Determinants of the performance of public water services in Chile 1977-1999

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Abstract

The type of ownership of water utilities does not necessarily determine their performance. In Latin America there have been examples of good-performing and bad-performing water utilities, both publicly and privately owned. The water and sanitation services in Chile during the 1980's and 90's, especially in the capital city of Santiago, are an example of a good-performing, public utility system. Chile's utilities were characterized by high coverage and low tariffs. The following study examines the recent history of Chilean water services, the determinants of their success and gives some recommendations for other countries.

During the lifetime of EMOS (Empresa Metropolitana de Obras Sanitarias), the public company operating in Santiago from 1977 to 1999, two reforms took place in the Chilean water sector. In the first one, institutional responsibilities were united on the national level and a goal of auto-financing was introduced. EMOS was the first company to reach this goal. The second reform mainly separated the state's normative and operational functions by creating an independent regulation authority and transforming providers into public limited companies. In addition, a subsidy was introduced which made it easier to raise tariffs. A few years after the second reform, coverage of water supply in Santiago reached 100% and sanitation reached 97%.

This success was in part due to the regional organization of services which proved beneficial in several aspects, but mainly for taking advantage of economies of scale. The priority given to technical and economic criteria in the development of the sector, reducing political interference was also important. Further, this favoured the employment of good professionals and motivated managers and staff. Also, an early concern for public health influenced the attitudes on urban water supply and sanitation, and the coverage has increased all since the 1960's. The investments in the water sector as a share of total investments in public works, has increased between the different governments since the 1960's. Within EMOS, policies of outsourcing and cooperation with communities and municipalities have clearly led to better performance.

Looking at the example of Chile and EMOS, recommendations that can be made for other countries are: to carefully design the scope of the operational units, to minimize direct political influence in the management of services in favour of technical and economical criteria and to find inspiration in practices adopted by private sector companies to enhance efficiency, without forgetting the social responsibility of making drinking water and sanitation accessible for all.

1 Introduction

In Latin America and the Caribbean, like in the rest of the world, water and sanitation services have traditionally been provided by public authorities. Great efforts were made by many governments in the 1960's and 70's to extend service coverage. At the beginning of the International Drinking Water Decade (1981-1990) the region of Latin America was comparatively well-provided with drinking water and sanitation. However, urban areas were better covered than rural areas and water supply was more extended than sanitation (ECLAC, 1990). Furthermore, greater attention was given to the quantity of services (number of new connections) than to the quality of services, implying that maintenance lagged and water losses were uncontrolled. In general, services were not designed to be auto-financed and were therefore hit hard by the macroeconomic crisis in the 1980's, which forced governments to reduce public spending (ECLAC, 1994).

As services deteriorated, attempts were made in most countries to implement reforms of the institutional and industrial organization of the sector, and to change the regulatory framework (Jouravlev, 2004). Several countries also opted to transfer their water companies to the private sector under different modalities, with the hope for more efficient management and increased investments. This followed the worldwide trend during the 1990's of increased private sector participation in public utilities. Results from the privatizations were mixed, though in most cases the large investments never came to fruition and several projects met protests from the local population. This was the case in the Buenos Aires province and Tucumán (Argentina), Cochabamba (Bolivia) and Trinidad and Tobago, where governments terminated contracts due to poor performance and services subsequently returned to public management. In Lima and Panama City, political opposition suspended bidding processes in the last minute and in Caracas, all private companies refrained from bidding, due to the bad state of works and weaknesses in the contract terms.

Compared with other Latin American countries, Chile had above-average coverage of water supply and sanitation at the beginning of the 1980's, and similar to neighbouring countries, services were public. Water sector reforms during the late 1970's and 80's were implemented not to solve operational deficiencies but more for ideological reasons. It had a slow pace compared to other sectors within the country, as well as compared to other countries. The public Chilean water companies, among them especially EMOS (the company serving the metropolitan region of Santiago), often are cited as examples of well-managed public companies, even before the reform in the end of the 1980's. Not until 1995 did the government make the final decision to sell its water companies. The selling of EMOS took place in 1999, without mayor incidents.

The cases in Latin America show that services have both succeeded and failed under public as well as under private management in different countries. This confirms the idea that ownership is not a crucial factor for the performance of a water service company. Comparing public and private ownership has been the objective of many studies and when reviewing them, results are highly dependent on the circumstances. Thus, generally speaking there is no firm evidence of private water services outperforming public (Hernandez de Cos, 2004; Renzetti and Dupont, 2004). Other factors are of greater importance for the efficient management of water and sanitation services.

Several authors have sought to explain the good performance of the water sector in Chile under public management (Alé, 1990; Blokland, 1999; ECLAC, 1998; Morandé and Doña, 1997; Shirley, Xu and Zuluaga, 2002; Yepes, 1990). They have come up with a number of factors, internal and external to the sector, which together illustrate the success story. However, most studies focus on the changes due to the reforms in the end of the 1980's and little attention has been given to the comparatively high performance that was achieved already before that. The present study also includes the earlier period, to get a wider historical perspective. The purpose is to examine the determinants of the Chilean water sector's good performance, with focus on the case of EMOS which served Santiago in the period 1977–1999.

For countries that wish to implement reforms in their water and sanitation sectors, it may be of importance to know the underlying drivers of success, when looking for best practices to emulate. Due to the specific economic, political and social characteristics of each country, in which reforms must be anchored, a method of “copy-pasting” will not lead to unquestioned success. Peña and Solanes put forth the importance of power structures, power groups and natural conditions within different societies which must be considered when choosing a model for water governance (which also includes the management of water services) (Peña and Solanes, 2003). Foster also argues that specific features of successful institutions may only be the outward manifestations of underlying, more intangible causes (Foster, 1996). A comparison between the historical background of the efficient water service management in the specific case of EMOS and water services in other countries, may be helpful for these countries in their path towards reform.

The document is structured as follows: section 2 explains the concept of performance used in this study and how it can be measured in the water sector. Section 3 applies the definition to the case of EMOS and discusses the standout performance achieved by the end of the 1980’s, before the second reform. Next, the history of EMOS is outlined and the evolution of tariff policies is presented. Thereafter six different factors contributing to the good performance of the Chilean water sector in general and EMOS in particular, are analyzed. In section 6, concluding comments are made and some recommendations for other countries considering reform of the water sector are derived from the analysis of determinants. Last follows an epilogue briefly commenting the circumstances of the privatization of EMOS in 1999.

2 Definition of performance in public water companies

The performance of water sector companies can be measured in two ways: effectiveness and efficiency. The first implies the degree to which goals set by the authorities are reached, concerning coverage and quality of services. The second refers to reaching the same goals but with a minimum of costs. The concept of efficiency can further be divided in two interpretations, productive efficiency and allocative efficiency. Productive efficiency means production at minimum cost and allocative efficiency means setting tariffs which reflect these minimum costs, thus implying an efficient resource allocation.

In common terms, the word efficiency is used when talking about overall performance of a public service company, but a company may very well be effective without being efficient. That is, it may fulfil the goals set out to be accomplished, but in an excessively costly way and with inefficient resource allocation. For this reason it is useful to look at both aspects of performance.

The development of the sanitation sector normally occurs in two phases: first water supply and sanitation, then wastewater treatment. In general, developing countries have still not completed water supply and sanitation coverage, and advances in wastewater treatment are even smaller. Therefore, effectiveness is mainly measured against the goal of 100% coverage of water and sanitation in urban areas and, to a smaller extent, rural areas. Since this is a long-term project, authorities may set goals of partial coverage in the short term. Beyond coverage, effectiveness goals include quality of services, which implies continuity (24 h/day), pressure, safety (of drinking water), attention to clients, etc. Thus, percentage of population served, percentage of house connections, growth of coverage per year, degree of disinfection and availability in number of hours per day are examples of measures used for estimating effectiveness in this sector.

To estimate the efficiency of a company in the water sector the specific characteristics of this industry have to be considered. Water supply and sanitation services are unlikely to be competitive due to the inefficiencies and extremely high costs that would arise from constructing two or more parallel networks of water and sewerage pipes within a region. If this was attempted, it would end with all but one company going out of business and the formation of a monopoly market where it would be possible to reach a higher level of productive efficiency. However, a monopolist does not have any incentives to maximize output due to lack of competition, and will produce less than it would under competitive circumstances. A profit-maximizing (private) water supplier would take advantage of the market power and set a price higher than the price at competitive equilibrium, not to mention that the company would under-invest and give service of lower quality. On the contrary, a public supplier, pursuing social or political goals might very well under-price services and be unable to finance long-run projects. There is also a risk that services are used to benefit the employees or the constituency groups of elected politicians. With regulation, a competitive environment may be simulated and the monopolistic company, whether private or public, can be forced to reach productive and allocative efficiency.

Some indicators of productive efficiency used in the water sector are staff per 1000 connections (usually both water and sewerage connections), unaccounted for water (UFW), working ratio and thousands of m3 billed/employee. The working ratio is the operating costs (excluding depreciation and interest payments) related to the operating revenues, which need to be well below 1. It is a useful indicator when examining a company's financial position. UFW is considered a good overall efficiency indicator. It compares the amount of water produced with the amount sold and is composed of technical losses (leaks etc.) and commercial losses (meter under-registration and illegal connections). A level of about 20% is deemed reasonable for developed countries (Yepes and Dianderas, 1996). Allocative efficiency can be measured as the ratio between income and long-term marginal costs (which, however, are not easy to estimate). That is, whether total income exceeds operating, maintenance, and capital as well as investment costs.

