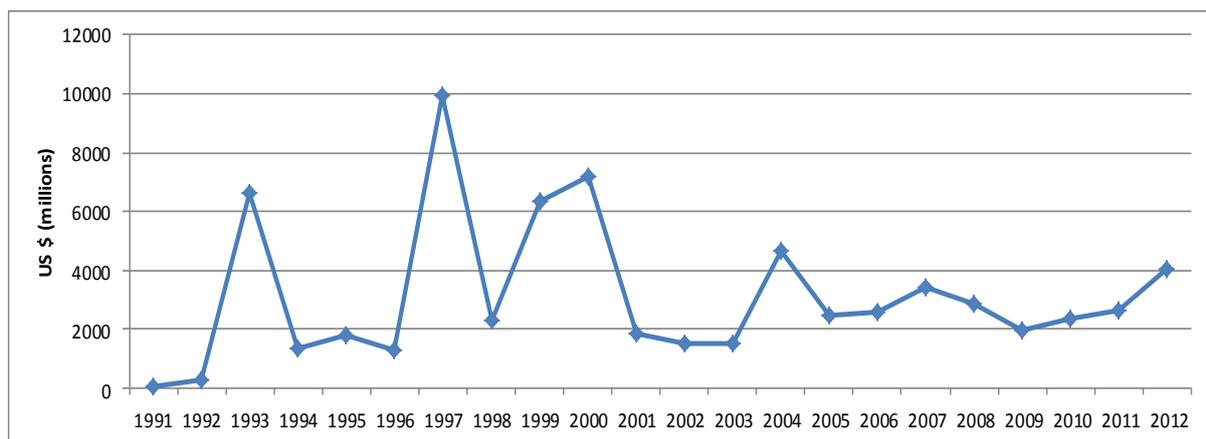


Figure 2. Private projects' investments for water and sanitation (1991-2012) (Source: <http://ppi.worldbank.org>).

3.1 Successful privatization cases

The results of privatization are mixed according to Prasad (2006) and Jerome (2004). Successful privatization attempts include the case of Argentina, where according to Benitez et al. (2003) and Galiani et al. (2005) privatization provided improvements in access and coverage, efficiency and quality. In this case the poor benefited the most. Positive outcomes include the reliability and quality of services improvements (Jerome, 2004). In developing countries, access in water has been achieved. Estimations showed that almost 600,000 connections have been added within 15 years (World Development Movement, 2006; Prasad, 2006). However, only about 250,000 connections have been provided by the private sector. World Bank research shows several cases where more people received basic services following private participation in water and sanitation provision in developing countries (Harris, 2003). One of the successful PPP cases is the Sao Paulo one where the water utility has undergone a big reform using outsourcing. In 1995 positive results were reported such as the increase in water supply coverage (from 84% to 91%) and the reduction of operating costs by 45% (Lobina & Hall, 2001). Another successful example of management delegation of water supply, sanitation and electricity to the private sector is the case of Casablanca, Morocco (Jamati, 2003). Positive results reported (Jamati, 2003) consist of better customer service, an increase of more than 20% of the population served with water and electricity, and a saving of 24 million m³ of water per year (which corresponds to the water supply of a city with a population of 700,000 inhabitants). Lee (2009) states that private water utilities provided water services to 38% of

the total population in China in 2008. Researchers argue whether the ownership and the management should be under private companies' control. A successful model is the Nordic countries one, where the ownership is maintained by the public sector and the municipalities run the utilities (Seppala et al., 2001). In Finland PPPs are formed as follows: municipal water utilities manage the operations and the private sector provides support services (Seppala et al., 2001). Seppala et al. (2001) conclude that it is public sector's responsibility to provide water services and that both public and private sector should have distinct roles in the partnership. The public sector should maintain a strong political commitment to the service and integrate environmental considerations in the planning and decision-making process. Private partners should provide skills, management expertise and financing for utility investment needs. It is not important the service being public or private, but it is important the utility to fulfil its objectives (Seppala et al., 2001).

