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Analysis of management models of water utilities and water coverage

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Analysis of Management Models of Water Utilities and Water Coverage

A Thesis

Presented in

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ABSTRACT

Academics, global leaders, and practitioners have debated, for decades, over the best management models (public, private, decentralized) of water utilities for increasing water access. Proponents of privatized water utilities argue profit motive incentivizes efficiency leading cost saving, infrastructure improvements, and increase usage. Proponents of publicly owned water utilities argue that efficiency is improved do to accountably to a constituency. Proponents of decentralized utilities argue locally owned water utilities maximize resource efficiency and eliminate waste because of accountability and local knowledge.

This thesis investigated whether these debates over the best management model for increasing accessibility oversimplify a complex global development issue. To investigate the impact of management models of water utilities had on water coverage this thesis used statistical analysis coupled with three water utility case studies (Agua Argentina (AASA) in Argentina, Companhia de Saneamento Basico do Estado de São Paulo (SABESP) in Brazil, Cooperativa de Servicios Públicos Santa Cruz (SAGUAPAC) in Bolivia). Statistical analysis did not

identify a satisfactory relationship between management models and water coverage. Additionally, case studies showed nuanced factors external to management models significantly impacted a utility's water coverage.

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ABBREVIATIONS

AASA-	Aguas Argentina
ARENA-	National Renewal Alliance
BAMR-	Buenos Aires Metropolitan Region
BOVESPA-	Brazilian Stock Exchange
COBES-	Bureau of Social Welfare
COOPLAN-	Cooperativa de Servicio Públicos Tres Mil
COP-	Comité de Obras Publicas (Committee of Public Works)
EMURB-	Municipal Development Agency
ETOSS-	Ente Tripartito de Obras de Servicios de Saneamiento
IBNET-	International Benchmarking Network for Water and Sanitation Utilities
MDB-	Movimiento Democrático Brasileiro
MRSP-	Metropolitan Region of Sao Paulo
MHUA-	Ministry of Housing and Urban Affairs
OSN-	Obras Sanitarias de la Nación
PLANSA-	Plano Nacional de Saneament Basico
PMDB-	Brazilian Democratic Movement Party
PPI-	World Bank's Private Participation in Infrastructure database

SABESP- Companhia de Saneamento Basico do Estado de São Paulo

SAGUAPAC- Cooperativa de Servicios Públicos Santa Cruz

SISAB- Superintendencia de Saneamiento Básico

SUMA- Servicio Universal y Mejora Ambiental (Universal Service and Environmental Improvement)

Research Statement

In 2000, Cochabamba, Bolivia privatized its municipal water utility resulting in massive protests and push back by the city's residents. Typically referred to as the 'Cochabamba Water Wars', the episode epitomizes a decades long debate about the impact of management models of water utilities on water access. Various international governmental and nongovernmental agencies estimate that anywhere from 880 million to 1.1 billion people lack adequate drinking water access.¹ Academics, global leaders, and practitioners have debated, for decades, the best ways to increase access. Pro-market donor organizations, like the World Bank, have commonly argued that privately operated water utilities position water as an economic good rather than a public good. This commoditization can discourage over consumption and waste while generating much needed revenue for the infrastructure

¹ The term 'adequate drinking water access', as defined by the World Health Organization (WHO), refers to "the improved service of piped water delivery provided by water utilities." Water access is defined broadly by the WHO as, "the availability of at least 20 liters per person per day from an 'improved source' within 1 kilometer of the users dwelling." The term 'improved source' is further defined as, "types of technology and levels of service that are more likely to provide safe water, such as household connections, public standpipes, protected wells." Service delivery is a broad concept as well, which could include delivery by bottled water or truck. Typically water utilities are integrated systems consisting of water treatment plants and delivery infrastructure (i.e. piping and infrastructure) responsible for accessing, filtering, sanitizing and delivering fresh drinking. This thesis will focus on piped water delivery provided by water utilities.

improvements of water utilities. Improvements to infrastructure can increase access by lowering the cost of piped water delivery. In opposition, it has been argued that water access is a universal right, a natural monopoly, and cannot be commoditized. Furthermore, privatization will increase the cost of water access leading increased access challenges for impoverished communities. Therefore, ownership of water utilities should remain in the public sphere.

This thesis investigated whether these debates over the best ownership model for increasing accessibility oversimplify a complex global development issue. This thesis used statistical analysis coupled with case studies to investigate the impact management models of water utilities in developing countries² had on water coverage. A statistical analysis of 144 water utilities in 33 different countries did not establish a satisfactory level of significance between management models and water coverage. Case studies of a privately owned water utility in Argentina, a publically owned water utility in Brazil, and a water

² The World Bank, "Data - Country Classification."; defines developing as, "*countries with GNI per capita measurement of less than \$11,905.*" Countries with a GNI score below \$976 as low income, \$976 to \$3,855 lower middle income, and \$3,855 to \$11,905 as upper middle income.

cooperative in Bolivia showed that factors external to ownership significantly impacted water coverage.

Discussed in the Literature Review Section, proponents of each ownership model commonly claim that their model increases water coverage through efficiency improvements. Proponents of privatized water utilities argue that commodification of water creates profit motive that incentivizes efficiency. Proponents of publicly owned water utilities argue that efficiency is improved because utility managers are accountable to a constituency. Proponents of decentralized water utilities argue that locally owned water utilities are more suited to maximize resource efficiency and eliminate waste because of accountability and local knowledge. After reviewing the literature covering management models this thesis started from the assumption that management models do impact water coverage.

A regression model was used to identify statistical relationships between the water coverage of water utilities (categorized as public, private, or decentralized enterprise) and three independent variables that measure a utility's efficiency. The regression model used water utility performance data collected from the International Benchmarking

Network for Water and Sanitation Utilities (IBNET)³ program. The dependent variable was IBNET's indicator 'water coverage' defined as "the percentage of population with access to water services as a percentage of the total population under utility's nominal responsibility."⁴ The collected independent variables were: water production,⁵ non-revenue water,⁶ and unit operational cost.⁷ Regression analysis measured the relationship between the water coverage of categorized water utilities and their levels of water production, non-revenue water, and unit operational cost.

To test the assumption that management models impact water coverage through efficiency regression analysis would need to establish a relationship between at least one ownership model's (private, public, or decentralized) water coverage and all three independent variables- water production, non-revenue water, and unit operational cost. This

³ IBNET is a non-governmental organization that is funded by United Kingdom's Department for International Development, The World Bank, and The United Nations Water and Water and Sanitation Program. IBNET collects water and sanitation utility performance data and creates a benchmarking program that allows participating utilities access to comparative information.

⁴ "IBNET Indicators," 2.

⁵ Ibid., 3. Water Production is defined as, "litres/person/day; total annual water sold expressed by populations served per day.

⁶ Ibid., 5. Non-revenue water is the "difference between water supplied and water sold (i.e. volume of water lost) expressed as a percentage of net water supplied.

⁷ Ibid., 8. Unit operational water cost is the "annual water service operational expense/total annual volume sold."

thesis hypothesized that all three management models will show relationships between water coverage and the three independent variables.

Regression analysis showed statistically significant relationships between each ownership model's water coverage and the independent variables. Both publicly and privately owned water utilities had inverse relationship between water coverage and non-revenue water. Decentralized water utilities had a statistically significant relationship between water coverage and unit operational cost. Regression analysis showed that perhaps there is a weak relationship between ownership model, water coverage, and efficiency.

This thesis analyzed one case study from each categorized ownership model to identify the positive and negative factors that impact the performance of water utilities. Kate Bayliss, from the University of Greenwich, has argued, "the nature of ownership does not necessarily indicate how an enterprise will perform."⁸ For Bayliss, pricing, utility history, cost recovery, and the political environment influence utility performance. This thesis' three case studies concur with

⁸ Bayliss, "Utility Privatization in Sub-Saharan Africa," 529.

Bayliss' conclusion by showing that factors external to management models impacted water coverage.

For the privately owned case study this thesis looked at Aguas Argentina (AASA) a privatized water utility operating in Buenos Aires, Argentina. AASA was awarded a 30 year concession contract but failed to meet contracted performance targets for expanding water coverage. Reviewed literature showed a rushed privatization process established institutions that failed to mediate the unique challenges created by local historical, political, geographic, and economic factors.

For the publicly owned case study this thesis looked at the Brazilian water and sanitation utility the Companhia de Saneamento Basico do Estado de São Paulo (SABESP) a public corporation primarily owned by the state of São Paulo. This case study found that the rise of democracy in Brazil played a significant role in SABESP's success in expanding water coverage.

For the decentralized case study this thesis looked at the Cooperativa de Servicios Públicos Santa Cruz (SAGUAPAC), a water and sewage utility serving the city of Santa Cruz de La Sierra, Bolivia. The wealth of SAGUAPAC's service area coupled with World Bank loans

played a significant role in the Bolivian utility's successful expansion of water coverage.

Highlighted earlier, the Cochabamba Water Wars emphasizes the importance of this research. Water availability is not just a business need or an economic need- it is needed for human existence.

Distributions in access can lead to violent reactions as demonstrated in Cochabamba. The next section reviews the literature on type of water coverage and production for this basic life necessity. Poor water access is often associated with poverty. For impoverished municipalities, states, and countries with limited resources and alternatives a better understanding of water delivery mechanism can be critical. The findings from this research contribute to the understanding that management models alone do not positively or negatively impact water access. More nuanced factors like a region's laws, geography, history, and economics have significant impact on water accessibility.