Making comparisons on the basis of performance indicators is a complicated task. First, data on the water industry is scarce and the data available is often not accurate. Second, there is not yet an international consensus on how to define indicators and in many countries measuring is not yet done on a consistent basis. Third, the different geographical, hydrographical, institutional and other circumstances under which the companies operate are not accounted for. For example, unaccounted for water (UFW) is difficult to estimate in systems that have little metering coverage. Further, the concept is much more relevant in water scarce areas than in water abundant areas, and due to this the efforts in reducing UFW will vary. The costs and benefits of reducing losses may differ between regions or countries. Equally the indicator staff per 1000 connections cannot be compared unless it is specified whether both water and sewerage connections are included and whether the staff refers to both in-house and externally contracted employees. The size of the company also matters for this indicator, as it diminishes with economies of scale. It is also important to realize that comparing the staff in numbers and in the costs it incurs on the company is not the same measurement and normally the costs matter more. Curiously enough it is found that personnel costs may increase although the number of employees decreases (Kemper, Yepes and Garn, 1996). Despite these difficulties, regulation by yardstick competition, which is based on the comparison of performance indicators, has attracted an increasing interest after its quite successful use since 1989 by the British regulator OFWAT.

Indicators are only as good as the database from which they are derived. In the Chilean water sector, data collection has improved over time but is said to be of little confidence before 1990,[1] and even less before 1977, due to changes in the institutional organization (Morandé and Doña, 1997). Although, in several other Latin American countries the situation is even worse. Comparisons over time and between countries and companies are therefore made complicated, and shall be taken with a pinch of salt rather than as exact measures.

[1] In the case of EMOS, a part of the shares were sold on the stock market in 1990, when it was turned into a limited company. This implied much stricter rules for accountancy from that moment on.

3 Description of EMOS' performance according to the definition

To underline the good performance of EMOS and of Chilean water services in general, already before the second reform, some indicators will be presented and, when possible, put in contrast to figures from other Latin American countries.

Effectiveness will first be represented by figures for water and sanitation coverage as well as the percentage of house connections, in comparison to a selection of other Latin American countries. In graphs 1 and 2, we can see that Chile had 98% coverage of urban drinking water by 1990 and sanitation coverage of 91%. Although not the most advanced country, Chile is among the leading countries for water and sanitation. Especially notable is the fact that all water connections and nearly all sanitation connections are house connections. This indicates high standards of the existing services, in comparison to the other countries. What further raised standards in Santiago was that EMOS had a continuous water supply, 24h/day (field interview).

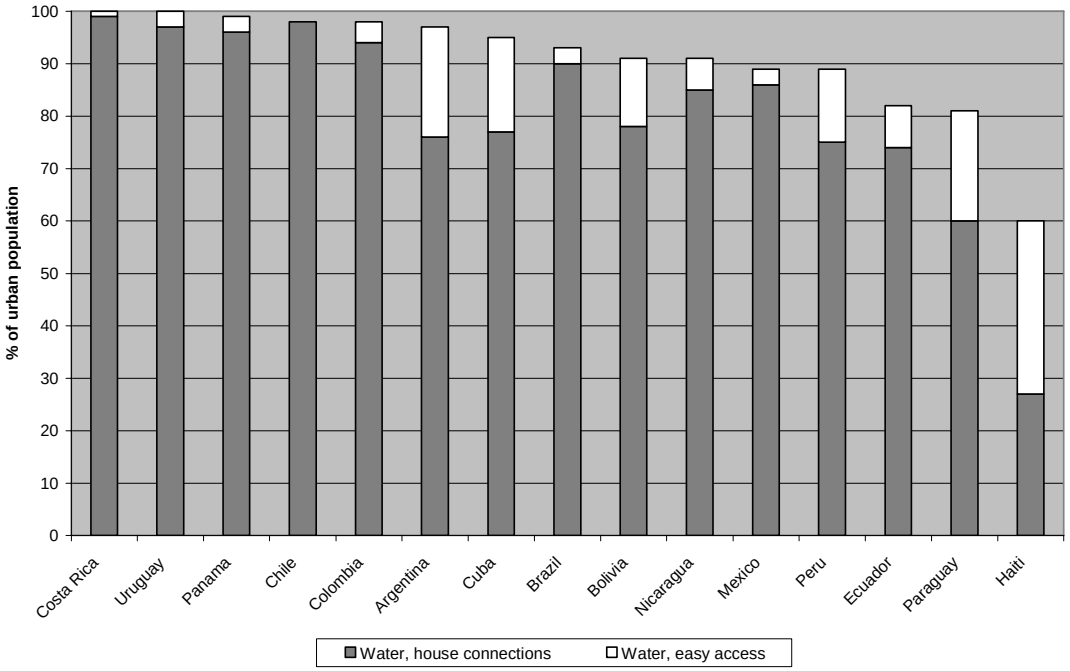
In a study for the World Bank, Yepes analyzed six public water companies in Latin America, selected as examples of high performance. Four European companies were included as a reference group. Among the Latin American companies, EMOS had the best coverage of water and sanitation in 1987 (99% and 90%, respectively) and was closer to the average of the European companies than to the average of the Latin American ones. The same applies for the coverage of micro-metering, where EMOS had reached 98% in 1987 (Yepes, 1990).

Next, looking at the national level, the average urban coverage for Chile in 1980 was 91.4% and 67.4%, for water and sewerage respectively. Shirley presents data for EMOS from the same year, stating 98.6% coverage for drinking water and 85% for sanitation, which implies that EMOS had a higher level than the country average, which is not surprising for a capital city (data from EMOS' Statistical bulletins, presented in Shirley, Xu and Zuluaga, 2002). During the 1980's percentage changes in coverage were small, since full coverage was almost achieved.

However, the figures from 1980 only refer to EMOS' concession area, which at that time excluded some of the peri-urban parts of the city. Between 1989 and 1995, the concession area was not only extended to include the peri-urban parts but coverage of drinking water in Santiago also went from 99 to 100% and sanitation from 91 to 97%. These achievements were made through different EMOS policies implying close cooperation with municipalities and future/new clients (Alfaro, 1997). See further section 5.6.2.

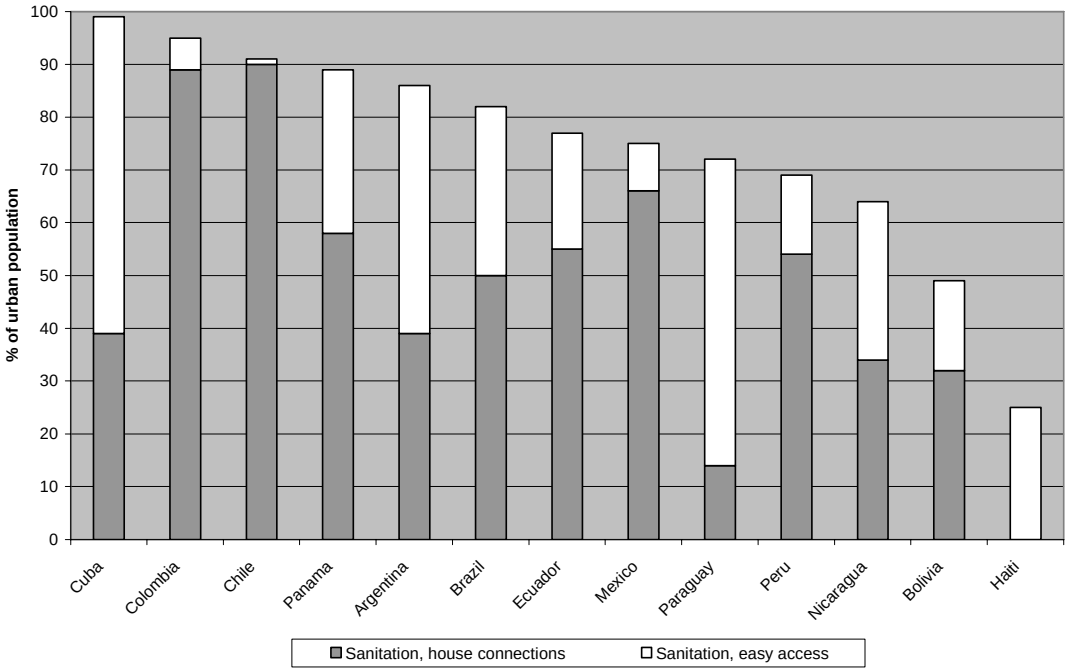
EMOS' weak point, as it relates to effectiveness measured as the coverage of services, was the treatment of wastewater. On the national level this had developed from 8% in 1989 to 22% in 1999, but for EMOS only from 1% in 1989 to 3% in 1995 (Chile/SISS, 2006 and 1995). This is a general characteristic of water services, even in some developed countries, since extension of distribution and recollection networks is the first priority and wastewater treatment the second. Around the year 2000, the few Latin American countries that had a level of wastewater treatment higher than 50% were mainly small island states (Jouravlev, 2004).

Graph 1: Urban water coverage in 1990



Source: World Health Organization (WHO)/United Nations Children's Fund (UNICEF), "Joint Monitoring Programme for water supply and sanitation", www.wssinfo.org, 2006.