3.2 Failed privatization cases

On the other hand privatization causes job losses, income decrease (Baylis, 2002) and reduced access to services (Bayliss, 2002; Birdsall & Nellis, 2003). Inequality and prices are increased (Birdsall & Nellis, 2003; Jerome 2004), while there is no social justice (Mulreany et al., 2006). Lee (2009) identified a number of risks in the Chinese water market: socio-political, institutional and regulatory, revenue and foreign exchange, and project construction and operation risks. Prasad (2006) argues that there is no guarantee that the private sector participation in the provision of water services will benefit the poor. Al-Jayyousi (2003) sets another very important issue: most of the water utilities ignore the efficiency level of their water networks being indifferent in the amount of water volumes lost. The unaccounted-for-water (UFW) index is used to measure the efficiency level of a water supply network. Al-Jayyousi (2003) argues that the UFW index values in public utilities are low (Singapore case: UFW=6% in 1996), where UFW values in private utilities are high (UK-private utilities: UFW up to 38% (Turton, 1998)). In general Al-Jayyousi (2003) concludes that ownership status does not matter for the provision of good water services to the people. The controversial involvement of the private sector in providing water, sanitation and electricity has been mentioned by Farlam (2005). There are examples of public water utilities that became inefficient and the consumers had to pay high prices for low quality services (Cosgrove & Rijsberman, 2000).

3.3 Water provision services in Europe

In Europe the provision of water services varies from exclusively private companies to exclusively public utilities. In England and Wales the water sector is private since 1989. According to Mahajeri et al. (2003) and Kolokytha & Tsountas (2008) in Austria, Denmark and Sweden PPPs with no profit motives provide water services, while in other European countries (France, Belgium, Finland, Spain, Germany, Italy) a mixed scheme of PPPs is the provider (Table 7). In Greece and Netherlands the water services are provided by public utilities.

4. REMUNICIPALISATION: WATER SERVICES BACK TO THE MUNICIPALITIES

After the big boom of privatization of water services in the 1990s, the phenomenon of remunicipalisation appeared in many parts of the world. Remunicipalisation is defined as "the transfer of water services from private to public sector (municipal authorities)" (Pigeon et al., 2012). Many examples around the world show that private sector has failed to provide water services of good quality and in the right price to the citizens as private water companies are mainly interested in profits. This is why many cities renegotiated their contracts with the private companies or did not renew them at all, returning back to the municipal provision of water services. A study

conducted from Pigeon et al. (2012) showed that municipal utilities offer more equitable, more transparent and more efficient services than the private companies. Additionally they provide a higher quality of services and with better long-term sustainability. Financial benefits are also included as in the case of Paris where €35 million are saved in the first year, and as in the case of Hamilton where C\$6 million are saved in the first three years. Other benefits include efficiency gains and short-term savings that are used for long-term investments in infrastructure.

Table 7. Urban Water management operational status (Kolokytha & Tsountas, 2008)

Countries	Private companies	Public & private companies	Public & decentralised local management	Public	Countries	Private companies	Public & private companies	Public & decentralised local management	Public
Austria		■			Estonia				■
Finland			■		Latvia				■
Belgium		■			Malta			■	
Germany			■		Spain			■	
Denmark			■		Italy			■	
UK	■				Cyprus				■
Luxembourg		■			France			■	
Holland				■	Greece				■
Sweden			■	■	Portugal		■		
Poland				■					

The authors try to review some of the most important remunicipalisation cases based on the book edited by Pigeon et al. (2012). One of the most well-known remunicipalisation cases is that of Paris, France. Pigeon et al. (2012) reported that since 1985 Veolia and Suez provided water services in Paris, while Veolia was in charge of billing the system since 1860. In 2010 the municipality of Paris did not renew the contract with the private companies. The water prices increased by 165% during 1985-2009 while water leaks were only reduced after negotiations. Additionally the city lost control of the system's technical knowledge. The transition from the private scheme to the municipal one was not easy as Pigeon et al. (2012) reported. The main problems included the financial management and the information systems where the boundaries are not clear. During the first year of the remunicipalisation the utility announced that 35 million euros were saved and in January 2011 the water prices reduced by 8% ($1.0464\text{€}/\text{m}^3 \rightarrow 0.9627\text{€}/\text{m}^3$). The utility promised that the water prices will not be increased more than inflation although the utility's savings will be reduced because of the reduced water consumption (Pigeon et al., 2012).