Literature Review

While the management models have been separated into three different categories it could be argued that these categories themselves are oversimplified. Within each category- private, public, and decentralized- there is variance in governance and legal structures. This Literature Review section begins with an overview of each ownership model and their various structures. Following, will be an examination of the various arguments surrounding water ownership.

Types of Management models

For the most part water ownership and delivery was the purview of states and municipalities. During the 18th and 19th century, states and municipalities were the only entities capable of expanding water service to rapidly growing populations. This largely contributed to the ascendancy of states and municipalities in water delivery⁹ Occurring in the last few decades of the 20th century international organizations like

⁹ Hall and Lobina, “Water as a Public Service,” 2–7. Authors’ note that states and municipalities as water providers began with European countries and expanded globally through colonialism. France was a notable exception with private companies contracted by municipalities as utility operators.

the World Bank promoted the idea that private companies are better at water delivery than state or municipal management.¹⁰ Later, in the Aguas Argentina case study this thesis discusses how this promotion of privatization influenced the Argentinian government in the 1990's.

Privatization of water utilities exists on a spectrum. At one end of the spectrum a private company may have complete ownership of a water utility; while at the other end a private company may be contracted by the state to manage a utility. When a private company completely owns a water utility they own the infrastructure- processing (plants and sanitation) with delivery (water pipes). Often they have more agency over business decision allowing more capability to increase profits. At the opposite end of the spectrum a private company contracted to run a utility will have less agency over business decision and will be more dependent on generating profits through efficiency gains. Despite the variability in ownership perception of water is similar. Privatized water utilities view water as a commodity and seek to maximize profits through efficiency gains. Private utilities strive to produce more water at lower cost while decreasing non-revenue water.

¹⁰ Bakker, "The 'Commons' Versus the 'Commodity': Alter-Globalization, Anti-Privatization and the Human Right to Water in the Global South.," 433–436.

The privatization of a state or municipally owned water utility can occur through a divesture sale, concession contract, a lease agreement, or a management contract. A full divesture sale occurs when a water utility is sold by a state or municipality to a private company giving the organization complete control over water delivery, maintenance, infrastructure, and billing.¹¹ Concession contracts are a more common form of privatization and occur when a company “takes over the management of a state owned enterprise for a given period.”¹² Privatization can also occur when private companies lease water rights from the state, or are contracted to manage the utility, allowing for government to have more influence on ownership and investment decisions.¹³

Publicly owned water utilities are owned and managed by a national or state/provincial government. Water is viewed as a universal good and a natural monopoly. Public water utilities in various countries tend to be owned and managed by national or state/provincial governments and are responsible for the maintenance and operation of

¹¹ Public Private Infrastructure Advisory Facility, “PPI Glossary - Private Infrastructure Projects - The World Bank & PPIAF.”

¹² Ibid.

¹³ Ibid.

all levels of water distribution and sanitation.¹⁴ Typically, a public water utility can be managed as a ministry or department, a statutory body, or as a public company, each with different management structures and oversight. Water utilities that are managed as a ministry or department of the government may operate under a system of direct control and oversight and do not exist as a separate legal entity. A water utility that is a statutory body is typically owned by the government and operates under public law, with a legal act establishing it as an autonomous corporate body. A public company may demonstrate similar characteristics of a private company, but with government by and large acting as the main shareholder.¹⁵

Decentralized utilities are operated by local entities like city council, municipal government, water association, or a water cooperative. Similar to publicly owned water utilities, decentralized water utilities view water as a universal good. The difference is that utility governorship should be handled at the local level.

Decentralization can occur in a variety of ways with the most common systems occurring when a national government transfers

¹⁴ Gleick et al., "The New Economy of Water," 26–27.

¹⁵ Baietti and van Ginneken, "Characteristics of Well - Performing Public Water Utilities," 2–3.

authority to a more localized entity. For example, local entities – city council, municipal government, water association, or a water cooperative – can be given decision-making ability over water utilities and the authority to collect revenue in the forms of taxes or tariffs.¹⁶

The local water entity may then serve as the policymaking and regulating body. Below that body a service operator may be set up and charged with the day-to-day operations of the water utility.¹⁷

Alternatively, service operations may be contracted out to a private company. Under a mixed capital model the municipality may choose to sell a small fraction of utility ownership to smaller water associations operating in the service areas.¹⁸

An increasingly popular form of decentralization is the water cooperative. Similar to publicly managed management models, cooperatives do not seek profit but to provide universal service coverage. They differ in that they are owned by the utility's consumers- often called members. Cooperative governance structure is typically designed to allow membership voting rights, oversight, and

¹⁶ Ribbot, Jesse, *Democratic Decentralization of Natural Resources: Institutionalizing Popular Participation*, 9.

¹⁷ Agrawai, "Enhancing Water Services through Performance Agreements," 7.

¹⁸ Dickson, Eric, *Management Models of Water and Sanitation: Approaches to Decentralization in Honduras*.

accountability. Utility management is accountable to member elected administrative and oversight boards- drawn from members.¹⁹

Public Good versus Economic Good

In general, private water utilities differ from public and decentralized water utilities in its perception of water. Both public and decentralized water utilities view water as a public good- it's both non-competitive and non-excludable. In contrast, private water utilities treat water as an economic good and seek profit maximization.²⁰

Proponents of privatization, occasionally referred to as 'market liberals' or 'neoliberals', are characterized by the belief "that the free market is the best mechanism to maximize resource consumption, efficiency, and allocation."²¹ In essence, these theories advocate for the removal of government ownership and the liberalization of the market. Market advocates argue that public resources, like water, will not be efficiently utilized unless managed by the private sector. Privatization will treat water as an economic good by establishing a price and

¹⁹ Ruiz-Mier and van Ginneken, "Consumer Cooperatives," 6–7.

²⁰ Budds and McGranahan, "Are the Debates on Water Privatization Missing the Point?," 92–98.

²¹ Harvey, *A Brief History of Neoliberalism*, 5–38.

concurrently a market. Priced water will be treated as a commodity giving government, industry, and society incentive to conserve and protect it. In addition, a market will bring about investment and improvements in water infrastructure and technology. This will be possible, "through efficiency gains and better management, private companies will be able to lower prices, improve performance, and increase cost recovery, enabling systems to be upgraded and expanded."²²

Michael Goldman argues that privatization advocates, like the World Bank, portray the private sector as benevolent actors working strictly to increase water access for the global impoverished. This benevolent perception is broadly fictitious. The private sector is largely motivated by profit and concerned with cost recovery, which often leads to price increases and water cutoffs to the impoverished.²³ In opposition, market advocates often argue that publicly managed water utilities attempt to ensure affordability by using cost subsidization schemes to keep water tariffs low. Frederick Segerfeldt argues that

²² Bakker, "The 'Commons' Versus the 'Commodity': Alter-Globalization, Anti-Privatization and the Human Right to Water in the Global South.," 437.

²³ Goldman, *Imperial Nature*, 221–271.

such subsidization schemes set prices so low “that on average it only covers about 30 percent of the water supplies expenses.”²⁴ In essence, public water utilities lack the adequate cost recovery needed to prevent infrastructure deterioration and increase in inaccessibility of piped water. Essentially, privatization proponents commonly argue that privatized water utilities’ profit motive ensures cost recovery, which is used for infrastructure maintenance and expansion.²⁵

Within the last few decades’ market advocates have successfully promoted markets and privatization as a viable solution to many global issues related to economic development, human rights, and environmental degradation.²⁶ In regards to development, market advocates argue that the public sector has failed in providing drinking water to an estimated one billion people. It is not uncommon for governments to engage in corrupt behavior by allocating resources to appease the more politically connected upper and middle class and neglect the impoverished. Likewise, a privatized water sector may be more apt, competent, and less politically corrupt in delivering water

²⁴ Segerfeldt, *Water for Sale*, 45.

²⁵ *Ibid.*, 43–58.

²⁶ Dezalay and Garth, *The Internationalization of Palace Wars*.

services to the poor.²⁷ Such arguments and studies supported the declaration of water as an “economic good” at the 1992 International Conference on Water and Environment.²⁸ In opposition, authors Bond and Goldman argue that global neoliberal organizations, like the IMF and the World Bank, use water scarcity and development as a vehicle to push pro-market solutions onto developing countries. Goldman describes how World Bank promotes privatization programs through a transnational policy network of development specialists, government technocrats, and journalists, who are dependent upon the Bank’s largesse.²⁹ Bond draws on South Africa’s experience with utility privatization to show how privatization programs, imposed by external global institutions, fail and result in populist anti-privatization movements.³⁰ A theme found in both authors’ work is that privatization is a project that is imposed by external actors that results in disconnect between the development rhetoric of neoliberal institutions and the interest of peoples in developing countries.

²⁷ Segerfeldt, *Water for Sale*.

²⁸ Gleick et al., “The New Economy of Water,” 6.

²⁹ Goldman, *Imperial Nature*, 221–270.

³⁰ Bond, “Water Commodification and Decommodification Narratives.”

Market proponent arguments are based on the assumption that water can be converted from a public good, where water is non-excludable, to an economic good, where water is excludable and set by price. In contrast, the opponents of privatization argue that the conversion of water into an economic good is not possible because it is a product that lacks competition and cost-reflective pricing.

With regard to competition, academics commonly contend that water utilities are natural monopolies because the technological and associated costs for water utilities are so high "it is more economical for a single firm to supply services than two or more competing firms."³¹ Privatization opponents argue that because water utilities operate as a natural monopoly there is no competition and without competition for market share, privatized water utilities will have no incentive to maximize efficiency, minimize cost, and invest in infrastructure, repairs, research and development of new technologies.³² Proponents of privatization argue that there are various schemes and mechanisms that simulate competition. For example, franchise bidding, a concept pioneered by Demsetz in 1968, is a process where the private sector

³¹ Joskow, "Regulation of Natural Monopoly."