Graph 2: Urban sanitation coverage in 1990



Source: World Health Organization (WHO)/United Nations Children's Fund (UNICEF), "Joint Monitoring Programme for water supply and sanitation", www.wssinfo.org, 2006.

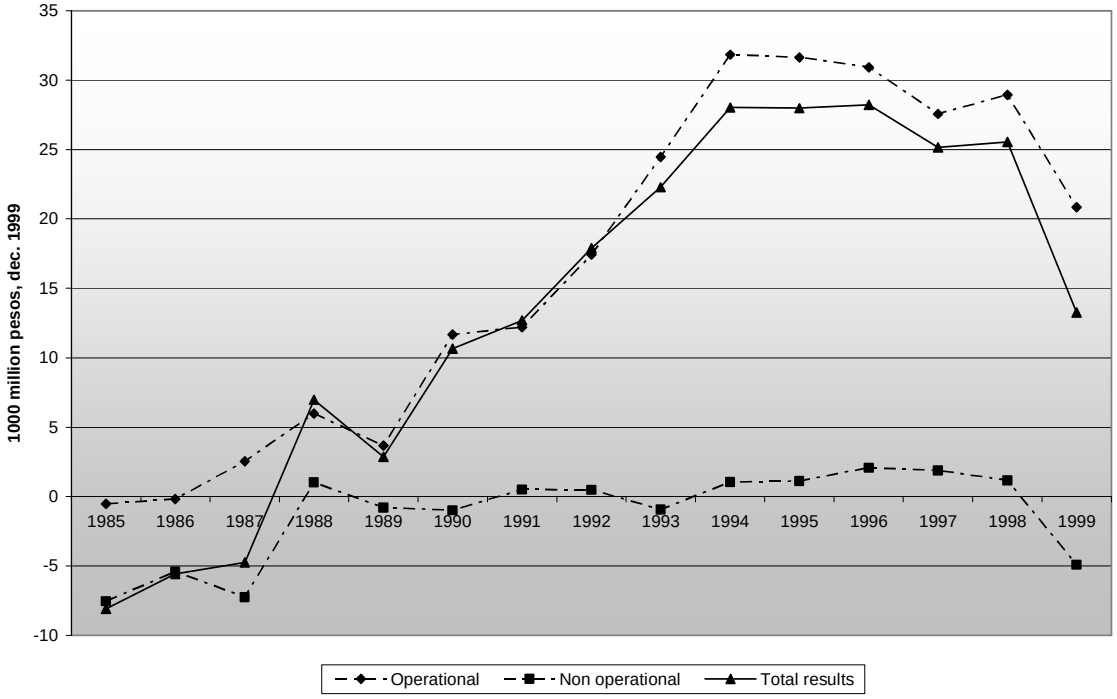
Internationally comparable data is scarcer concerning productive and allocative efficiency. In the World Bank study mentioned above, the indicator of number of employees per 1000 connections in 1987, gives EMOS a high rank, even when including the number of out-contracted workers. Measured only for water connections the figure was 3.5 workers/1000 connections and 1.8 when measuring for both water and sewerage connections. This should be compared to the average values for the selected Latin American companies which were 5.3 (only water) and 3.1 (water and sanitation) (Yepes, 1990). During the 1980's the number of workers increased from about 1550 to 1700. At the same time the number of connections increased at a faster rate, which resulted in a decreasing number of workers per connection (EMOS, 1986 and 1990).

Yepes does not make any detailed comparison of financial indicators between companies in different countries, because of the difficulties of such an assessment. However, the figures presented for EMOS sustain its productive efficiency. In 1987 the working ratio was 0.53 and the debt/equity ratio was 15%, the highest level allowed for public companies in Chile at the time (Yepes, 1990).

During the major part of the 1980's EMOS and the other Chilean water services did not make any profits and were not allocatively efficient, due to low tariffs. Alé presents data for EMOS, ESVAL and SENDOS from 1984 to 1988. During this period EMOS had operational results slightly under zero, until 1987 when figures turned positive. ESVAL had negative results, approaching zero in 1988 but with an average of US$ -4 million. The loss of SENDOS was considerably larger, roughly around US$ -20 million (Alé, 1990).

Operational and non-operational figures, as well as total results, for EMOS for the period 1985-1999 are shown in graph 3. 1988 was the first year EMOS' incomes covered its total costs and the company even made a profit. During the 1990's total results increased considerably due to raised tariffs. For 1989, results are only presented for the latter half of the year, which explains the low figures. The fall in 1999 occurred because of a reduction in consumption, due to a rationing of water resources in response to a severe drought and large payments to laid-off workers, as the company was privatized the same year (EMOS, 1985–1999).

Graph 3: EMOS' results 1985-1999



Source: Empresa Metropolitana de Obras Sanitarias (EMOS), *Informe anual*, 1985–1999.

4 The history of EMOS and EMOS S.A.

During the lifetime of EMOS, the Chilean water sector underwent two major reforms. EMOS was created in 1977, within the first reform, which implied the unification of responsibilities for water and sewerage services in the country. The second reform, in 1988-90, mainly separated the operating and regulating roles of the state, with the introduction of a regulator, SISS (Superintendencia de Servicios Sanitarios), and transformed the regional water services into limited companies. The history of EMOS can therefore be divided into two periods, each starting with a reform.

4.1 Institutional framework in the late 1970's

Before 1977 drinking water in central Santiago was provided by a municipal company, EAPS (Empresa de Agua Potable de Santiago), and wastewater was taken care of by a separate public service, Servicio de Alcantarillado de Santiago. The periphery of Santiago was attended by the DOS (Dirección de Obras Sanitarias), a subdivision of the ministry of public works. A few smaller, public and private water services also operated in the metropolitan region. In the rest of the country, responsibility for water and sanitation was meant to be solely belonging to the DOS. In practice, however, they worked in parallel with the DSS (División de Servicios Sanitarios), under the ministry of housing and urbanism, and other directions under the ministries of health, internal affairs and agriculture. In sum, the responsibilities for the water sector were far from united.

In 1971, the Chilean branch of the Inter-American Association of Sanitary and Environmental Engineering (AIDIS)[2] presented a diagnostic of the drinking water sector, pointing at several weaknesses in the system and suggesting vital changes. They criticized the lack of coordination between different authorities and lack of administrative and financial autonomy in the sector (AIDIS, 1971). In the years to follow, Chile was forced to live through a turbulent macro-economic crisis, with hyperinflation and shortage of goods. Politically this period was marked by the military's overtake of the regime in 1973. During this time no major changes occurred in the management of water and sanitation.

Under the new authoritarian government, national politics took a sharp turn from socialist to market liberal. Some principles of the new politics, important for the public sector in general were: the requirement of auto-financing for public companies; submitting public and private companies to the same norms (intending to separate the state's normative task from the management of public companies); the subsidiary role of government (implying that government should not take care of things that the private market can handle); reducing social assistance and channelling it to those most in need, and the state as a guardian of social interests, through guaranteeing free competition and private property. At this time the administrative division of the country was also changed into the current one of 13 regions, subdivided in provinces and municipalities.

Within this framework a reform of the sector started in 1975, possibly influenced by the AIDIS lobby. In 1977 a national service for sanitary works, SENDOS (Servicio Nacional de Obras Sanitarias), was created, replacing the DOS and the DSS and reporting to the ministry of public works. SENDOS had its headquarters in Santiago and one directorate in each of 11 out of a possible 13 regions. Additionally, in the metropolitan region and in the fifth region, around Valparaíso, the semi-autonomous public companies EMOS and ESVAL (Empresa Sanitaria de Valparaíso) were created. The regional directorates of SENDOS and the two semi-autonomous companies integrated urban drinking water and sanitation services, each in its entire region.

During the socialist government, employment within the public sector had grown a lot and the creation of SENDOS meant diminishing the DOS work force by several thousand workers.

[2] Influential civil society of engineers, created in 1948, working closely with governments and organizations such as WHO (World Health Organization) and PAHO (Pan-American Health Organization).

The service employed as many as 13500 persons in 1973, but in 1979 SENDOS had only about 3000 employees (Morandé and Doña, 1997). Another major change was the focus on charging for services and plans on raising tariffs, according to the goal of auto-financing. For example, this implied a continued installation of micro-meters, detection of illegal connections and introduction of a tariff for sewerage. The first steps towards computerized billing were also taken (field interview).

The state's control over this monopoly market was executed through several ministries. Tariffs were set by the ministry of economy and the ministry of finance approved budgets. The ministry of public works set quality and technical norms, and approved construction projects. Being a subdivision of the ministry of public works, the national directorate of SENDOS had the task to supervise the fulfilment of norms and procedures by its regional directorates as well as by EMOS, ESVAL and some minor municipal and private companies. Although, in practice, according to ex-managers in EMOS, the company depended directly on the ministry of public works and had only briefer contacts with SENDOS (field interviews).