Another remunicipalisation case is that of the city Dar es Salaam in Tanzania. In 2003 water and sewerage systems became private (Pigeon et al., 2012; Castro, 2008) under great secrecy and international pressure. The company running water and sewerage was the result of a joint venture of Biwater (UK), Gauff (Germany) and a local private firm that joint the venture later (Pigeon et al., 2012). Reports after two years mentioned that the situation was worse than before the privatization. This is why the public operator DAWASCO (Dar es Salaam Water and Sewerage Corporation) took over in 2005. The private scheme failed mainly because of the private operator's poor preparation, difficult relationships with staff, and shareholder in-fighting (Pigeon et al., 2012). The positive results recorded after the remunicipalisation are the reduction of water losses, the increase in water supply and the improvement in water quality to comply with the World Health Organization standards (Pigeon et al., 2012). Many problems exist as well. DAWASCO faces many technical and economic problems (mainly pricing issues) mainly due to the fact that public entities do not pay their water bills (25% of the operational costs of the company). Corruption practices continue to exist due to the big inequalities between the personnel's top and the lower hierarchical levels (Pigeon et al., 2012). The remunicipalisation case of Dar es Salaam was not a matter of choice but a need imposed by the existing situation.

The case of Buenos Aires in Argentina is also reported as a remunicipalisation case by Pigeon et al. (2012). One of the greatest private concessions was the provision of water and wastewater services in the metropolitan area of Buenos Aires in 1993 (Pigeon et al., 2012). Almost nine million people were served by the private consortium headed by Suez (Pigeon et al., 2012). The

government ignored the fact that the company did not fulfil its contractual obligations, but in 2006 the government proceeded in the concession cancellation, returning the provision of water and sanitation services to the public. At the beginning of the privatization period the main characteristics were the price increases, the contracts modifications and the failure of the company to comply with its obligations regarding the environment protection, the network extension targets and the quality of services (Pigeon et al., 2012). In the meantime Argentina went through a bankruptcy in 2001 facing many financial problems including the currency rate fluctuations. This situation caused the delay of negotiations with the private company. The company failed to accomplish the targets set. The water service coverage target was set from 70 to 88% in 2002 but the company arrived only to a service coverage of 79% according to Pigeon et al. (2012). The sanitation service coverage respectively was set from 58 to 74% but the company arrived only to 63% (Pigeon et al., 2012). Additionally the environmental goals were not met. Only 7% of the sewerage was treated and the rest was spilled in the river. The final outcome was that in 2002 about 800.000 people has no access to water and more than a million people had no access to sanitation services (Pigeon et al., 2012). Finally the contract was cancelled and a new scheme “Aysa” (Agua y Saneamientos Argentinos) took over. 90% of the company’s shares belonged to the government and 10% to the workers union. Although the financial record of Aysa was not very good, it operated on a human-based strategy being more efficient in the social level.

A successful and promising remunicipalisation case is that of Hamilton, Canada (Pigeon et al., 2012). As the local municipality faced many financial problems and could not implement any investments, a 10-year PPP contract was signed between the municipality and a private corporation in 1994. The private corporation was sold twice and in 2002 the new owner was Thames Water. As the municipality was negotiating a new contract with higher social orientation and the people were pressing for better contract terms in 2004, all offers withdrawn and finally the water services returned to the municipality (Pigeon et al., 2012). The privatization results included environmental issues as the port was polluted and not cleaned appropriately and the wastewater network leaks increase; operational issues as the operation units and the personnel reduced; and financial ones as the company profit went up to \$4.8million per year (Pigeon et al., 2012). Generally as the company ownership was changing often and finally a multinational company took over, social reactions were raised. After the remunicipalisation process the first results include: the operating cost reduction; the employment of new personnel; significant financial benefits; the continuous improvement of saving and cost effectiveness; 50% river pollution reduction; gradual upgrade of water and sewerage infrastructure; and the establishment of a research centre for the technology development of wastewater treatment (Pigeon et al., 2012).