³² Vickers and Yarrow, "Economic Perspectives on Privatization," 116.

competes “to become the sole producer in a naturally monopolistic industry.”³³ Furthermore, Demsetz asserts that this process would be viable alternative to rate regulation in controlling the behaviors of natural monopolies.³⁴ Also, benchmarking programs like IBNET use yardstick measurements like water coverage, water production, non-revenue water, and unit operational costs to create a matrix where individual water utilities can compare their performance against one another.³⁵

For pricing, market advocates like Peter Rogers, Radhika de Silva, and Ramesh Bhatia argue “the correct pricing of private and public goods can lead to gains in economic efficiency.”³⁶ Using neoclassical marginal cost theory the authors argue that when water is correctly priced there is a demand in reduction, efficient reallocation of the resource, and increase in supply.³⁷ Bakker argues water is a public good that cannot be ‘correctly priced’ because of the temporal and spatial externalities associated with water. A crude and simplified explanation of this point is that water utilities delivering potable piped

³³ Prager, “Firm Behavior in Franchise Monopoly Markets,” 211.

³⁴ Demsetz, “Why Regulate Utilities?”

³⁵ van den Berg and Dailenko, “IBNET-a Global Database of the Water Sector’s Performance.”

³⁶ Rogers, De Silva, and Bhatia, “Water Is an Economic Good,” 2.

³⁷ Ibid.

water to consumers must adjust to a variety of geographical features. Some households may be located on top of a hill, while other users are located in a valley. In addition, some consumers may live farther away from a water utility requiring more expenditure to deliver potable water. In essence, utilities cannot accurately price water because the delivery of water to consumers has uneven costs.³⁸

Opponents to privatization argue that attempts to maximize profits by establishing a market price for water negatively impacts access in developing countries. For example, Bayliss demonstrates that mathematical cost recovery schemes, like the Automatic Tariff Adjustment (ATA) formula, have negatively impacted consumers. The ATA is a mathematical equation designed to pass infrastructure cost, inflation, and currency depreciation onto consumers. Both the World Bank and the International Monetary Fund have promoted the ATA.³⁹ This mathematical equation has led to price increases by water utilities in Sub-Saharan Africa forcing impoverished populations to either rely on unimproved water resources or cut costs in other areas of family

³⁸ Bakker, "Neoliberalizing Nature?," 556–559.

³⁹ Bayliss, "Utility Privatisation in Sub-Saharan Africa," 517.

spending such as health care.⁴⁰ Privatization opponents argue that due to the volatile nature of water pricing utilities should be operated by the state because it can set tariffs that are accompanied with a policy of cross-subsidization which will ensure utility cost recovery without a price increase on the poor. Admittedly, cross-subsidization policies can be enacted for privatized water utilities; however, states that are engaged in neoliberal projects of privatization tend to reduce government's role, which may then lead to a decrease in subsidies.

Financing of Local Managed Utilities

Water utilities can be managed by localized entities like municipal governments or community water boards. Nobel Lauriat Elinor Ostrom's work has promoted the management of common goods, like forests, fisheries, and water, to be the responsibility of local entities like municipal governments or water cooperatives. The underpinning philosophy of localized management over common resources like water is that smaller communities with adequate resource management capacity (e.g. through the transfer of traditional knowledge, partnership

⁴⁰ Bayliss and Fine, *Privatization and Alternative Public Sector Reform in Sub-Saharan Africa*, 105–120.

with development NGOs) are more suited to maximize resource efficiency and eliminate waste because of accountability and local knowledge.⁴¹ However, critics argue that locally managed utilities have their own governance and financing issues. Locally managed utilities are often limited in their ability to raise the capital necessary for service expansion. For water cooperatives, the not-for-profit mission is often a deterrent for investors and international lenders. Typically, investors look to maximize returns on investments; whereas cooperatives reinvest gains back into infrastructure development. With limited opportunities not-for-profit utilities are dependent upon government largesse for funding.⁴²

Summary

Again the management categories private, public, and decentralized have variance. A privatized utility could be a divesture sale, concession contract, or a management contract. They are categorized together because they share the assumption that profit motive will lead to increased water coverage. Similarly public

⁴¹ Ostrom, *Governing the Commons*.

⁴² Constance, "IDBAmerica: Are Cooperatives a Better Way to Solve Latin America's Water Problems?"

management also has some variance. They could be owned and managed by a national, state, or provincial government. They could exist as a government department or operate as a corporate board. They are united in the periodization of full coverage over full cost recovery. Decentralization is the most challenging category- in particular listing municipality as a decentralized utility. It could be argued that municipality should be listed as public because unlike a cooperative it's a government entity. For this thesis municipal is categorized as decentralized because like water cooperatives and associations municipal utilities prioritize servicing its community above full cost recovery and profits.

Methods and Design

This thesis used both statistical analysis and case studies to explore the impact management models of water utilities in developing countries have on water coverage. Regression analysis was used to identify possible relationships between the water coverage of management models and identified dependent variables- water production, non-revenue water, and unit operational cost. Case studies examined local political, economic, and historical factors that impacted management models and their water coverage. This section describes how sample utilities are selected and categorized, what utility indicators will be used to measure performance, and how gathered data will be analyzed.

Sample Selection

This thesis conducted a regression analysis using water utility data from IBNET- a non-governmental organization that is funded by United Kingdom's Department for International Development, The World Bank, and The United Nations Water and Sanitation Program. IBNET is the

world's largest performance database for water and sanitation utilities. Performance data is used to establish benchmarks for inter-utility comparisons that assist practitioners, governments, and regulators in service improvement.⁴³ On IBNET, water utility samples were drawn from developing countries.⁴⁴ One critique of the sample is that it is too broad and the scope should be limited to a specific region with similarities in geography, demographics, history, economics, and politics. It is not uncommon for pro-privatization literature to use similar data sets to reinforce such claims of improved efficiency and or coverage. This analysis intends to engage in a similar exercise to test the significance of management models influence on water coverage. For this purpose, this thesis has selected a sample from 33 different developing countries in order to minimize the influence of a variety of local and specific factors on water utilities. This sample is also influenced by data availability, and most significantly by the lack of data provided to the IBNET database. Table 1 demonstrates the diversity of countries and regions represented in the study.

⁴³ "About IBNET: Objectives of IBNET."

⁴⁴ The World Bank, "Data - Country Classification.;" For 2008, The World Bank classifies countries with a GNI score below \$976 as low income, \$976 to \$3,855 lower middle income, and \$3,855 to \$11,905 as upper middle income.

Table 1: Sample Utilities by Country

Country	# Utilities	Private	Public	Decentralized
Argentina	6	4	1	1
Armenia	2	2	0	0
Benin	1	0	1	0
Bolivia	2	0	0	2
Brazil	23	0	23	0
Burkina Faso	1	0	1	0
Chile	11	10	0	1
China	2	2	0	0
Columbia	25	13	0	12
Costa Rica	1	0	1	0
Ecuador	1	1	0	0
Gabon	1	0	1	0
India	6	0	0	6
Kyrgyz Republic	1	1	0	0
Lao PDR	10	0	10	0
Malaysia	1	1	0	0
Mali	1	0	1	0
Mauritania	1	0	1	0
Mexico	2	2	0	0
Mozambique	1	1	0	0
Niger	1	0	1	0
Panama	1	0	1	0
Paraguay	4	0	4	0
Philippines	3	3	0	0
Poland	1	0	0	1
Romania	1	1	0	0
Russia	15	13	2	0
Rwanda	1	0	1	0
South Africa	14	0	0	14
Togo	1	0	1	0
Tunisia	1	0	1	0
Uganda	1	0	1	0
Uruguay	1	0	1	0
Total	144	54	53	37

Once sample utilities were identified they were categorized as public, private, or decentralized water utility. As discussed in the Literature Review, these management models have different legal and governance structures. These structures, defined in Table 2, were used to identify and categorize sample utilities.

Table 2: Criteria for Utility Categorization

Economic Regime	Criteria for Utility Categorization
Private	Utilities that are owned, managed, or operated by the private sector through a full divesture sale, concession contract, lease agreement, or management contract.
Public	Utilities that are managed and operated by national or provincial governments as a department/ministry, statutory body, or a government company.
Decentralization	Utilities that incorporate local entities like municipal governments, city councils, or water boards in management process.

Sample utilities were identified through contemporary academic literature and the World Bank’s Private Participation in Infrastructure (PPI) database. The process of collection could have had a sample error

in two ways. First, identified potential samples were matched with the IBNET database to ensure complete data on required indicators. Because of limited space on IBNET data output spreadsheets, utility names are manipulated and shortened. For example "San Pedro MPC" and "San Pedro RACL" are two similarly named utilities from the Philippines. Such manipulations of utility names can lead to confusion and to inaccurate categorization of samples. Second, samples identified through academic literature were categorized based on the descriptions of utility mechanism. A misreading of the academic literature could lead to a misunderstanding of the utility leading to inaccurate categorization. To minimize error, all three economic regime categories have a minimum of 30 samples.

Privatized utilities were identified through data collected from the PPI database.⁴⁵ The PPI collects and publishes data on private investment in infrastructure projects in developing countries. The PPI identified which water utilities were involved in a divestiture sale or were actively operating under a concession, management, or lease contract.