4.2 The creation of EMOS

EMOS was created through a fusion of the wastewater service of Santiago, the public water service El Canelo, the part of DOS serving the outskirts of Santiago and the EAPS, thus vertically integrating water and sanitation services. EAPS was not a public service, but a municipal company with a certain degree of autonomy and was therefore used as the main building block. The same strategy was used in Valparaiso where ESVAL was created around the municipal Valparaiso sewage company. The fusion in Santiago did not occur without friction. Employees of EAPS were used to being more independent and had therefore a higher status than the ones of the DOS. Thus, long negotiations were needed to reach agreements on employees' rights and salaries. The municipality of Santiago was given free water for municipal buildings and irrigation of gardens, as part of its compensation for selling EAPS (field interview).[3]

From the start EMOS had the responsibility to supply water and sanitation to Great Santiago and 15 surrounding towns in an area of 40000 hectares, with about half a million drinking water and sewerage connections, serving a population of approximately three million inhabitants (EMOS, 1989). About 2400 persons were employed by the company (Chile/SENDOS, 1989). This workforce diminished to 1700 in 1989, as a suite of the auto-financing policies. Instead of raising tariffs to cover costs, the costs had to be restricted to the budget approved by the government. This was done by reducing in-house staff and starting to contract out services such as meter reading and network maintenance. To a great extent, early retirement was offered to the laid-off workers. Others went on to work as contractors for EMOS (Chile/SENDOS, 1989).

At this time, Chile received two loans for water and sanitation from the World Bank. The first was given in 1980 with the objective of increasing the number of house connections, reducing unaccounted for water and developing a sewerage master plan, including pollution abatement. A small part of this loan (13%) was destined for SENDOS and the major part (87%) for EMOS. In 1986 another loan was given for EMOS and ESVAL, with the amounts of US$ 60 millions and US$ 6 millions, respectively. In Santiago the aim was to expand water distribution and sewerage mains and to improve management, information and operation systems.

In 1982 Chile entered a severe debt crisis, with rising external debt, weakened bank sector, falling export incomes, considerable unemployment and general instability. The GDP went from a 5% increase in 1981 to a 10% decrease in 1982 and decreasing a further 4% in 1983 (World Bank, 2006). Even if sectors of tradable goods were hit harder, the water sector also felt the general economic downturn as they were given tighter budgets. However, EMOS could continue its expansion during these years thanks to the financing from the World Bank. In fact, it

[3] This right to free water was later sold to Aguas Andinas under the mayor Lavín in 2002, causing a public controversy.

was a requirement from the World Bank that the investments were carried out, according to the loan agreements (field interview).

4.3 Transformation of EMOS into EMOS S.A.

During the 1980's important parts of the infrastructure (the electric energy sector and telecommunications) were privatized according to the principle of the subsidiary role of the state. When the reform of the water sector started in 1975, some politicians were already inclined towards privatization, but leading engineers in the sector had the opinion that it was not possible at the current time.

> *"In July 75, the minister of economy told me… this was at the time of the Chicago boys, everything was about to be privatized in Chile… he told me: 'let's go ahead with the privatization'. I said: 'no, because it is impossible. Each one of these regions is a crippled child and you want me to make them run. What do I propose? Public companies.' (…) In the end this idea was accepted."*
>
> Interview with Sr. Guillermo Ruiz Troncoso, director of DOS/SENDOS 1975-1979, 2006-11-07. Author's translation.

The agreement between politicians and engineers implied that the reform was slow-moving, with a main goal of improving and extending services. Also, privatization was not openly discussed until the latter half of the 1980's. Discussions of some different work groups, led and coordinated by the ministry of public works (Mira, 2002), led to the second reform in which a set of laws were introduced between 1988 and 1990, destined to prepare the sector for a sell out (Chile/SENDOS, 1989).

The new laws included the introduction of a concession[4] regime for service provision, an independent regulation authority (the SISS, Superintendencia de Servicios Sanitarios), new tariff and subsidy systems and the transformation of EMOS, ESVAL and SENDOS' regional offices into limited companies. This legislation implied further autonomous management for EMOS, cutting its direct link to the ministry of public works. The SISS took over the duties of regulating as well tariffs as service quality norms. EMOS S.A. (Sociedad Anónima, that is limited company) was now owned to two-thirds by CORFO (Corporación de Fomento)[5] and to one-third by the ministry of Finance.

The concession regime implies that concessions can be given to a company for any of the following four services: production of drinking water, distribution of drinking water, recollection of wastewater, and disposal of wastewater. Normally, all four concessions are granted to the same company for its determined geographical area, which was also the case for EMOS S.A. With the SISS, regulation became more formalized when compared to the previous structure. Before SENDOS had both normative and productive functions. For EMOS S.A. and the other concessionaires this meant that development plans (*planes de desarrollo*) had to be elaborated, consisting of investment programs for a specific time period, detailing planned improvements of services and works. If the plans were not fulfilled, the company faced the threat of loosing the concession. Now, thanks to the new tariffs generating profits for the company, EMOS could also start making long-term plans, such as cooperating with municipalities on extending networks to poor communities (Alfaro, 1997).

Turning into a limited company, EMOS S.A. started to implement more of management principles proper of a private company. One important change was the salary raise for the employees, which approached market values. Salaries were now negotiated through collective bargaining and in the negotiations, incentives based on profitability and productivity were introduced. Before the remunerations were not directly connected to the performance of the company (field interviews). Another change was a better client orientation by opening more

[4] Concession in the sense of a license (not a contract) for an indefinite period, obliging the company to provide services, within a specified geographic area, to anyone who demands it. The concession is transferable with the authorization of the SISS.
[5] The government's economic and industrial development agency.

customer service offices. The idea was to bring the company closer to the clients, to facilitate the tariff raise under the new tariff law (field interview). EMOS also actively promoted the subsidies among their poorer clients and organized plumbing workshops as part of an initiative of client education.

4.4 Evolution of tariffs and tariff policies

With the reforms in the mid 70's, tariffs started being an important issue in the management of the water sector. Prior to this time, there was no tariff for sewage, only drinking water was charged, and these tariffs were kept very low, without any relation to production costs. For clients, incentives to pay were low, since the service was not cut off even if bills were not paid. At the beginning, the new government politics of auto-financing took the shape of charging bills more insistently rather than raising tariffs, which would have been difficult in the current economic situation. An anecdote on this theme is how the DOS increased their incomes by US$ 1 million, during the last six months of 1975, only through demanding the payment of bills (field interview). Eventually, when tariffs were raised, this was "facilitated" by civil rights, including the freedom of speech, being limited by the military regime. This reduced the need for searching agreements between different interest groups (Morandé and Doña, 1997). However, protests from the population in the early eighties stopped an attempt of marginal cost pricing (Alé, 1990).

Another characteristic of tariffs in the 1970's and 80's was the price discrimination according to volume consumed. In the mid 70's, tariffs were set for three different levels of consumption: below 15 m3/month, between 15 and 45 m3/month and above 45 m3/month, where the households consuming more than 45 m3/month subsidized those consuming less than 15 m3/month (AIDIS, 1977). This was based on the assumption that high consumption is positively correlated with high income. Since this is not always the case, this cross-subsidy was more regressive than progressive and the aim was to eliminate it eventually. There was also redistribution between regions. 10% of the incomes from each region were redistributed by the SENDOS to the poorer regions (field interview).

In the case of EMOS, tariffs continued to be set politically until 1987, when the University of Chile made a study on what tariffs were required to recover costs. Then tariffs were raised somewhat, but not to the level suggested by the study (field interviews). Despite this raise, EMOS continued having the lowest average tariffs in the country. See table 1. Also earlier during the eighties, discussions on marginal cost pricing went on and some attempts were made. However, none of the water services showed positive results until 1988, when EMOS went from results of US$ -5.7 millions in 1987 to US$ 8.5 millions in 1988 (EMOS, 1988).[6]

Table 1: Annual average tariffs, US$ Dec.88/m3

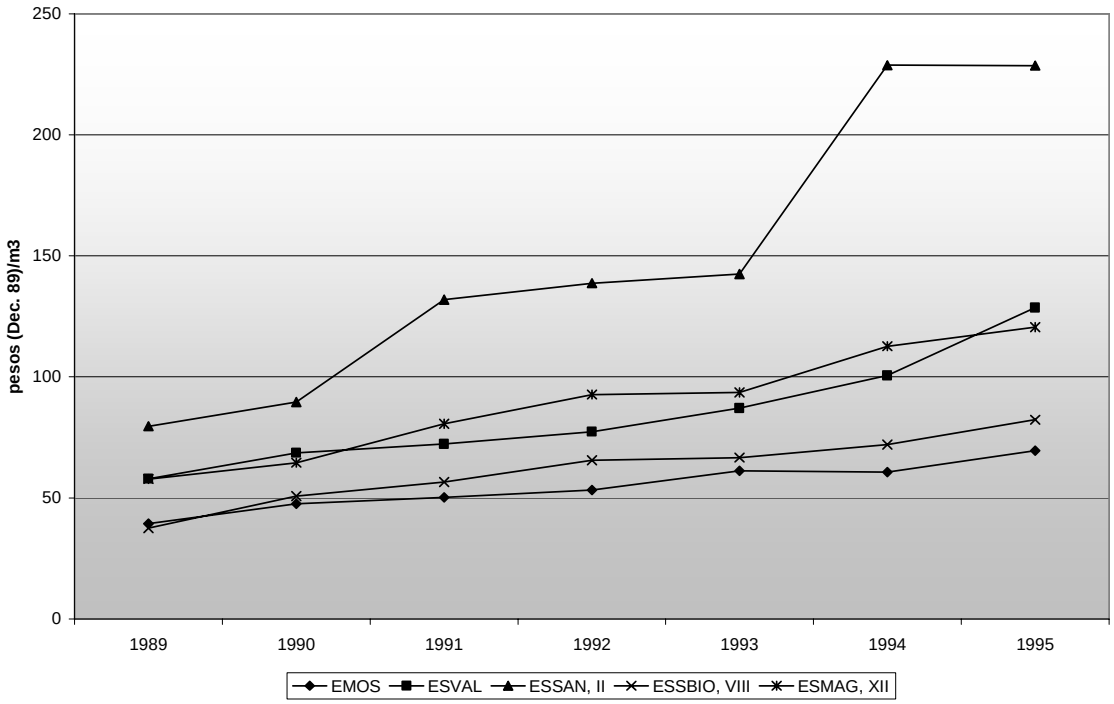
YEAR	EMOS	ESVAL	SENDOS
1979	0.08	0.08	0.14
1980	0.08	0.10	0.16
1981	0.07	0.11	0.16
1982	0.07	0.11	0.14
1983	0.08	0.10	0.13
1984	0.07	0.09	0.15
1985	0.08	0.10	0.15
1986	0.09	0.12	0.16
1987	0.11	0.12	0.14
1988	0.13	0.13	0.17

Source: Alé, 1990 (presenting figures provided by the respective utilities).