One of the most well-known privatization cases is that of Bolivia as it resulted in very severe social uprising (Castro, 2008; Apostolopoulos, 2013; Nickson & Vargas, 2002). In 1982 the country follows a new neoliberal plan to get loans from the World Bank, accepting to privatize all the public utilities (transport, phone and electricity services, national refineries, etc.). To renew the loan agreements both World Bank and World Development Bank set as a prerequisite the privatization of water services in 1997. A Suez subsidiary company signed a concession to provide water and sanitation services to the capital city serving 1.3 million people (Apostolopoulos, 2013; Nickson & Vargas, 2002). Another concession contract is signed with an international consortium headed by the American Bechtel to provide water and sanitation services to the city Cochabamba serving 600.000 people (Apostolopoulos, 2013; Nickson & Vargas, 2002). This case is particular as the public utility providing water services before the privatization was accused for corruption and inequality practices. The rich areas were served at about 90% while the poor suburban areas were served at only 50%. Lack of water services and the government negligence led the people to organize among themselves to solve their problems, establishing independent water supply partnerships (cooperativas). The cooperation culture was very strong as 150 partnerships existed in the country (Apostolopoulos, 2013; Nickson & Vargas, 2002). A law in 1999 (no. 2029) changed the whole situation. This law provided the exclusive use of water resources to the private company and abolished all the independent means of water supply including the partnerships. Additionally

the private company proceeded in price increases from 60 to 200% even if the contract allowed only an increase up to 35%. The water price increase was too high representing almost 20% of the income of a poor worker (Apostolopoulos, 2013; Nickson & Vargas, 2002). This situation led the people to the known “water war” (La Guerra del agua). A general strike was organized and the city centre was closed for 4 days in February 2000 by a wave of social rage (Apostolopoulos, 2013; Nickson & Vargas, 2002). At the beginning the government used violence but then committed to freeze water prices and renegotiate the agreement. It took three months and a young person’s life for the government to cancel the contract with the private company (Apostolopoulos, 2013; Nickson & Vargas, 2002). The positive impact of this “water war” was the fortification of communal and individual water rights, the public consultation for the water pricing and the fact the water was recognised as social good. The case of Volivía is one of the most well-known water privatization cases causing the social awareness’ global increase regarding the results of the water privatization (Apostolopoulos, 2013; Nickson & Vargas, 2002; Castro, 2008).

From the review all these different privatization cases (based mostly on the book edited by Pigeon et al., 2012) some final conclusions regarding the remunicipalisation can be drawn. The government or the municipalities chose the water privatization policies mainly because the public sector was not efficient. Corruption practices, lack of money to finance infrastructure works or even the imposition of private companies from financing organisations to provide water and sanitation services are the main reasons many cities privatized their water services. During the privatization period the following problems arose: enormous profit margins; unequal access to water; water prices increase; scandalous concession terms; non-compliance to the contracts terms; environmental risks; personnel layoffs; and loss of expertise (Sepentzi, 2013). Sooner or later many privatization cases returned to the former regime: the provision of water and/or sanitation services became municipal. The return was marked by many problems, such as significant economic claims from the private company, unclear ownership limits of technological systems and priority to revenue collection even when many people do not have access to water. Remunicipalisation is a difficult task but it can be successful under certain conditions, such as (Sepentzi, 2013): (a) the citizens should recover their trust to the public and work together; (b) knowhow transfer from other cities where remunicipalisation was successful; (c) cohesive international partnerships and cooperation with scientific entities; (d) strong political leadership; and (e) establishment of a public entity that will manage a sustainable water supply system operating with transparency and responsibility.

5. PERFORMANCE-BASED CONTRACTS: ARE THEY THE SOLUTION?

It is obvious that both privatization and PPPs cause many problems based on previous experience. It is very important then to find a financing tool for the public companies that cannot finance infrastructure or do not have the know-how and the expertise to solve specific problems. The solution seems to be Performance-Based Service Contracts (PBSCs), a financing tool already implemented in many areas around the globe. The PBSC is a new and flexible approach where a private company is contracted to implement a specific program and paid to deliver services and provide incentives in order to meet operational performance measures (Liemberger et al., 2007). PBSC can provide an enabling environment and incentives in order to address specific problems, with immediate operational and financial benefits, when there is proper balance of government oversight and private sector initiative. On the other hand it is not a substitute for carrying out the broader institutional reforms necessary to promote the sustainability of the sector. The specific problems that could be addresses through a PBSC are operational problems such as Non-Revenue Water (NRW) reduction, problems in the billing chain (meters reading, bills collection) etc. The applicability of PBSC to a program depends on the level of risk that the private sector is willing or able to take. Although PBSC is a relatively new concept for the water sector in the developing world, it is increasingly contemplated in other sectors as a way to improve efficiency and accountability of contracts with private providers (Kanakoudis & Tsitsifli, 2012). The key issues

considered in PBSCs are contract design, management practices, outsourcing options, technical assistance, risk management, and other lessons learnt (Liemberger et al., 2007).