⁴⁵ The World Bank Group, "About the Database - Private Infrastructure Projects - The World Bank & PPIAF."

In total 54 privatized utilities were identified: 2 full divestiture sale, 32 concession, 2 management, and 18 lease contracts.

Cases for the remaining two management models were identified and categorized by utility descriptions found in contemporary academic literature. For public utilities 53 cases were identified: 20 owned by the national government and 33 owned by provincial/state entity government. There were a total of 37 decentralized utilities that were identified: 34 owned by a municipal entity and three cooperatives.

Measuring Performance

IBNET's data is collected by participating water utilities self-reporting measurement data on service coverage, water consumption and production, cost and staffing, and non-revenue water. Data is reported with the use of the IBNET tool-kit, which is a collection of spreadsheets requiring specific information.⁴⁶ The fact that data is collected through a self-reporting process does bring legitimate questions of validity to the process. For example, Electrogaz (Rwanda's water utility) reported, in 2005, that water coverage was at 119 percent

⁴⁶ "IBNET Toolkit | IBNET Toolkit | Toolkit Instructions."

of the population. This figure could be derived from a misunderstanding of the reporting process, inexperience, or political pressure to misrepresent improved performance. This thesis will be leaving such figures out because of unclear, questionable, or poor description of criteria.

To minimize the effects of inaccuracies, misrepresentations, and misunderstandings this thesis used a minimum of 30 samples, gathered from IBNET data, in a regression model to explore the relationship between categorized utility's water coverage and water production, non-revenue water, and unit operational cost. This thesis has elected to use water coverage as the dependent variable for several reasons. First, it measures the percentage of the population within the specific utility's service district that has access to water services, including both household connections and public access water points.⁴⁷ Second, coverage provides insight in a nation state's conception of development and its implementation through concrete policies. Chapter six of the United Nations Development Report 3, "Water in a Changing World" emphasizes how a lack of sustainable water access could inhibit

⁴⁷ "IBNET Indicators," 2.

development.⁴⁸ Finally, water coverage, unlike the other three indicators, measures distribution and not production or delivery. The three independent variables are typically used for benchmarking effectiveness and efficiency.

The first independent variable, water production, provides insight into the production side of water access. Water production is measured by liters per person per day and expresses the total annual water produced and supplied, by the utility, to the distribution system.⁴⁹

Regression analysis will measure the strength of the relationship between an ownership model's performance in water production and water coverage. Tracking and measuring this indicator will show which management models produce higher level of water and if there is an identifiable relationship between water coverage and water production.

The second independent variable, non-revenue water, will observe the amount of wasted water produced by sample utilities. Non-revenue calculates the difference in water produced and water sold in order to establish how much water is lost within the distribution network before

⁴⁸ The United Nations World Water Development Report 3.

⁴⁹ "IBNET Indicators," 3.

it reaches the consumer.⁵⁰ An analysis of water lost can provide insights into the health of a distribution system and validates or invalidates critique. Noted earlier, a criticism of publicly managed water utilities is its failure to curb waste because it is treated as a common good, whereas privatization gives water an economic value that discourages waste. Regression analysis measured the strength of the relationship between an ownership model's performance in non-revenue water and water coverage.

The final independent variable, unit operational cost, measured the health of a utilities infrastructure. Unit operational cost takes the total operational expenses of water utilities (including staffing, infrastructure, and maintenance) and divides them by the annual volume sold to show a 'bottom line assessment of the mix of resources used to achieve the outputs required.'⁵¹ This indicator shows how much it costs to provide water to consumers. Lower costs could indicate a better performing water delivery system coupled with cost effective management and staffing. Regression analysis will measure the

⁵⁰ Ibid., 5.

⁵¹ Ibid., 9.

strength of the relationship between an ownership model's performances in unit operational cost and water coverage.

Table 3: IBNET Indicators

Indicator	Performance Measure	Variable	Definition
Water Coverage	Water Coverage	Y	Percentage of the population with access to water services as a percentage of the total population under utility's nominal responsibility.
Water Production	Water Accessibility	X1	Litres/person/day; Total annual water sold expressed by population served per day.
Non-Revenue Water	Waste	X2	Difference between water supplied and water sold expressed as a percentage of net water supplied.
Unit Operational Cost	Infrastructure	X3	Annual water service operational expenses/Total annual volume sold.

Statistical Analysis

Regression analysis was used to explore statistical relationships between the water coverage of private, public, and decentralized water utilities and three independent variables- water production, non-revenue water, and unit operational cost. This thesis hypothesized that all three management models would show a relationship between water coverage and the three independent variables.

This thesis tested that decentralized water systems would have the most positive impacts on water allocation, infrastructure improvement and waste reduction. Non-revenue water, water production, and unit operational cost will be equal or better to privatization levels and water coverage will be equal or better to publicly managed utilities.

The hypothesis for privatization asserts that utilities will perform well in non-revenue water, unit operational cost, and water production. To evaluate this hypothesis, it must first be shown that privatized utilities have comparatively lower levels of non-revenue water and operational costs while maintaining higher levels of water production.

Public management, compared to privatization and decentralization, will have less infrastructure investment and higher levels of waste, and a poorer performance in water allocation. To validate this hypothesis, analysis must show a lower level of water coverage and production coupled with higher levels of operational cost and non-revenue water.

Case Studies

Three case studies were used to explore the more nuanced internal and external factors that impact the water coverage of utilities operating in Latin America. This thesis used media reports, academic literature, and available databases to explore how price, cost recovery, institutional arrangements (e.g. World Bank Loans), legal frameworks, utility history, and political environment impact the performance of Aguas Argentina (AASA) a privatized water utility in Buenos Aires, Argentina; Companhia de Saneamento Basico do Estado de São Paulo (SABESP) a state owned utility in São Paulo, Brazil; and Cooperativa de Servicios Públicos Santa Cruz (SAGUAPAC) water cooperative in Santa Cruz, Bolivia. Each case study explored the unique events that have led

to significant changes in infrastructure, management, and operations and how these changes impact water coverage.

The three utilities were selected from the regression model case studies of each categorized property regime. Additionally, the three utilities were selected from Latin American countries because it is a region that has a long history with privatization programs. Each case utility was selected based on the criteria for utility categorization summarized in Table 2. In addition, each utility was selected because each has been highlighted in academic literature as a positive example of a high performing utility.

Complementing regression analysis with these case studies provides a fuller picture of management models and water coverage. Statistical analysis will establish, if any, a relationship between water coverage and management models. The case studies will provide a more in-depth look at how management models impact or are impacted by local nuanced factors.

Results- Multicollinearity and Regression Analysis

Table 4 Management Model Descriptive Means for Performance Indicators

Management Model	Number of Cases	Water Coverage (% of Access)	Water Production (l/person/day)	Non-revenue Water (% Leakage)	Standardized 2009 Unit Cost (US\$/m³ sold)
Public	53	77.97%	350.79	37.46%	\$0.37
Private	54	87.72%	373.13	38.06%	\$0.31
Decentralized	37	91.05%	281.2	33%	\$0.51
Total	144	85.38%	339.92	36.43%	\$0.38

Working under the assumption that management models do impact water coverage this thesis hypothesized that all three management models would show a relationship between water coverage and the three independent variables with the decentralized model outperforming the privately and publicly owned models. Data collected from IBNET on 144 water utilities is averaged and summarized in table 4 (preceding). The preceding descriptive show that decentralized utilities on average has higher levels of water coverage with lower levels of non-revenue water. However, decentralized utilities have significantly higher unit operational cost. Exploring farther, this thesis conducted a multiple regression analysis for each ownership type (private, public, and decentralized) that explored significance between

the dependent variable, water coverage, and the three independent variables- water production, non-revenue water, and unit operational cost.

Regression analysis established relationships for all three ownership types, but only for water coverage and one independent variable. Based on the results both privatized and publicly owned water utilities have a statistically significant inverse relationship between water coverage and non-revenue water. Meaning, an increase or decrease in non-revenue water will result in the opposite reaction of higher or lower water coverage. There was no significant relationship for water production and unit operational cost with water coverage. For decentralized water utilities there was significance between water coverage and unit operational cost. Increased unit operational cost correlates with higher water coverage. There was no statistically significant relationship established with the other two variables- water production and non-revenue water.

Multicollinearity Results

A multicollinearity test was run to explore possible linkages between the three independent variables- water production, non-revenue water, and unit operational cost. A weak level inverse correlation of multicollinearity was found between water production and non-revenue water (Pearson's $r = -.40$; $sig = .00$). A possible explanation of this is that water production involves water moving through a utility's infrastructure. Non-revenue water measures water leaking out of a utility's infrastructure. There was no multicollinearity detected between water production and unit operational cost (Pearson's $r = -.15$; $sig = .08$). Additionally, there was no multicollinearity detected between non-revenue water and unit operational cost (Pearson's $r = -.11$; $sig = .19$).

Table 5: Multicollinearity Findings using Pearson's r

N=144	Water Production	Non-revenue Water	Unit Operational Cost
Water Production	1	.40**	-0.15
Non-revenue Water	0.40**	1	.11
Unit Operational Cost	-0.15	.11	1

Note* $p < 0.05$

Source: IBNET

One Way ANOVA

Analysis of Variance (ANOVA) was used to establish significance regards to management models and water variables- water coverage, water production, unit cost, and non-revenue water. If significance is established there is the possibility that type of management model impacts water variables. If no significance is established there is the possibility that ownership models do not impact water variables. Three of the four water variables showed significance. Non-revenue water shows no significance ($F = .28, p = 0.76$). This is interesting because privatization and decentralization both have discussions on why non-revenue water would be impacted under each ownership model.