[6] US$ of December 1988, i.e. 1 US$ = 247,49 pesos.

One substantial part of the second reform was the tariff act (DFL MOP 70/88) passed in 1988, establishing in detail the modalities for tariff setting by model company. This method was previously used in the electricity and telecom sectors in Chile and implies an estimation of costs for an imaginary company, working efficiently. The maximum tariff allowed is calculated from projections of demand as well as operation and maintenance costs. In the end, to ensure auto-financing and allocative efficiency, the tariffs are adjusted to the total long-run cost over five years, including investments. After the first tariff setting process, average annual tariff/m^3 for EMOS rose about 70% in real terms over the following five year period. The tariff increase for EMOS was smaller than that for companies in other regions. For example, in ESSAN (region II, northern, desert area) tariffs rose about 150% and in ESVAL, ESSBIO (region VIII, central southern area) and ESMAG (region XII, southern area), about 100%.[7] The evolution of average tariffs for these companies after the first tariff process is shown in graph 4.

Graph 4: Average tariffs, 1989-1995



Source: Chile/SISS, *Memoria 1990-1993*, 1994 and *Memoria annual*, 1995.

To ensure the sustainability of the higher tariffs, a direct means-tested subsidy was also introduced (Law no 18.778). A few years were needed before the subsidy system started to work satisfactorily and during this time the law was amended in two turns to improve its applicability. EMOS actively participated in the formulation of these law amendments. The subsidies are administered by the municipalities which transfer government funds directly to the water service companies, covering a part of the bill for the poorest customers. The entitled beneficiaries of the subsidy are identified through a national household survey, CASEN. Together with the new tariff system, this meant the end for the cross-subsidies in use before the reform.

The tariff raise was further facilitated as it was implemented at the same time as a general upswing in the Chilean economy. This led to higher disposable income for the population. Adapting tariff increases to macroeconomic changes is very difficult; in this case it was just a

[7] Estimations made on basis of data from SISS, annual report, 1995.

fortunate coincidence. What a company can do is to adapt tariffs to seasonal changes in demand. To reduce the impact on the clients, EMOS chose to introduce the higher tariffs in winter, when consumption and tariffs[8] are lower.

There were important differences between the first and the second tariff setting updates, due to the regulator being newly established. In the first process, only the most basic criteria were considered in the calculations and in general, procedures were more informal. By the time of the second process, in 1995, both the companies and the regulator had gained experience of the new modalities and the tariff setting was done more rigorously and on a more thorough basis. This pattern has continued for each tariff process up to date (Chile/Ministerio de Economía, 2000).

[8] In summer a surcharge is added at a certain level of consumption.

5 Factors contributing to good performance

Through literature review and interviews, a number of factors contributing to the good performance of EMOS have been identified. These are the organization of services by region, continuity in the professional teams, government politics, the political autonomy favouring professional capacity, the water sector as a government priority, and EMOS' internal policies and characteristics. In the following, the circumstances and implications of each determinant will be explained.

5.1 Organization by region

The optimal organization unit for water services can be seen from several perspectives. From an environmental point of view, it is important to take into account the scope of the river basin. Considering regulation, the number of operational units must be in proportion to the capacity of the regulating unit. For productive efficiency, with the economies of scale in mind, the number of connections must not be less than the minimum efficient scale. This is also important if considering private sector participation in some form. The private sector will only be interested in participating, if service units have the prerequisites for being efficient and commercially viable (Foster, 1996).

During the 1980's and 90's there was a trend of decentralization of water and sewerage services in Latin America. Before, many countries had an organization of national monopoly and this was then fragmented into regional or provincial units, like in Argentina, or even municipal units, like in Colombia and Peru (Foster, 2005). After the reform in 1990, water services in Chile were organized regionally, with 13 limited companies supervised by one national regulator. However, already in the preceding period the structure for this organization was outlined. EMOS and ESVAL were semi-autonomous regional public companies since 1977, each with its own budget and administration and although SENDOS was a national organization, its regional offices operated services in their respective regions and became sufficiently independent to be used as the basis for the creation of limited companies in 1990. In its staff appraisal report for the loan given to Chile in 1980, the World Bank qualifies the regional offices of SENDOS as "relatively decentralized" (World Bank, 1980).

In Chile, the organization by region seems to have been beneficial for the different perspectives on optimality mentioned above. Especially, it allowed for EMOS and the other companies to benefit from economies of scale. The water industry is generally considered to be a natural monopoly, although empirical testing in the field has been scarce so far (Noll, Shirley and Cowan, 2000). There is no general consensus on the extents of the economies of scale in water and sanitation services. When figures are referred to, confusion easily rises since they sometimes concern number of connections (one connection per household) and sometimes number of persons served (several persons per household). Further, there may be important scale differences if only the technical parts of water services, such as production and distribution, are concerned or if the whole company is taken into account (Foster, 1996). There are also regional variances in the optimal scale, depending on local conditions such as density of population and topography (Jouravlev, 2000). Cowen and Cowen states that "experience suggests economies of scale in the operation of distribution networks for populations of at least 50,000 to 100,000 people. Economies of scale in system management as a whole are more extensive (evidence from Britain indicates that managerial economies of scale are exhausted at populations of 500,000 to 1 million)" (Cowen and Cowen, 1998). Yepes relates proof from Latin America of improved efficiency when municipalities with a maximum population of 150000 or 200000 inhabitants are bundled together under a regional company. He further shows how the efficiency indicators staff/1000 connections and operating costs/connection improve for a company size of up to 1 million connections, for a sample of Latin American, European and North American companies (Yepes, 1990).

Unfortunately, a comparison of data on the number of connections and efficiency indicators before and after the fusion in 1977 is not possible due to lack of data. However, according to the figures above, with a total of half a million connections it seems reasonable that it should be more efficient for one company to serve the inner and outer parts of Santiago, as well as the surrounding towns, compared to the previous division between EAPS and DOS. Regrouping several towns under one company means that they can share large constructions such as water intakes and treatment plants. Administration, billing, maintenance and construction of networks, and internal auditing are further examples of activities that benefit from economies of scale. Also, larger entities will often have an easier access to financial resources. The high transaction costs from coordinating the activities of several companies within one geographical area, using the same water sources, are as well avoided.

What further highlights the benefits of economies of scale is that after the privatization of EMOS S.A. in 1999, Aguas Andinas (the company's new name, taken in 2001) bought the small private companies operating in Santiago and created the corporate group Aguas. The fusion was only made de facto, not through legal procedures. In the tariff setting process, the SISS wanted to take into account the benefits of the de facto fusion, setting the tariffs for the different companies on the basis of their common assets, to avoid double charging the users for assets shared by the different companies in the group. However, this was rejected by the Contraloría General de la República[9], which stated that the assets should be treated individually for each company, since the fusion was not legally approved, resulting in the company receiving the gains from the increased economies of scale (Chile/SISS, 2005).

Economies of scope, in addition to economies of scale, are very important in the water sector. For instance, the same equipment and workforce can be used for the different activities of both drinking water and sewerage services. Additionally, the best way to charge for wastewater services is to include it in the price of drinking water, which is considerably facilitated when the services are provided by the same company. The reform in 1977 meant for Santiago that drinking water and sewerage services became vertically integrated, which allowed for benefiting from these advantages. Later, with the concession regime arose the possibility to split the four components of water and sewerage services between different companies. This was probably due to influence from the reform of the Chilean electricity sector, where different phases of production were separated with the goal of enhancing competition. In the water sector the possibilities for competition are much more limited and in fact, there are few cases in the world where water and sewerage services are provided by separate companies.

An organizational division by municipality would have meant that some municipalities would not have access to surface water from rivers within their area.[10] They would have to extract subterranean water, which would imply much higher costs. For municipalities along the same river, agreements on treatment and discharge of wastewater would have to be made between the facilities situated upstream and those located downstream. These problems are of minor importance in Chile. The geographical characteristics of the regions imply that they all include as well mountain range as coastline (except for the metropolitan region which ends shortly before the coast) and thus, roughly coincide with river basins. Conflicts between upstream and downstream towns are thereby internalized, since each regional water service control an important part of a river basin. This further implies good incentives for the companies to apply watershed management, which has considerable environmental gains.

In countries where water services have been organized at municipal level, this has often been within a general program of decentralization and without specific consideration of the characteristics of the water sector. This causes problems when it is not synchronized with the regulatory reform. For example, in Colombia there are more than 1000 municipalities providing water and sewerage services and only one, national regulator, which impossibly can regulate all the providers in a satisfactory way (Foster, 2005).