5.1 Successful PBSC cases

One of the problems water utilities face is the big amounts of NRW. NRW is the amount of water not bringing revenues to the water utility and includes all water losses (both apparent/commercial and real/physical), the water volume the utility provides for free (e.g. government buildings water use, public benefit entities (e.g. hospitals, schools) etc. and water volume billed but not paid by the customers. Eliminating all NRW in a water utility does not seem feasible. To reduce by half the current level of losses in developing countries is a realistic target. Well-designed NRW reduction programs will give good paybacks, but still each opportunity has to be assessed in terms of its particular cost-benefit ratio. Successful project implementation requires two essential and related elements: preparing good contracts and setting realistic baselines.

Liemberger et al. (2007) presented four significant and diverse projects where PBSC took place. Six key factors were used to evaluate these contracts, namely: scoping (the role of the private contractor); incentives; flexibility (to what extent the contract allows the private sector to be creative in the design and implementation of the NRW reduction activities); performance indicators and measurement; procurement / selection (of the private contractor); and sustainability. The case studies showed various levels of quality in contract preparation, baseline setting, and -as a consequence- project effectiveness. Contract design must be clear about what the utility expects from the contractor and how it envisions success. All NRW reduction contracts should include basic guidelines concerning risk transfer, an indicator for leakage, and provisions for effective oversight by utility managers. Contracts should set viable targets and allow for flexibility in responding to challenges and opportunities. To be successful, however, the study shows that good preparatory work is required. The starting point is to develop a strategy based on a sound baseline assessment of the sources and magnitudes of the NRW. Such a strategy needs to consider both the short and long terms (for example, the achievement of short-term reductions versus how to maintain lower levels of NRW over the long term). It is during strategy development that opportunities for teaming with the private sector can be identified. Once those opportunities are known, policy makers must create an incentive framework that will encourage the private sector to deliver in the most cost-effective manner, allocating risk appropriately between the parties (Liemberger et al., 2007).

McKenzie et al. (2006; 2007) presented a small scale performance based PPP that took place in South Africa. The problem was excessive leakage in the distribution network having as a consequence huge amounts of water being lost. From the study of this project it is obvious that PPPs can be small scale projects and need not be the typical mega-projects normally associated with this type of venture. Funding for such projects remains a key constraint and one that has not been addressed. Very few consultants will be willing or able to take on the financial risk for such projects. Those who are able to do so, may only be able to find appropriate security for one such project and may have to wait until the first project has been completed before tackling another – which may result in delays to future projects simply because the consultant cannot source appropriate funding. The red tape associated with the funding of such projects is horrendous and is delaying new projects by many months, if not years. Even with a normal bank loan, the funding for the project took more than five months to secure. Risk-reward contracts need not be 50/50 -type projects- this one was an 86/14 project in favour of the public entity. Without such a weighted distribution of the savings, the local municipality might not have considered the project to be in the interests of its customers. The selection of the split in savings is a critical element of any risk-reward contract, and requires very careful planning and preliminary investigations. Both parties must be satisfied with the outcome for the project to be successful. The inclusion of a cap on savings is an essential element of any risk-reward contract to provide the client with the security that the consultant will not be overpaid for its services. The use of an independent auditor is a key element in any risk-reward contract. To date there have been no disputes or concerns from either

side and the independent auditor has been a critical component in the success of the project. By introducing a five-year operation and maintenance period, the client effectively ensures that the savings will be maintained. The consultant must ensure that the savings continue throughout the contract period or it will not be paid. In effect, the client is paying around 10% per year of the savings to ensure that they are sustained, and the other 90% (plus) continues to accrue to the municipality. After the five-year period has elapsed, it is likely that a new contract will be awarded for another few years – the savings are so large that it would be foolish to risk losing 90% in an attempt to save 10%.

The greatest risk to the consultant is not necessarily that the savings are not achieved, but rather that the client does not pay the agreed savings. In the case of this project, the support and honesty of the client has been the key to the success of the project. The project is the first phase of a long-term plan to reduce wastage to normal levels and improve the overall level of service to the community. One of the unexpected benefits from the project has been the identification and repair of many water network problems that had not previously been identified. As these problems have been identified and addressed, the water supply system is operating more efficiently and many residents now experience higher pressures and a more reliable supply. This is an additional and unexpected benefit.