Table 6 ANOVA analysis of management models and water variables

Constant	F	Sig.
Water Coverage	18.41	0.00
Water Production	5.95	0.03
Non-revenue	.28	0.76
Unit Cost	20.03	0.00

Note* $p < 0.05$

Source: IBNET

[CS1]

Regression- Privatized Water Utilities

Multiple regression analysis of privatized water utilities was used to investigate significance between water coverage and water production, non-revenue water, and unit operational cost (adjusted $R^2=.308$, $F=8.857$, $p<.05$). This thesis hypothesized that there would be a significant relationship (or better) between water coverage and water production, non-revenue water, and unit operational cost. Analysis showed an inverse relationship between water coverage and non-revenue water (standardized $\beta= -.684$, $p=.00$). There was no significant relationship for water production (standardized $\beta= .267$, $p=.06$) and unit operational cost (standardized $\beta= -.083$, $p=.47$).

Table 7: Regression results of private water utility's water access and independent variables

Constant	Standardized Beta (N=54)	Sig.
Water Production	.267	.06
Non-revenue Water	-.684	.00*
Unit operational cost	-.083	.47

Note* Adjusted $R^2=0.308$, F Stat= 8.857, $p < 0.05$
Source: IBNET

Regression- Publicly Owned Water Utilities

Multiple regression analysis of public water utilities investigated significance between water coverage and water production, non-revenue water, and unit operational cost (adjusted R²= .113, F=3.201, p<.05). This thesis hypothesized there would be significant relationship between water coverage and water production, non-revenue water, and unit operational cost. Analysis showed an inverse relationship between water coverage and non-revenue water (standardized β = -.481, p=.01). There was no significant relationship for water production (standardized β = .113, p=.46) and unit operational cost (standardized β = -.249, p=.10).

Table 8: Regression results of public water utility's water access and independent variables

Constant	Standardized Beta (N=53)	Sig.
Water Production	.113	.46
Non-revenue Water	-.481	.01*
Unit operational cost	.249	.10

Note* Adjusted R²=.113, F Stat= 3.201, p < 0.05
Source: IBNET

Regression- Decentralized Water Utilities

Multiple regression analysis of decentralized water utilities was used to investigate the relationship between water coverage and water production, non-revenue water, and unit operational cost (adjusted $R^2 = .094$, $F = 2.245$, $p < .05$). This thesis hypothesized that there would be the relationship between water coverage and water production, non-revenue water, and unit operational cost. Analysis showed significant relationship between water coverage and unit operational cost (standardized $\beta = .383$, $p = .03$). There was no significant relationship for water production (standardized $\beta = .288$, $p = .09$) and non-revenue water (standardized $\beta = .086$, $p = .60$).

Table 9: Regression results of decentralized water utility's water access and independent variables

Constant	Standardized Beta (N=37)	Sig.
Water Production	.288	.09
Non-revenue Water	.086	.60
Unit operational cost	.383	.03*

Note* Adjusted $R^2 = .094$, F Stat= 2.245, $p < 0.05$
Source: IBNET

Summary

Regression analysis showed that there is the possibility that at some level management models can impact water coverage. For publicly and privately owned water utilities, plugging leaks can translate into high rates of water coverage. For decentralized water utilities high levels of unit operational cost can increase water coverage. Regression analysis also shows that broad claims about ownership, efficiency, and improved water coverage should be suspect. Not one ownership model established significant relationship between water coverage and all three independent variables.

Privatization: The Buenos Aires Water Concession

In 1993, the Buenos Aires public water utility, Obras Sanitarias de la Nación (OSN), was privatized as a 30-year concession contract and awarded to the private water consortium Aguas Argentina (AASA).

Privatization was implemented with the goal of achieving universal water coverage through efficiency gains and full cost recovery. AASA continuously failed to meet performance targets, which led to the renationalization of the utility in 2006. This section presents an analysis of the AASA privatization case study and argues that the concession collapsed because a rushed privatization process established institutions that failed to mediate the unique challenges created by local historical, political, geographic, and economic factors.

Service Area

The city of Buenos Aires is a federally administered autonomous district located within Buenos Aires province on the southern side of the

Rio de la Plato from which the city draws 92 percent of its fresh water.⁵² The city itself includes the Capital District (the core) and 24 surrounding municipalities, often referred to as the Buenos Aires Metropolitan Region (BAMR). AASA service area only includes the Capital District and 17 surrounding municipalities, servicing (at the time of concession) a population of 9.3 million.⁵³ When this thesis refers to Buenos Aires it is in reference to this service area and not the greater metropolitan region.⁵⁴

This case study begins by contextualizing the Buenos Aires service area and its political environment. This will be followed by a discussion of how the political environment of the late 1980s and early 1990s impacted the privatization process. Finally, this thesis will discuss how a rushed privatization process contributed to weak governance that was advantageous for AASA.

Historical Context

⁵² Alcázar, Abdala, and Shirley, "The Buenos Aires Water Concession," 3. The remaining 8 percent is provided by wells.

⁵³ Loftus and McDonald, "Of Liquid Dreams," 186. At privatization the population of service area was 8.6 million. It expanded to 9.3 million with the inclusion of Quilmes municipality in 1995.

⁵⁴ Please see map in Appendix A.

During the 18th century and early 19th century, in most European cities, water access was provided by private companies or municipalities. However, the industrial revolution coupled with population growth outpaced their capabilities of providing potable drinking water. Commonly, these cities' water systems were polluted, stagnant, and a breeding for water borne illness. Frequent epidemics of malaria, cholera, typhoid complemented with scientific exploration of water borne illness led to a re-thinking on water management. Over the late 19th and early 20th century the concept that maintaining healthy water systems decreased epidemics gained consensus. Water needed to be cleaned, it needed to be running, and it needed to be protected from waste. This was an investment well beyond just building sewers and laying water pipes. This re-thinking was a significant change in urban planning and required investment well beyond the capabilities of private companies or municipal governments. The state was the only actor capable of financing the modernization of water infrastructure. By the 20th century, in most European cities, the state is the main actor in financing, regulating, and managing water. A notable exception is France where the state partnered with private water companies and

subsidized the modernization of their water systems- a point that is reviewed later in this section.⁵⁵

Hall and Lobina note that in the colonies the development of water systems differed- colonial policies limited water access to colonial elites while native populations were charged at full cost recovery prices.⁵⁶ For Argentina, the colonial history has played a significant role in shaping the water politics of Buenos Aires. It contributed to 'canilla libre' (translation: all you can use), a principle belief that water service should be provided by the state. After independence the concept of public water became associated with independence, while payment for water was associated with colonialism.⁵⁷

The Argentinean government established OSN in 1912 with the original responsibility of managing and expanding all urban area's water and sanitation services. Buenos Aires experienced decades of service expansion, but, economic mismanagement and canilla libre inhibited adequate cost recovery, and expansion stalled in the 1950 until privatization began in 1993. In 1983, with stalled expansion, poor cost

⁵⁵ Goubert and others, *The Conquest of Water*.

⁵⁶ Hall, Lobina, and others, "Water as a Public Service," 6.

⁵⁷ Schneier-Madanes, "From Well to Network," 46.

recovery, and a debt crisis –referred to as the lost decade– the Argentinean government, under pressure from the IMF and World Bank, decentralized OSN.⁵⁸ The responsibility of water and sanitation services was passed on to the provincial governments. Consequently, as Botton and Gouvello argue, the decentralization of OSN created access barriers within the concession area. Decentralization created two different utilities, OSN (federally owned) and Aguas Bonarenses (provincially owned), within the Greater Buenos Aires metropolitan region. In both service areas, peripheral municipalities, like Buenos Aires' Almirante Brown, had lower access levels compared to centralized municipalities with higher access levels.⁵⁹ Incidentally, periphery areas also had higher levels of poverty than centrally located areas like the Capital District.⁶⁰ As will be touched on later, fragmentation created challenges to service expansion in the periphery municipalities.

Issues of fragmentation and cost recovery were not address during the 1980s. The newly elected Alfonsín government, responding to the debt crisis, prioritized debt repayment at the expense of public

⁵⁸ Ibid., 47–48.

⁵⁹ Please see Map 2 (Appendix B).

⁶⁰ Botton and Gouvello, "Water and Sanitation in the Buenos Aires Metropolitan Region."

works. This negligence led to infrastructure underinvestment, deterioration, and up to 45 percent of water loss due to infrastructure leakage.⁶¹ By 1993, one-third of Buenos Aires service area connections were unregistered, customers frequently did not receive or pay utility bills, and 68 percent of collected revenue was from business and industries that represented 2 percent of OSN's customer base.⁶² By the end of the 1980s the debt crisis escalated, which resulted in a loss of confidence in traditional economic policy solutions and an electorate clamoring for a new economic direction.

The Push for Privatization

The loss of confidence in the Alfonsín administration created an opportunity for proponents of privatization, both internal and external to Argentina, to push market oriented policies. External actors, most are from Argentina's foreign creditors, including the IMF and the World Bank, pushed privatization through two approaches. The first was through experts who argued Argentina's inefficient public sector crowded out the private sector and inhibited economic recovery. The

⁶¹ Alcázar, Abdala, and Shirley, "The Buenos Aires Water Concession," 4.