[9] A superior, autonomous control organ, supervising the use of tax incomes and the legality of measures taken by the public administration.
[10] Except for regions I and II, surface water is the main source for drinking water.

Under the military regime in Chile, the administrative organization of the country became highly centralized and municipalities had a limited power, mainly dedicated to minor activities such as street cleaning (field interview). All public services were organized with one head office in Santiago and subdivisions in each region and the same logic was applied when creating the SENDOS. In the second reform, the motivation for creating regional limited companies was the prospect of privatization. Regional companies would be more commercially interesting and easier to sell than a national company. Since the national regulator, SISS, was introduced at the same time as the creation of the companies, it was possible to consider the number of companies in relation to the regulator's capacity.

5.2 Continuity in professional teams

Morandé and Doña refer to the continuity of professionals within the water sector as a determinant factor for its good performance. In the twenty years following the reform in 1977, engineers and other professionals within the sector have remained the same, with the exception of some rotation between companies and authorities (Morandé and Doña, 1997). For example, the majority of the staff of the SISS was recruited from the previous national water service (SENDOS) and the last director of SENDOS became the first director of the SISS (field interview). In this way sector-specific experience has been accumulated over a long time, which is beneficial for the long term development of any organization.

Previous employees of EMOS confirm that the culture of the company was to enter young and dedicate one's entire working life within the company, consistent with the traditional view of state employment. Many employees made an internal career and as they got more responsibilities they already had a good knowledge of company praxis and could take on new tasks more quickly than someone coming from the outside (field interview). This contributed to the efficiency of the company by reducing costs for on-the-job training.

Within the outsourcing policy, EMOS required companies to hire a certain percent of ex-EMOS employees as a measure to help the laid off workers. This also contributed to the continuity of professionals within the sector and manifests a care-taking of company specific knowledge. See further under section 5.6.1.

Other reasons for staying within the company were the scarcity of options in the labour market, especially for women, and a particular enthusiasm for working with drinking water and sanitation.

The private sector was not much involved in the supply of drinking water and sanitation during the 1970's and 80's, except for the sub-contracted firms mainly employing low-skilled workers and a few minor water supply companies. Before 1989, the private sector operated less than 3% of the Chilean water and sanitation market (Chile/SISS, 2004). This was mainly in coastal resorts and upscale areas of Santiago. In Santiago, some private companies surged in response to urbanization processes that were more rapid than the expansion of the public water services. Thus, the main option for water and sanitation engineers was the public sector, although salaries were not very attractive.

Many of EMOS' employees were women, especially in the administrative and commercial divisions. This reflects that, in general, the public sector was less discriminating against women regarding wage differences and rights to maternity leave than the private sector. This created an incentive for women to stay within the company. Men often preferred the private sector, with higher remunerations, which meant that in the public sector women had less competition for leading positions (field interview). In the beginning of the 1990's, 50% of the manager posts were held by women (Alfaro, n/d).

Besides the job security offered by the public sector, many employees within the water sector are said to have manifested a special enthusiasm and joy for working with drinking water supply and sanitation. They felt that their work was useful and that they helped to solve the problems of the population's basic needs (field interviews).

> *"Despite the bad wages, once employed in the company [EMOS], as most of us were young, we started to like it. The older people told about their experiences and passed on the love for the company. I think it happened to us all. Later, even if you got opportunities from outside, you were no longer interested."*
>
> Interview with Sra. Victoria Ahumada, ex-manager in EMOS, 2006-10-27. Author's translation.

5.3 Government politics

The first reform of the Chilean water sector was implemented within a framework of a non-democratic political situation with an authoritarian military government, no parliament and no opposition parties. Quick decisions without excessive debate were therefore possible. It also prevented the politicizing of the sector to a certain extent. Since political activity was generally low and elections were not held, there were no political favours to return or electoral incentives to keep water tariffs low (a populist way of gaining votes, which has been observed under other governments in Chile and in other countries).

The economic politics of the military regime were strongly market liberal and advocated the private sector as the driving force of the economy. Economic evaluation of public sector investments and projects, was introduced. Social assistance was narrowly focused on those most in need. Most of the state-owned finance and manufacturing companies as well as the pension system were privatized and international trade barriers were removed. The subsidiary role of government was the guiding principle. The energy and telecom sectors, which have many features in common with the water sector, but with more opportunities for competition and higher profitability, were also privatized.

For the water sector, which remained public, the new orientation towards auto-financing from 1975 meant tight budgets leading to the reduction of in-house staff in favour of outsourcing. State companies were not allowed to take loans and had to pay dividends. Former EMOS' employees perceive this as an important factor for the efficiency of the company (field interviews).

> *"I would also say that one key to the success was the austerity, not one peso too much was spent. The budget was quite restricted."*
>
> Interview with Sigrid Stranger, ex-manager in EMOS, 2006-10-19. Author's translation.

Another prerequisite for an efficient water service is an extended culture of payment. Water was long perceived as a free good, coming from nature, without any related production costs. This has been the root of many ineffective water supply systems, not being able to cover their costs. Some consider the market oriented politics of the Pinochet regime to have influenced the general culture of payment of the Chileans (not only for water services), "having established a mentality of small-scale entrepreneurs" (field interview). Certainly, the policy of cutting the water supply in response to unpaid bills also affected payment behaviour.

During the Allende government, the public sector was the main employer and contributor to the GDP. Therefore the military regime's project of diminishing the state became a long-term one. It is unclear to what extent the idea of privatizing the water sector was seriously considered already at the time of the first reform. It seems probable that the long term goal of the military regime was to sell out EMOS and the rest of the water sector, but in agreement with engineers in the sector they decided that it first needed to be reformed in order to attract the interest from private investors. This is an important difference from other Latin American countries, where privatization has been seen as a way to improve performance, an approach that has proved less successful.

EMOS was not very high on the agenda of privatization for several reasons. First, there was no urge for a rapid change since water supply in Santiago did not have major deficiencies and the population of Santiago was not a major constituency for the military regime. Second, in comparison to other sectors, the water sector was not supposed to bring in very high revenues

when sold. However, within the sector, EMOS was valued higher than the other regional companies. Last, the Pinochet government did not anticipate the return of democracy in 1989. They believed their time in power would be longer and that they thereby would have the time to privatize the water sector (Shirley, Xu and Zuluaga, 2002).

Despite the change between authoritarian and democratic governments during the lifetime of EMOS, the politics continuously allowed for an autonomy of the water sector, leading to the prevalence of technical criteria. The change to democracy could have meant a complete reorganization of the previous politics. Instead the initiated reform destined for private companies was continued but applied to public companies,[11] which were given incentives to improve productive and allocative efficiency.

5.4 Political autonomy favouring technical and professional capacity

The fundamental importance of drinking water and sanitation services makes them vulnerable for political capture. In other cases, political interference has manifested itself in the shapes of tariffs kept low, favouring certain areas in the extension of networks, awarding outsourcing contracts without proper procedures etc. In general, the military government in Chile did not intervene much in technical matters and starting with the creation of SENDOS, the water and sanitation sector turned towards more important influence from professionals and the evolution even had some technocratic features. The previous institution, DOS, had a low percentage of high-skilled employees and offered them little or no on-the-job training. In SENDOS the diversity of professions was much larger: civil engineers, auditors, chemists, geologists, lawyers etc. The Chilean branch of AIDIS was an important meeting point for engineers in the sector and this association exercised lobby activities towards the government (field interview). The engineers had more influence in the political decisions than the politicians had in the management of services, which favoured good performance since technical criteria were made more relevant. Tariffs, however, were an exception – these were set through political decisions until 1990. It is further notable that the reforms of the Chilean water sector occurred on a national initiative and were not the result of pressure from international finance institutions, as in some other Latin American countries.

The professionalism of the public sector is reflected in the fact that, in comparison to other countries, corruption in Chile is perceived as almost nonexistent. In the ranking of the Corruption Perception Index, which was first estimated in 1995, Chile has constantly had a rank around the 20th least corrupt country in the world, with other Latin American countries falling at least ten steps behind (Transparency International, 1995-2005). High ethics were also the standards in EMOS.

> *"If there was corruption in our company, that was isolated cases, unknown until today. Because there, we had procedures for everything. Everything was done in an established way and there were controls. For the acquisitions, calls for tender were used. And the majority of the employees did not have economic interests but were there because they wanted to work in this company. (…) In the part of constructions, which had more money, the acquisition of materials… we had a long list of providers. Even sometimes we bought more expensively than if we would have had contracts with only some particular companies, but that is the cost of transparency."*
>
> Interview with Sra. Victoria Ahumada, ex-manager in EMOS, 2006-10-27. Author's translation.

Managers of EMOS were professionals and came from within the company. They in turn did not consider political matters when employing their staff. Politics were always held external and managers were free to compose their teams as they wished. EMOS had well established internal rules for employment, which limited employment on political grounds. In the period before the reform in 1990, nepotistic employment was also probably held back by the low remunerations in the sector (field interviews).

[11] The reasons for this are described by Shirley, Xu and Zuluaga, 2002.