Another successful PBSC case is that of Burkina Faso in Sub-Saharan Africa (Marin et al., 2010). Urban water supply is provided by a state-owned utility, ONEA. Marin et al. (2010) report, that more than one third of the urban population had not access to water in the 1990s. Although the utility transformed to a limited liability company (100% state-owned governed by private law) and the operational performance was very good (16% NRW; water provision 21hrs per day), there were many unresolved problems. The country was facing severe water scarcity, urban water coverage through connections was only 32%, high water tariffs were imposed and only 85% of the water bills were collected (Marin et al., 2010). The utility had a very difficult task to handle: it should finance a very costly infrastructure (dam) without increasing water tariffs, by taking advantage of operational efficiency (including collection of water bills) and exceeding the customer base. As the experiences of private companies' involvement were very disappointing, the utility decided to proceed to a PBSC with the assistance of the World Bank. Marin et al. (2010) report that the contract included the management of the commercial and financial departments at a fixed monthly fee plus bonus depending on the contractual targets (a penalty was also involved). The consultant received additionally a fixed price for every output. An independent auditor was appointed to monitor the progress. International donors supported the PBSC. During the five years of the PBSC (2001-2006) significant benefits were recorded (Marin et al., 2010): the network length was doubled; the service connections were doubled; NRW remained stable despite the increase of operating pressure; meter readings and collections of bills were improved; and finally the revenues increased by 50%.

5.2 Problems recorded

The main problem faced at PBSCs has to do with funding small-scale projects (McKenzie et al., 2007). Few private partners will be willing or able to take on the financial risk involved. Those who are able to do so, may only be willing to find proper security for the project and may have to wait until the first project is fully closed before tackling another. This may result in delays to future projects simply because necessary funds are not available. The problem associated with the funding of such projects is delaying new ones by many months, if not years. Even with a normal bank loan, the funding for the project may take enough time to secure. Another risk to the consultant is not necessarily that the savings are not achieved, but rather that the client does not pay them.

6. ABOVE ALL THE SOCIALLY FAIR ALLOCATION OF WATER COST

Based on the analysis of problematic privatization practices (including PPPs) and the better

results achieved from the PBSCs, some key points need to be stressed out. Public water utilities can do their job very well and sometimes they are very well aware of their networks. What they don't know is the performance level of their networks as they don't have the time and/or the knowledge to assess it. On the other hand the private sector is capable and has the expertise to provide the right solutions to the problems. Thus the design of the right contracts for both parties is very important (Fanner, 2008). The key points during the contract design are that negotiations have to be made in equal terms, one partner must not suffocate the other and the deal should be a long-term one. The negotiations phase is very crucial. One partner should be at the place of the other and understand that there is a common benefit for both parties. The cooperation should not be based on competitiveness but it should be considered as a win-win situation. The contract should include the correct performance incentives to achieve the objective desired by the utility (Fanner, 2008). Finally the ultimate goal is the socially fair allocation of water cost.

As water is considered to be a social good, important for human life and welfare, the division of the water cost to the users should be socially fair. The authors propose the following allocation of the water cost. The water volume entering the water supply network (System Input Volume – SIV) can be divided in two consumptions: water volume consumed by the users/customers (Q_{CUST}) and water volume “consumed” by the network (Q_{DN}):

$$Q_{CUST} = a * Q_{SIV} \quad (1)$$

$$Q_{DN} = (1-a) * Q_{SIV} \quad (2)$$

where a is the rate of water use by the consumers (users). According to the IWA International Standard Water Balance (Lambert et al., 1999) the water volume entering the system consists of the following kinds of consumption (in m^3):

$$Q_{SIV} = Q_{RW} + Q_{NRW} = Q_{RW} + Q_{UNB} + Q_{AL} + Q_{RL} \quad (3)$$

$$Q_{AL} = Q_{WTH} + Q_{MER} + Q_{RER} \quad (4)$$

$$Q_{RL} = Q_{CARL-EARL} + Q_{EARL-UARL} + Q_{UARL-UARL_{opt}} + Q_{UARL_{opt}} \quad (5)$$