⁶² Porporato and Robbins, "Privatisation and Corporate Governance in Emerging Economies," 196.

solution came in the form of a set of economic proposals -commonly referred to as the Washington Consensus- that reduced the public sector, deregulated the economy, and removed barriers to foreign trade.⁶³ The second approach was that global lending institutions used previous foreign debt and future loans to pressure Argentina into accepting market oriented policy solution.⁶⁴ Victoria Murillo argues that because of an atmosphere of elevated external financial pressure voters were more accepting of privatization programs.⁶⁵ During the 1989 general election the voting public viewed privatization programs favorably. In Buenos Aires, 16 percent of the population opposed privatization.⁶⁶ Running on a privatization platform, Carlos Menem, a candidate from the Peronist party, was elected president.

Menem's economic agenda began with combating the 3,080 percent hyperinflation by artificially pegging the value of the Argentinean peso to the US dollar. It was believed that by artificially linking the peso to the dollar it would enhance the credibility of the currency, which lowered the perceived risk of investing in Argentina's

⁶³ Baer and Montes-Rojas, "From Privatization to Re-Nationalization," 325.

⁶⁴ Stiglitz, *Making Globalization Work*, 222.

⁶⁵ Murillo, "Political Bias in Policy Convergence," 464-467.

⁶⁶ Alcázar, Abdala, and Shirley, "The Buenos Aires Water Concession," 12.

private companies.⁶⁷ Next, the Menem administration pushed through the National Administrative Reform Law (No 23, 696) and presidential decrees 2074/90, 1443/91, and 2408/91 authorizing the full, or partial, privatization of all state owned enterprises in the form of concession contracts.⁶⁸ Following this, over 115 SOEs were privatized between 1990 and 1994.⁶⁹ Privatizing OSN began in 1991 by making the utility financially appealing to bidders. In February of 1991, tariffs increased by 25 percent and by another 29 percent in April.⁷⁰ Two years later, in May 1993, Aguas Argentina, through a competitive bidding process, won the concession contract with a proposed tariff reduction of 26.9 percent.

AASA is a consortium of organizations led by the largest shareholder, the French water company Suez.⁷¹ A breakdown of AASA investors shows a consortium consisting primarily of large international organizations with a significant amount of resources and influence. The exception is the 10 percent ownership by the employees.

Failed Privatization

⁶⁷ Stiglitz, *Making Globalization Work*, 221.

⁶⁸ Loftus and McDonald, "Of Liquid Dreams," 182–183.

⁶⁹ Estache and Trujillo, "Privatization in Latin America The Good, the Ugly, and the Unfair," 1.

⁷⁰ Loftus and McDonald, "Of Liquid Dreams," 190.

⁷¹ At the time of purchase Suez was Lyonnaise des Eaux, became Suez after a merger in 1997.

AASA's 26.9 percent tariff reduction was to be offset through efficiency gains and waste reductions. Immediately following privatization, AASA –with the union's cooperation- used early retirement programs to reduce the workforce by 50 percent.⁷² Additionally, AASA decreased non-revenue water from pre-privatization levels of 45 percent to 32 percent by 2001.⁷³ However, despite such efficiency gains AASA failed to meet performance goals established in the concession contract because the economic geography and water politics⁷⁴ of the concession area made expansion unprofitable in certain municipalities.

During the late 1980s and early 1990s proponents of water privatization promoted the French model for water service management. This model was founded on a public-private partnership formalized through a concession contract, and greatly influenced the design of the AASA concession contract. The model has been operating and developing since the 1850s. Pezon argues that French model concessions often fail because conditions for success are unique to France and difficult to replicate in other areas. In particular, French

⁷² Rudo et al., *Aguas Argentina 1998-1999 Capital Investment Program*, 5.

⁷³ "IBNET Indicators."

⁷⁴ The term 'water politics' refers to community beliefs like *canilla libre*.

concessions in the 19th century were originally based on a principle of full cost recovery; however, this principle failed to generalize water access and was abandoned in the 20th century for concessions that implemented public financing.⁷⁵ For Buenos Aires, this lesson was overlooked and its concession contract was based on a principal of full cost recovery, which was challenged by fragmentation, *canilla libre*, information asymmetries, and a weak regulator.

AASA's concession contract established a tariff regime that included price cap and cost plus pricing schemes creating a contradictory and inefficient tariff regime. A price cap scheme –often used by utilities in France and Britain- sets a price ceiling for the utility but then creates artificial competition by forcing the utility to earn profits through efficiency gains. The cost plus pricing allowed AASA to renegotiate its tariff cap when the firm's operational cost increases by 7 percent.⁷⁶ As shown in the following paragraphs, information asymmetries allowed AASA to circumvent the price cap because it provided the firm the opportunity to increase tariff charges through

⁷⁵ Pezon, "The French PPP Model for Water Services Management: Genesis and Key Factors of Success."

⁷⁶ Casarin, Delfino, and Delfino, "Failures in Water Reform," 238.

property reclassification. The price cap mechanism was further undermined because of a weak regulator. AASA was able to renegotiate several tariff increases.

The regulator Ente Tripartito de Obras de Servicios de Saneamiento (ETOSS) was created to monitor AASA service expansion, the quality of service, and establish tariff rates.⁷⁷ At the time of establishment, ETOSS was staffed with about 70 former OSN employees, mostly engineers and technicians.⁷⁸ Very few had the skills, knowledge, and experience required for a regulator, such as economics, law, and accounting.⁷⁹ This lack of experience was most problematic with regards to setting tariff rates, a holdover from OSN. This was mostly because reforming the tariff would take time, and changes ran the risk of discouraging potential investors.⁸⁰ The inherited rate also had different pricing structures for metered and non-metered customers. The pricing structure differences between metered and non-

⁷⁷ Porporato and Robbins, "Privatisation and Corporate Governance in Emerging Economies," 196.

⁷⁸ Idelovitch and Ringskog, *Private Sector Participation in Water Supply and Sanitation in Latin America*, 42.

⁷⁹ Alcázar, Abdala, and Shirley, "The Buenos Aires Water Concession," 23–24. The authors also note, "ETOSS had only four economists and four accountants versus 20 engineers in 1995."

⁸⁰ Abdala, "Welfare Effects of Buenos Aires' Water and Sewerage Services Privatization," II.4.3.

metered customers are significant because it enabled AASA's opportunistic price inflation.

Metered customers represented a small portion of connections, about 8 percent in 1995.⁸¹ For the most part, this was due to decades of canilla libre coupled with meter installation charges implemented after privatization. For metered customers, the pricing formula was:

$$MT_{ij} = 0.5 * BBT_{ij} + P_i * K * (C - \tilde{A})$$

MT_{ij} and BBT_{ij} define the type of service and customer category. $(C - \tilde{A})$ is a pricing scheme that allowed for a flat rate for zero marginal cost for the first 30m³. After 30m³ the consumer is then charged \$0.33m³ for water services only, or \$0.66 for water and sewage services.⁸² A consumer was allowed to switch from un-metered to metered service, however additional connection charges and meter reading cost typically served as a financial deterrent for switching to metered service.⁸³

The non-metered pricing scheme lacked a flat rate mechanism and contained variables that allowed for AASA to inflate customer cost. The formula for non-metered service is:

⁸¹ Ibid., II.

⁸² Ibid., II.4.2.

⁸³ Delfino, Casarin, and Delfino, "The Buenos Aires Water Concession a Decade after the Reform," 7.

$$BBT_{ij} = GT_{ij} * K * Z * (SC * E + ST/10)$$

A similarity in both formulas was a mechanism used to adjust tariffs that was represented by K. For metered connections the variable K was calculated with variable C, which measured consumption and was mechanically measured by a meter that could be checked by consumers and ETOSS. For non-metered customers the variables Z and E are coefficients that vary dependent on property age and location.⁸⁴

Together, the variables K, C, E established a pricing scheme -often referred to as the K factor- that is dependent upon property characteristics. The K factor was often inaccurate because Buenos Aires lacked a strong legal property system capable of defining private property. In addition, OSN failed to maintain an updated property database leading to a lack of information about property within the service area.⁸⁵

After privatization AASA, through field surveys and aerial photography, updated resident information. With an updated database AASA had an information advantage over ETOSS in the renegotiation of

⁸⁴ Casarin, Delfino, and Delfino, "Failures in Water Reform," 239.

⁸⁵ Delfino, Casarin, and Delfino, "The Buenos Aires Water Concession a Decade after the Reform," 21-24.

tariff increases to reclassified residents. First, identified commercial property was reclassified from residential to industrial, increasing cost by 1.9 times.⁸⁶ Next, AASA reclassified customers based on the age or value of their property, typically resulting in higher water bills for the reclassified resident. Finally, AASA reclassified customers from residential to non-residential, a classification that typically doubled their water bill.⁸⁷

In addition to reclassification, in 1994, AASA also negotiated with ETOSS a 13.5 percent tariff increase. Despite the tariff increase the average water bill was about \$16.53, which was still lower than 1993 OSN tariff charge of \$19.40.⁸⁸ However, with privatization came the implementation of two new access charges for newly connected residents. The first, called connection fee (CF), was an upfront charge of \$335 to gain access to the water grid. The second, infrastructure charge (IC), was a \$785 fee (payable in installments) used to pay for network expansion and was only charged to new customers after work

⁸⁶ Post, "Pathways for Redistribution," 58–59.

⁸⁷ Alcázar, Abdala, and Shirley, "The Buenos Aires Water Concession," 21–24.

⁸⁸ "ETOSS || Ente Regulador Del Agua."

was completed.⁸⁹ For customers who could not afford access fees AASA was required to help with financing. The CF and IC placed the cost of service expansion onto new connections.⁹⁰ The cost burden to new customers played a significant role in causing AASA to fall short of performance goals.