As mentioned earlier many workers and managers in the sector felt a special affinity to their job. Although, this was not transmitted to the customers, who did not consider sanitation workers with any high esteem. The relations between workers and customers were, for a long time, characterized by typical bureaucratic interactions. Low tariffs did not give the population any power in demanding better services or attention. This started to change in the 1990's when the general director of EMOS started a campaign for the "dignifying" of workers in the water sector. A new approach to the customers was also adopted: they were now called *clients*, and should be treated as if they had the possibility to change to another water supplier. Subsequently, the client relations were more professionally managed (field interviews).

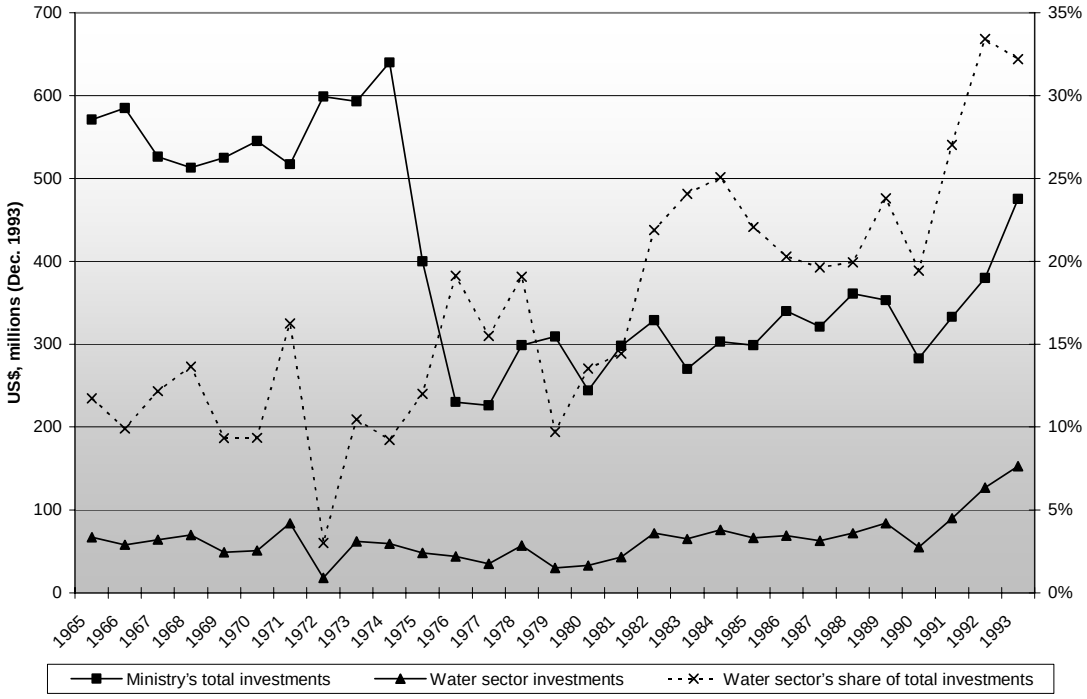
Another measure, to strengthen the knowledge within the company was to interchange information on practices and methods between different departments within the company. The idea was that an operation technician would contribute more to the overall performance of the company if he knew how the administrative department of the company worked, and vice versa. Employees understand their own role better and perform better if they have a holistic view of their workplace (Alfaro, n/d).

5.5 The water sector: a government priority?

There are different ways to look at the question whether the water sector "always" has been a government priority in Chile or not. On the one hand, the sewerage system in Santiago was born after an epidemic outbreak already in the beginning of the 20th century. The Chilean government's early concern for water and sanitation is said to be influenced by a traditionally strong public health sector. Doctors have been insisting on preventive measures, such as vaccination programs to a larger extent than in other countries. This policy has also had effect on the government's view of the water sector (field interview; Morandé and Doña, 1997). On the other hand, before 1975 the government's priority was to extend drinking water and sanitation coverage and no attention was given to the economic viability of services, which makes a system unsustainable in the long run.

The coverage of drinking water and sanitation has been continuously increasing in Chile since 1965, although at varying speed (SISS, 2006). The fact that the coverage never decreased shows that authorities have coped well with population increases. It would be interesting to compare the evolution of coverage to that in other Latin American countries, but with existing data sources, this is not possible.

Graph 5: Total investments of the Ministry of Public Works and investments in the water sector



Source: Chile/SISS, *Memoria 1990-1993*, 1994.

Data that can be used for comparison over time is the percentage of the ministry of public works' investments, dedicated to the water and sanitation sector. There are important variances from year to year, but one can see a general increasing tendency between 1965 and 1993. The amount of investments in the water sector in real terms has been relatively stable, while the total amount of investments of the ministry of public works has varied a lot more. Especially between the Allende and Pinochet governments, when average annual investments dropped from about US$ 560 millions to about US$ 330 millions, consistent with the general diminishing of the state under the right wing military regime and the economic crisis in the mid 70's. This implies that the water sector's share of the ministry's total investments rose between the two governments. After the return to democracy, the ministry's total investments rose again and this time the water sector's investments reached higher levels than before, implying a further increase in the percentage dedicated to water and sanitation. There are two main reasons for this: the Chilean economy's general increase in the 1990's contributed to higher tax incomes, and there was an increase in investments and a cut in current expenses, within the public finances (Chile/MIDEPLAN, 1999). See graph 5.

What can be concluded is that the Pinochet and Aylwin governments dedicated a larger part of the ministry of public works' investments to the water sector than the previous governments. That they had a special concern for investments in the water sector is also shown through the fact that it was not the water sector that was used as the main adjustment mechanism at the time of the mid 70's crisis and when the total investments in public works increased in the early 90's, so did the water sector investments.

5.6 EMOS' internal policies and characteristics

The factors mentioned so far have a general character and are valid for all companies in the Chilean water sector or even for the entire public sector. They are important because without them EMOS would not be able to develop as it did. However, it is not only the environment that pushed EMOS to perform well, but great efforts were also made inside the company.

5.6.1 Outsourcing to enhance efficiency

From its earliest years, EMOS started developing strategies for outsourcing as a way of cutting costs in response to the combination of tighter budgets, inflexible employment and remuneration structures of the public sector, and increasing demands on service quality. This reduced the EMOS in-house personnel from more than 2400 in 1977 to around 1700 in 1989 (Chile/SENDOS, 1989). In EMOS' annual reports there is no information on the number of sub-contracted workers, but other sources state that they were about 1500 in 1989 (monthly average) and 1000 in 1987 (Chile/SENDOS, 1989; Yepes, 1990). However, the number of sub-contracted workers is difficult to compare with the number of in-house personnel, since they might have short-term contracts or only work part-time at EMOS, and in the end their cost is more important than their number.

In the beginning, the outsourcing was only considered from a general economic perspective, without consideration or measurement of productivity, since the company had little experience in this field. Over the years this changed and economic analysis became more and more important in the outsourcing strategy and for the overall management of EMOS, accordingly with government politics on public spending.

The first services outsourced, already in 1977, were some activities within network maintenance, distribution of bills and the service of disconnecting and reconnecting clients in the case of unpaid bills. Some initial problems occurred due to inexperience in drafting contracts and administering sub-contractors. The new companies offering services to EMOS also needed support in the training of its personnel and the introduction of computers. However, they were benefited by the condition on hiring a certain percent of former EMOS staff. After adjusting the difficulties encountered in the beginning, the results from the first contracts were deemed sufficiently positive and they continued with other services, such as meter reading, transports, maintenance and repairing of house connections among others (Chile/SENDOS, 1989).

Most contracts were awarded for two years through competitive bidding. The selection procedures differed according to the nature of the activity. For the installation of basic works public bidding was used to choose the most suited construction company. For the more complicated task of developing a 25-year plan, a private bidding process between pre-selected consulting firms was preferred.

With the outsourcing strategy, EMOS became a company mainly employing high-skilled technical and administrative personnel, primarily executing strategic functions such as accounting, tariff studies, and operation activities closely related to the quality of services (Blokland, 1999). Employees were also trained for the supervision of the subcontracted staff and their services. In terms of improved efficiency, EMOS could benefit from lower prices by contracting services from third parties which developed economies of scale through servicing several companies. As wages increased in EMOS after the second reform, it also became more economical contracting low-skilled labour through third parties which often paid minimum wages, compared to employing them internally (field interview).

Another measure to increase productive efficiency was the policy of water conservation. This was implemented at all levels of the production and distribution. Illegal consumption was detected and clients were educated in basic plumbing; efforts that reduced UFW (Alfaro, 2007).

5.6.2 Improved effectiveness by extending services to the poor

One of the most difficult challenges in reaching the effectiveness goal of 100% coverage of water and sanitation is extending the services to the poor while maintaining the efficiency of operations. The tariffs needed for auto-financing in the long run as well as connection fees may be too high for many low-income families. High coverage figures in Chile are related to the fact that, according to law, new houses must be built with water and sanitation connections and the connection fees are thus included in the total price of the house. However, informal settlements outside the planned urban development zones do exist, although in much smaller scale than in other Latin American capitals. The responsibility for their water provision falls on the municipality, which in many cases does not have the financial resources for this. In addition, these settlements often have inconvenient locations such as river banks or lowland terrain, so there may be physical difficulties in reaching them. A special attention to these clients is therefore needed to reach full coverage.