where Q_{RW} is the revenue water (RW: water volume providing revenues to the utility); Q_{NRW} is the NRW; Q_{UNB} is the unbilled authorized consumption; Q_{AL} is the apparent losses; Q_{RL} is the real losses; Q_{WTH} is the unauthorized use (including water theft and illegal use); Q_{MER} is the metering errors; Q_{RER} is the reading errors; $Q_{CARL-EARL}$ is the difference between the Current Annual Real Losses (CARL) and the Economic Annual Real Losses (EARL); $Q_{EARL-UARL}$ is the difference between EARL and the Unavoidable Annual Real Losses (UARL); $Q_{UARL-UARL_{opt}}$ is the difference between UARL level and UARL optimum level; and $Q_{UARL_{opt}}$ is the UARL optimum level. $UARL_{opt}$ are the unavoidable real losses when the network is in its best operating condition (new and well-maintained), operating at the minimum acceptable pressure (Equation 5 related to Figure 3). $UARL_{opt}$ is part of UARL since these unavoidable real losses refer to the network at its current condition. The network's minimum technically achievable real losses are UARL but it is not economic to achieve them. The minimum economic level of real losses is EARL level. The empirical equation to calculate both UARL and $UARL_{opt}$ is the following (Lambert et al., 1999):

$$UARL = (18 * L_m + 0.8 * N_c + 25 * L_p) * P \quad (6)$$

where: L_m is the network's distribution pipes length (Km); N_c is the number of service connections; L_p is the network's service pipes length (Km); and P is the average operating pressure (m). When P takes its lowest acceptable value P_{opt} then $UARL_{opt}$ are calculated using equation (6).

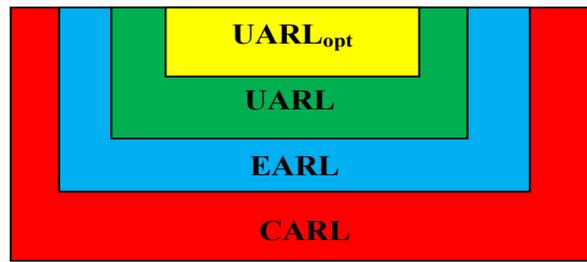


Figure 3. Current Annual Real Losses (CARL) components.

According to a socially fair water cost allocation the consumer must pay the following:

- His actual consumption (Q_{RW});
- The unbilled authorized consumption (Q_{UNB}) related to the pipes and tanks flushing, the water volume for firefighting, the water volume used for the parks, the municipal buildings' consumption, etc. as all these water uses aim at serving the consumer or at improving his quality of life;
- The metering errors (Q_{MER}) as these are actual consumption, not registered though, by the meters. In-house leakage not recorded is also included;
- The optimum level of UARL ($Q_{UARL_{opt}}$) as this level of real losses can be accepted to be the opportunity cost the consumer has to pay. Without the water distribution network the consumer would not have water in his tap;
- Finally the consumer has to pay a part (his part of consumption compared to the SIV which is the rate a) of the difference of EARL and UARL ($Q_{EARL-UARL}$). This water volume actually represents the water volume that technically can be recovered but it is not economically efficient as the water volume recovery cost is higher than its revenues if sold. This has to do with the cost of the techniques applied and with the water price. Thus all the consumers must pay proportionally the cost of this water volume ($Q_{EARL-UARL}$).

The water network being a consumer itself (actually the water utility) should pay the following:

- The water volume related to reading errors (Q_{RER}) since it is the utility's responsibility to avoid errors during the meters' readings and the transfer of the consumption to the users' bills;
- The unauthorised water volume used (Q_{WTH}) as it is the utility's responsibility to perform audits and locate water theft and illegal use phenomena and apply measures against them;
- The difference between CARL and UARL ($Q_{CARL-UARL}$) as a penalty to the utility for the bad infrastructure and for not taking measures for real losses reduction;
- The difference between UARL and $UARL_{opt}$ ($Q_{UARL-UARL_{opt}}$). The utility must take all the necessary measures (active leakage control, speed and quality of repairs, pressure reduction) to achieve the optimum level of UARL;
- Proportionally the part $(1-a)$ of the difference of EARL and UARL ($Q_{EARL-UARL}$).

Based on the above mentioned allocation of the water volume each user (consumers and the water utility) has to pay and taking into consideration that the optimum level of UARL is 5-10% of SIV, the final allocation of the water volume is presented (Table 8). It is necessary to know the water volumes allocated in the WB to calculate the coefficient a . The latter denotes the rate of SIV the consumers have to pay.