Table 10: Concession Contract Service Performance Targets

Target Year	% of Population Coverage	
	Water	Sewage
1993 (0)	70	58
1998 (5)	81	64
2003 (10)	90	73
2013 (20)	97	82
2023 (30)	100	90

Source: Idelovitch, E. and Ringskog, K. Private Sector in Water Supply and Sanitation in Latin America.

Stretched over the 30-year concession period AASA was required to meet performance targets for service expansion, network renovation, and decreasing non-revenue water. AASA needed to expand water

⁸⁹ Delfino, Casarin, and Delfino, "The Buenos Aires Water Concession a Decade after the Reform," 7.

⁹⁰ This differed from cross-subsidization where all connections share service cost.

coverage, from 70 percent (roughly 6 million) of residents in 1993, to 81 percent (increase of 1.3 million) by 1998.⁹¹ Initially, Aguas Argentina expanded water service by 949 thousand residents and sanitation service by 279 thousand residents. For the first 5-year performance target AASA was about 28 percent (382,000) short of target for water connections and about 70 percent (650,000) short of target in sanitation.⁹² One reason for this shortfall is AASA expanded into areas with higher income stream. Typically, these areas were closer to the service area's center, had high population density and low poverty levels. Because expansion was being financed through new connections AASA typically avoided periphery municipalities with low population and high levels of poverty.⁹³ AASA delays in expansion of services ETOSS began in 1996 to levy fines against the firm.⁹⁴ In addition to these fines, AASA also suffered financially because customers refused to pay their water bills – a cost AASA estimated to be at 30 million.⁹⁵

⁹¹ Idelovitch and World Bank Group, *Private Sector Participation in Water Supply and Sanitation in Latin America / Ringskog, Klas,; 1945-*, 39.

⁹² Delfino, Casarin, and Delfino, "The Buenos Aires Water Concession a Decade after the Reform," 3.

⁹³ These themes can be found in Delfino 2007 and Botton 2008; in addition, Map 2 (Appendix B) spatial shows these themes.

⁹⁴ Privatisation, *Privatisation, Competition and Regulation*, 193–203.

⁹⁵ Delfino, Casarin, and Delfino, "The Buenos Aires Water Concession a Decade after the Reform," 7.

In 1997, mostly because of canilla libre and ETOSS fines AASA pushed for contract renegotiation. ETOSS's board of directors superseded the regulator and approved renegotiation. The six-member board of directors was filled with political appointees (significantly influenced by the Menem administration) drawn from the national, provincial, and municipal levels of government.⁹⁶ By 1997, the AASA concession had become a political liability to the Menem administration that had an invested interest in ensuring the success of privatization.⁹⁷ ETOSS was left out of renegotiations and the Ministry of Economy, the Department of Natural Resources, and Aguas Argentina carried out negotiations.⁹⁸

Renegotiations produced significant changes in pricing and service expansion. First, the ETOSS fines against AASA were dropped and service expansion targets were relaxed. Most significantly, IC charges were dropped and CF charges were lowered to \$120 spread out over a five-year period in \$4 bi-monthly charges. IC charges were replaced with a \$4.00 universal charge to all customers called the "Servicio

⁹⁶ Idelovitch and Ringskog, *Private Sector Participation in Water Supply and Sanitation in Latin America*, 42.

⁹⁷ Porporato and Robbins, "Privatisation and Corporate Governance in Emerging Economies," 202.

⁹⁸ *Ibid.*, 197.

Universal y Mejora Ambiental” (Universal Service and Environmental Improvement), commonly referred to as SUMA. The renegotiated payment scheme lowered cost for new connections by 18 percent (\$26.65 monthly before renegotiation to \$22.53 monthly after). For connected residents their monthly payments increased 24 percent, from \$16.53 to \$20.53.⁹⁹ The logic to the new price scheme was to implement cross-subsidization to spread out the cost of expansion throughout the service area. Solutions reached in renegotiation were focused on cost and price. Renegotiation sidelined ETOSS and furthered weakened it institutionally. Additionally, renegotiation failed to address the information asymmetries between AASA and ETOSS.¹⁰⁰

Despite renegotiation and tariff changes AASA still failed to meet its 2003 performance goals for both water (84 percent coverage) and sanitation (63 percent coverage).¹⁰¹ This shortfall was largely due to AASA exposure to the global market; specifically tariffs being linked to US dollars. As noted earlier, Menem’s administration pegged the Argentinean peso to the US dollar in 1989, sowing the seeds of

⁹⁹ “ETOSS || Ente Regulador Del Agua.” Figures are average monthly water bills calculated as monthly payments spread over 5 years.

¹⁰⁰ Loftus and McDonald, “Of Liquid Dreams.”

¹⁰¹ “INDEC:INSTITUTO NACIONAL DE ESTADISTICA Y CENSOS DE LA REPUBLICA ARGENTINA.”

economic turmoil a decade later. External economic shock such as the 1997 East Asian crisis, slumping commodity prices and financial turmoil in Brazil sent Argentina's economy into a tailspin in 2000. The economic crisis sent unemployment soaring past 20 percent and reduced Argentina's GDP by 12 percent. Furthermore, because the peso was pegged to the US dollar it was appreciating in value. As a result, Argentina's exports increased in price while imports decreased.¹⁰² In 2002, interim President Eduardo Duhalde, who replaced Menem's successor Fernando de la Rúa-, pushed through the 'Economic Emergency Law' removing the peso's tie to the dollar, which quickly decreased in value to 1 dollar = 3.5 pesos.¹⁰³ The devaluation of the pesos resulted in a \$500 million dollar loss for AASA, destroying the firm's net-worth. Further complicating matters for AASA, the Duhalde administration instituted tariffs freezes in 2003, dashing AASA hopes of tariff increases to recover loss.¹⁰⁴ Following this SUEZ pushed to cut its losses and sell its share, however, with economic instability there were few takers. In 2005, Suez decided to walk away from AASA and in

¹⁰² Stiglitz, *Making Globalization Work*, 220–225.

¹⁰³ "Argentina's Collapse: A Decline without Parallel | The Economist."

¹⁰⁴ "Buenos Aires – Collapse of the Privatization Deal | Food & Water Watch."

March 2006 the private water company was renationalized forming the public company Agua y Saneamientos Argentinos S.A.

AASA Summary

Before 1990, water access for OSN was below 70 percent of the service area's users. The utility's infrastructure was underinvested and deteriorating- water leakage was about 47 percent. The IMF, World Bank, and Argentina's foreign creditors pushed privatization as a solution. The AASA privatization is an example of the oversimplification of challenges to water access. AASA failed because rushed privatization neglected local historical, political, and economic factors all of which created unique challenges to service provision and expansion.

Furthermore, this rushed process created weak water governance that failed to curtail the opportunistic behavior of AASA.

The concession contract required AASA to meet expansion targets every five years. AASA did not succeed in meeting these performance targets for two reasons- first; any service expansion was mostly concentrated into areas with identifiable revenue. A significant reason for this was because expansion, at first, was financed through charges

to new connections. Areas without identifiable revenue were typically located on the periphery of the service area and had higher levels of poverty. Second, the weak governance structure established by the rushed privatization process failed to mediate obstacles to expansion posed by local factors such as 'canilla libre'. Renegotiation only weakened the regulator further and resulted in market solutions that failed to address canilla libre.

Public Ownership: Water and Sanitation in São Paulo

The Brazilian water and sanitation utility the Companhia de Saneamento Basico do Estado de São Paulo (SABESP) is a public corporation and is primarily owned by the state of São Paulo. Established in 1973, SABESP was created through government development programs aimed at establishing and strengthening state owned water and sanitation companies. SABESP was established during a period of exponential industrial growth and chaotic urbanization in São Paulo. Noted by Silva and discussed later in this section, during the 1970's and early 1980's SABESP largely prioritized water coverage to support São Paulo growing industrial demands. In doing so SABESP neglected expanding service coverage in low-income and impoverished neighborhoods.¹⁰⁵ Today, SABESP is often used by academics and practitioners as an example of a high performing state owned water utility. It has a reputation for efficiency, well regarded for service

¹⁰⁵ Silva, "The Connectivity of Infrastructure Networks and the Urban Space of Sao Paulo in the 1990s."

delivery, often maintains full cost recovery, and water coverage is nearly universal.¹⁰⁶

This thesis argues that the rise of democracy in Brazil played a significant role in SABESP's success in expanding services. In 1985, Brazil's military regime collapsed, opening the door for national democracy. With the rise of democracy, a grassroots protest from residents of São Paulo's shanty towns, commonly referred to as favelas, pushed for service expansion into their communities. Protest encouraged the implementation of SABESP's Recovery Program- a fiscal, administrative, and operational streamlining, credited for improving operational efficiency, reducing non-revenue water, and achieving full cost recovery. The Recovery Program provided SABESP with the economic feasibility to maintain and continue service expansion.

Service Area

SABESP is one of the world's largest water and sanitation utilities providing water to the entire state of São Paulo. São Paulo is located on Brazil's southeast coast and is surrounded by the state of Rio de Janeiro

¹⁰⁶ Mirandola, "Hybrid Capital Structures and the Governance of State-Owned Companies."

to the north, Paraná to the south, and Minas Gerais to the north and west. Together these five states constitute Brazil's most economically developed, diverse, and productive region. However, São Paulo is Brazil's wealthiest and most populated state. Its population is approximately 43 million inhabitants and the state accounts for 33 percent of Brazil's GDP-¹⁰⁷

SABESP provides water service to approximately 23.6 million and sewage service to approximately 20 million consumers. Its service area is separated into two-regions- the Regional Systems and the Metropolitan Region of Sao Paulo (MRSP). The Regional System is geographically larger and encompasses 343 municipalities, most of which are rural. The MRSP is demographically larger and services the city of São Paulo (the state's capital) and the surrounding 27 municipalities- approximately 20.4 million residents. As of 2010, the MRSP contained 46 percent of the state's population and is one of the most densely populated urban areas in the world. The MRSP represents SABESP's core market. ¹⁰⁸

¹⁰⁷ "IBGE :: Instituto Brasileiro de Geografia E Estatística."