As mentioned above, EMOS had almost 100% coverage already in 1980, but at this time some poor settlements were excluded from the concession area. When the area was enlarged, solutions for network extensions were sought in cooperation between EMOS, the municipality and the community, to reach the clients outside the existing network. In some cases, municipalities needed help with project design, for which a new division was created within EMOS. In other, the funding of projects was shared equally between the three parties. In informal settlements where networks existed but connections were lacking, EMOS offered a payment scheme of up to 60 instalments to make the connection fee affordable to poor households. For the poorest clients, only a symbolic sum was charged, aiming at creating a habit of payment. Once connected, preferential attention was given to poor clients, to help them afford the monthly bill. The EMOS' Consumer Orientation Unit produced client education material on how to save water and organized basic plumbing workshops. The same unit worked with the information and promotion that was needed for the new subsidy to take effect and as already mentioned EMOS took part in the amendments of the subsidy law which improved its applicability (Alfaro, 1997).

According to EMOS' general manager at the time, one of the advantages of public companies is the major possibilities to have a holistic and long-term view of water and sanitation issues, including as well the social aspects that are needed for extending coverage to low-income population, in comparison to a private company which tends to have a more short-term orientation. From this point of view, EMOS did not make losses when they offered low-cost solutions to poor households; they gained new clients (field interview). Expressed in other terms, losses in efficiency were compensated by gains in effectiveness.

5.6.3 EMOS serving the capital city

The fact that EMOS was the company serving Santiago, the capital city, has also been important for its performance. Since cities are more densely populated than rural areas, water and sanitation services become more important. In Chile, the metropolitan region holds 40% of the population, but only 2% of the country's surface area.[12] Political attention is often focused on the capital, since it has a great concentration of population, which often has higher wages. The capital is also more visible internationally, and together this leads to water services in the capital getting a higher priority than those in the rest of the country.

This was reflected in the institutional organization of the water sector. As already explained, the first important difference between SENDOS, EMOS and ESVAL was that EMOS and ESVAL were created around already existing companies. Therefore they had more autonomy than the regional offices of SENDOS, maintaining their characteristics of public services. EMOS and ESVAL also got a better support from the SENDOS national office, concerning for example technical equipment.

[12] Calculated on the basis of data from INE, 2001

> *"The machinery, the equipment, the first computers we bought, we bought them for EMOS and for ESVAL. The first optic reader… In 77-78, I had international contacts… optic reading started for making the bills. We bought optic readers and to whom did we give them? To EMOS, because it was the company that was here. We all felt very close to EMOS."*
>
> Interview with Sr. Guillermo Ruiz Troncoso, director of DOS/SENDOS 1975-79, 2006-10-30. Author's translation.

Despite having the same degree of autonomy there were also differences between the performance of EMOS and that of ESVAL. This is attributed to the larger share of high-skilled employees working in EMOS (field interviews). The percentage of professionals out of the total number of employees was about 8.6% for ESVAL and 16.6% for EMOS, in 1987 (Chile/SENDOS, 1989). Chile's highly centralized administration implied a concentration of high-skilled people in the capital city. Most engineers, managers, economists etc preferred working in Santiago (field interview). For example, the first regional directors of SENDOS were offered new houses and offices as an incentive to make them accept their positions in the remote regions of the country (field interview). This illustrates the reasoning of Foster, that the scarcity of human resources makes strong decentralization undesirable (Foster, 2005). With a municipal organization of services in Chile, it would have been even more difficult to attract competent staff to small localities, far from Santiago.

6 Concluding comments and recommendations

The performance of EMOS improved in its different aspects, at different times during the period analyzed. The productive efficiency was enhanced from the very beginning, mainly through the outsourcing strategy, and the company covered total costs and started yielding profits at the end of the 1980's. Coverage of services increased during the entire period. In the 1990's drinking water reached 100%, sanitation services almost did as well, and coverage of wastewater treatment started to advance, although slowly.

The list of determinants of good performance of EMOS and the rest of the Chilean water sector under public management presented in this paper does not pretend to be exhaustive. However, in this study, these are the most obvious factors that explain the success.

As stated in the introduction, despite the difficulties with emulating practices from other countries, the idea with this study is to examine and put forward an example of good performance of water and sanitation services. Even if some circumstances are not possible to transfer to other countries, they need to be explained to give a more complete picture. These circumstances are especially those external to the water sector, relating to overall, national politics and macroeconomic tendencies. As such, the framework of the military regime during the 1970's and 1980's is considered a non-repeatable circumstance. The absence of democratic, political forces may have facilitated a radical change of the institutions in the water sector and an increased focus on efficiency, but it is not a desirable form of government for any country. Neither is it said that such a development can not take place under a democratically elected government.

What is interesting for policy makers when looking at the case of Chile is not mainly the specific characteristics of the water sector institutions or the reforms, but some of the underlying guiding principles which are important whether services are provided either under private or public management. These are the principles of auto-financing and technical management of services, which should be the basis for regulation mechanisms, as well as economic and financial evaluation in decision making. Reaching auto-financing will mean a raise of tariffs and this may be difficult to implement in many developing countries, due to widespread poverty. In Chile, this was solved by introducing a direct means-tested subsidy, which is one of a kind in the world. This may not be feasible in many other countries, since it requires stable tax incomes and a low level of corruption. A cross subsidy is another option, but it must be carefully designed so that it does not result in regressive redistribution, which was the case in Chile in the 1980's. For any subsidy system, an efficient public administration is needed that can identify the beneficiaries of the subsidy and channel the resources to them.

It may be better to start by giving the water sector a certain autonomy, to favour the focus on technical criteria and make operation of services more productively efficient, as this should lead to lower tariffs in the long run. Closely related to this is the size of the organizational units which is also important for the productive efficiency. It is not certain that a division by regions is the optimal for every country. This depends on how the country is divided administratively and also on the distribution of the population. For Chile, a division by regions turned out to be favourable for the operation of services as well as from the environmental perspective, even if this was not the main intention from the beginning. What can be concluded is that an intelligent design of organizational units, taking into account the geographical (river basin), administrative and demographic conditions of the country can improve efficiency.

For public company managers, it may be easier than for policy makers to directly imitate some of the policies used in EMOS to improve its performance. The outsourcing strategy, the economic evaluation of projects, the knowledge-sharing between personnel from different areas within the company and the client orientation are all inspired by practices from the private sector. The general advice given is to use such private sector techniques, to increase efficiency, in combination with an active social commitment, to make water services accessible also for the low-income population. These measures can be considered repeatable, but a public company might be resistant to using them unless the right incentives are given.

A lesson can also be drawn from the handling of human resources in EMOS. Appointing managers on a basis of technical and leadership skills seems to have been beneficial for the entire company. The staff they employed was well motivated, highly skilled and characterized by sound ethics. Thus, it is an advantage not letting political considerations interfere in the employment procedures.

As a final comment, it is important to point out that the lack of historical statistical records has limited this study in certain respects. Data is scarce and not 100% reliable. Monitoring of performance indicators is important for comparisons, between companies, internationally and over time, which in turn makes evaluations of different forms of management possible. To facilitate future assessments of well-performing services, it is desirable for water and sanitation utilities (being public or private) that indicators are compiled in a consistent way.

7 Epilogue: The privatization of EMOS

In 1995, the Chilean government under president Frei, decided to start selling their portion of the urban water sector. The main reasons were to incorporate private capital, to be able to extend wastewater treatment and to free up government resources which could be dedicated to other areas, such as education or rural water services. The first company that was sold was ESVAL in 1998 and in 1999, 51.2% of the shares in EMOS were sold to French and Spanish investors. In 2001 the company changed name to Aguas Andinas.

At this time the goal of 100% coverage of drinking water was reached in Santiago and wastewater coverage was at 97.8%. Therefore, a new effectiveness goal was now in focus: the treatment of wastewater. Since coverage was only 3% in 1995, a large amount of investments was needed to construct the necessary treatment plants, estimated for EMOS to at least US$ 600 millions over ten years (Alfaro, 1993).

Several sources concur that privatizing the drinking water companies was not the only solution for financing the wastewater treatment in Santiago. For example, it had been perfectly feasible for EMOS to carry out the wastewater treatment project, if the company had been allowed to finance this by taking a credit (field interviews). Another solution could have been to call for tenders to construct and operate the treatment plant, perhaps under a BOT[13] contract. Calling for tenders worked well for the public company ESSAN S.A. in Antofagasta which set up one desalination plant and one wastewater treatment plant in this way (Fischer and Serra, 2003). In sum, it was a political decision conveying that the state should not engage in this activity in the rest of the country and that public companies could not be in debt.

However, five years after the privatization of EMOS S.A., 68% of the wastewater in Santiago was treated (Chile/SISS, 2006). The other very notable result of the privatization was the increase in productive efficiency measured as number of clients per worker. With its European contacts, Aguas Andinas could bring new, advanced technology which implied a technological substitution in the company. However, these changes were initiated already before the sell out. For example, within client attention, new procedures for the management of complaints and billing were introduced. In control of operations a unit allowing distance control over the different works and plants was created. About 500 employees were laid off and were offered early retirement or other forms of compensation for voluntary withdrawal (field interview; Alfaro, 2007).

Despite the seemingly increase in productive efficiency, the tariffs have kept rising. Of course, the costs for the ongoing extension of wastewater treatment have been added to the bill, but independently of this, the tariffs for drinking water and sewerage have risen too (tariffs are calculated separately for each step in the production). It remains to see whether the efficiency gains are real, since they in that case should translate into lower tariffs, within the near future.

[13] Build, operate and transfer. At the end of the contract, the plant is transferred to the company that ordered it, which from that point takes over operation.

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