The example given above results in the value of $a=87.37\%$. This means that although the users consume only 60% (Q_{RW}) of the water entering the network they have to pay through their bills for 87% (Q_{CUST}) of the water entering the network. This can be achieved by changing the average water price and not by applying the socially unfair practices applied today. The water utilities try to recover 100% of the full water cost of the SIV through the water billed (Q_{RW}) to the consumers. They actually achieve that by increasing the average water price charged by 14.46% ($100/87.37$).

The proposed water cost allocation is more fair to the water utility too, compared to the one the consumers desire (60% of SIV). To conclude the procedure of fair water pricing, the design of a socially fair increasing block tariffs water bill remains.

Table 8. *The responsibility allocation of recovering the water cost (an example with real values)*

Water volumes per use in the water distribution network				Consumer	Utility
				$Q_{CUST} = a * Q_{SIV}$	$Q_{DN} = (1-a) * Q_{SIV}$
Q_{SIV} (100%)	Q_{RW} (60%)	Q_{RW} (60%)	Q_{RW} (60%)	100% * _(60%)	-
		Q_{UNB} (5%)	Q_{UNB} (5%)	100% * _(5%)	-
		Q_{WTH} (2%)	Q_{WTH} (2%)	-	100% * _(2%)
	Q_{NRW} (40%)	Q_{AL} (15%)	Q_{MER} (10%)	100% * _(10%)	-
			Q_{RER} (3%)	-	100% * _(3%)
		Q_{RL} (20%)	$Q_{CARL-EARL}$ (5%)	-	100% * _(5%)
			$Q_{EARL-UARL}$ (5%)	$a\%$ * _(5%)	$(1-a)\%$ * _(5%)
	$Q_{UARL-UARLopt}$ (2%)		-	100% * _(2%)	
			$Q_{UARLopt}$ (8%)	100% * _(8%)	-
					$Q_{CUST} = (0.83+0.05a)\% * Q_{SIV}$

7. CONCLUSIONS

It is common knowledge that the public water sector does not have the resources and/or the expertise to solve severe problems such as the infrastructure construction / maintenance, NRW reduction etc. This is why during the 1990s a big wave of private sector participation (including PPPs) took place in many parts of the world, especially in developing countries (but not only there). The results were catastrophic for the utilities as they lost any control in public assets and for the consumers as they did not enjoy better water services at reasonable prices. Although a number of significant challenges have been arisen for the successful private sector participation, its complexity and the costs involved should make the public sector treat such attempts carefully, recognizing that privatization and PPPs set many problems. Definitely the private sector participation is not panacea. A huge wave of remunicipalisation is described in this paper as a review of a study edited by Pigeon et al. (2012). The review of these cases shows that the modernization of the water sector must include the economic principles together with quality, environmental standards and the required performance. It is very important to take into consideration each city's specific characteristics and needs. This review showed that the results after remunicipalisation were better compared to the privatization ones.

As the EU is trying to open the water sector market to private companies, it must be noted that the water services priorities include the provisions of quality services, the equal access to water, the water supply network reliability and the protection of the environment. The EU adopted a proposal regarding a framework (COM(2011)897final) for the delegation of concession contracts including the provision of water services. This proposal caused many negative reactions and through the initiative of Right2water more than 1.8 million European citizens protested against the privatization of water services (www.right2water.eu).

Another financing tool that seems to bring the desired results to both the consumers and the utilities is the PBSC. PBSCs are not a panacea as well. These contracts must be designed carefully taking into consideration both parties' interest. The public sector must not suffocate the private partner and the latter must maintain the project's public acceptance. The negotiations' phase is crucial and must be on equal terms. The final outcome is that accepting that water is a social good, essential for life and welfare and that water resources are limited and in stress (Carter & Danert, 2003), water users should pay affordable prices for water services taking measures for water protection. The pricing policies must be based on the socially fair water cost allocation. The authors' proposal include an innovative socially fair water cost allocation by charging the consumers with only a part of the costs involved instead of 100% as utilities do today. A part of the water cost is charged to the water utility as it holds part of the responsibility. The innovation of this

proposal is the inclusion of the water losses' cost and the water cost allocation between the consumers and the water utility.

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