¹⁰⁸ *COMPANHIA DE SANEAMENTO BASICO DO ESTADO DE SAO PAULO- 20F- 20030603*, December 31, 2010, 22–44.

Historical Context

Beginning in the 1960's the state of São Paulo experienced exponential population and economic growth. Drawn by employment prospects, many rural Brazilians migrated to the MRSP to fill low-income industrial positions. In 1965, the MRSP encompassed 550km² and had a population of approximately 6.5 million Paulistas. By 1980, MRSP's population grew to 12.6 million within MRSP's geographically expanded 900km² area.¹⁰⁹ Discussed in the following the MRSP's high decades long growth rate nearly double the city area because of continued migration to the periphery. From 1970 to 1991 the MRSP averaged a three percent growth rate, but the growth was disproportionately distributed throughout the region. São Paulo City, MRSP's core, averaged an annual growth rate of 2.3 percent. Comparatively, MRSP's peripheral growth rate was around 4.7 percent.¹¹⁰ The periphery's higher growth rate is attributed to its lower-cost of living. During the 1980's property values in Sao Paulo were high, and a relaxation of rental laws allowed rental property owners to regularly increase rental

¹⁰⁹ Alan, *Mega-City in Latin America, The*, 226.

¹¹⁰ Ibid.

fees, which dis-incentivized affordable rental housing. The increases in rent and property value raised the cost of living in the MRSP's core, and pushed the metropolitan area's growing poor population to the periphery municipalities.¹¹¹

Additionally, the lack of enforcement of environmental laws allowed favelas to encroach upon the sources of the state's freshwater supply. Protective measures, in the form of area-based regulations, were instituted by the state in 1975 and 1976. The regulations were intended to prevent development from occurring within critical watersheds. Poor enforcement within the protected areas allowed for their illegal occupations, which lead to high population growth and subsequent severe pollution within the watershed.¹¹² In 1971, the population living in favelas was approximately 41,000 Paulistas, which rose to approximately 1.9 million by 1993.¹¹³

Resistance to Water and Sewage Service Expansion

¹¹¹ Lloyd-Sherlock, "The Recent Appearance of Favelas in Sao Paulo City," 296–302.

¹¹² Gutberlet and Hunter, "Social and Environmental Exclusion at the Edge of São Paulo, Brazil," 9–10. authors argue that changes to property laws in Brazil's 1988 constitution established new ownership laws that forced São Paulo's low-income residents to the periphery

¹¹³ Lloyd-Sherlock, "The Recent Appearance of Favelas in Sao Paulo City," 291.

In 1971, approximately 20 percent of favelas received water service and less than 1 percent received sewage service. By 1987, water service to the favelas had grown exponentially, to approximately 99 percent.¹¹⁴ While one might conclude that the establishment of SABESP significantly contributed to favela service expansion, this would be an oversimplification. Argued below, Brazil's military government, in partnership with the government of São Paulo established a state-supply model that prioritized support for Brazil's rapidly growing industrial demands. SABESP prioritized service delivery and expansion to accommodate São Paulo growing industrial needs. This prioritization came at the expense of the rapidly growing favelas resulting in a lack of water access. Furthermore, SABESP resisted service expansion into the favelas. The expansion of service into favelas resulted when a shift in political regimes allowed for greater civic influence on the aforementioned institutions and São Paulo's water governance.

In 1971, Brazil's military regime implemented the Plano Nacional de Saneamento Básico (PLANSA), a national plan that centralized water and sewage services. PLANSA used a mixture of tax revenues and

¹¹⁴ Watson, "Water and Sanitation in São Paulo, Brazil," 8.

federal backed loans to consolidate smaller municipal water and sewage companies into larger state owned utilities.¹¹⁵ Under PLANSA, SABESP was established through the centralization of São Paulo's water and sanitation municipal companies- COMPASP, SAEC, and SANESP. Furthermore, SABESP was established as a public corporation with the requirement that the state of São Paulo own two-thirds the utility's voting-shares.¹¹⁶

During the 1970's and early 80's service expansion into the favelas was impeded by SABESP and government. Brazil's ruling military regime launched PLANSA to support Brazil's rapidly increasing industrial needs, and not develop universal household access. PLANSA's water and sewage services became a state supply model that favored industrial centers over low in-come centers.¹¹⁷ São Paulo's government did not want to extend public services to favelas because they were viewed as illegal settlements. Public service to land occupations would have

¹¹⁵ Faria, Souza, and Moreira, "Public versus Private Water Utilities."

¹¹⁶ *COMPANHIA DE SANEAMENTO BASICO DO ESTADO DE SAO PAULO-SABESP - 6-K - 20050919 - FORM*, 34.

¹¹⁷ Silva, "The Connectivity of Infrastructure Networks and the Urban Space of Sao Paulo in the 1990s," 139-142.

legitimized the illegal communities.¹¹⁸ SABESP argued that expanding service in the favelas had high technical and engineering challenges that would be too costly to implement. SABESP engineering and infrastructure standards were aligned with consolidated organized urban areas like São Paulo city. Unlike these areas, the favelas were disorganized, crowded, and often built on steep hills, flood plains, or along waterways. Despite national, state, and SABESP's resistance to favela service expansion; these marginalized communities experienced a 32 percent increase in water and sewage services by 1980. This continued to climb, reaching 98 percent by 1987.¹¹⁹ Argued in the following, much of this service increase can be attributed to the gradual democratization of Brazil, beginning in the late 70's.

Civic Movements and Service Expansion

After the 1964 coup, the newly empowered military regime implemented a variety of new laws to consolidate power and erode democratic institutions. One such law only allowed two national political

¹¹⁸ Briscoe and Garn, "Financing Water Supply and Sanitation under Agenda 21." themes of this argument can be found in Evans 2000, Gutberlet 2005, Watson 1987

¹¹⁹ Watson, "Water and Sanitation in São Paulo, Brazil," 8.

parties- the National Renewal Alliance (ARENA) and the Movimento Democrático Brasileiro (MDB). ARENA was the conservative party and favored by the military government. The MDB was the liberal party and was formed out of the consolidation of the Brazilian Labor and Social Democratic parties. Despite the existence of the MDB party Brazil's government mostly operated as a one party system. National, state, and municipal positions –including President, governors, and mayors- were appointed by senior military leaders and given rubberstamped approval by the ARENA controlled congress.¹²⁰ However, in 1974 this political control began to erode. The newly appointed President General Ernesto Geisel, began a program of gradual re-democratization- often referred to the as the *abertura* (opening) or the decompression.¹²¹ Essential, the *abertura* was a rollback of laws limiting media and political opposition. This rollback helped to increase the influence of the MDB, forcing ARENA candidates to compete for votes.¹²²

¹²⁰ Diniz, "The Political Transition in Brazil."

¹²¹ Boran, "Popular Movements in Brazil." Different schools of thought on Brazil's re-democratization attribute the *abertura* to the erosion of regime legitimacy triggered by political pressure from societal change caused by industrial modernization and urbanization, political transition from above during a favorable period of economic prosperity, or a renegotiating of Brazil's patronage system led by neighborhood leaders.

¹²² Diniz, "The Political Transition in Brazil."

In São Paulo in the early 70's, faveledos (favela residents) began to protest for changes in property laws, infrastructure improvements, and access to public service- such as water, sewage, and electricity. The faveledos movement often used non-violent protest targeted at both municipal and state government institutions and public service providers- like SABESP. For example, in one protest in 1984- faveledos marched on SABESP headquarter delivering buckets of stagnant water from the favelas. Such protests played a significant role in pressuring ARENA candidates to institute more progressive policies towards the favelas.¹²³

In 1979, the City of São Paulo's new mayor, Reynaldo de Barros (ARENA candidate), charged the Bureau of Social Welfare (COBES) and the Municipal Development Agency (EMURB) with expanding urban services into local favelas. The municipal agency's launched PROFAVELA, a pilot program designed to provide favelas with water, sewage, electricity, storm drains, and retention walls. Specifically for water, PROFAVELA was limited in scope. For the first three years, the

¹²³ Boran, "Popular Movements in Brazil."

pilot program impacted 26 favelas (three percent of favelas) providing approximately 14,200 water connections.¹²⁴

Despite impacting only three percent of favelas, PROFAVELA was a significant step in SABESP service expansion. It served as an incubator for innovation in water service expansion and facilitated institutional change at SABESP. PROFAVELA worked with civic organizations to pioneer new construction techniques that are more adaptable to the favelas chaotic layout. For example, the incorporation of a high-density polyethylene pipe (PEAD) allowed for the expansion of water services into the narrow winding streets of the favelas. PEAD was fairly inexpensive, light-weight, and most importantly flexible enough to navigate the chaotic favela landscape.¹²⁵ Favela civic organization played an active role in the PROFAVELA program. First, favela residents monitored the quality of the expansion work; rejecting poor quality installation. Second, favela residents formed volunteer work brigades that assisted by pre-digging trenches for ground water pipes. The work

¹²⁴ Watson, "Water and Sanitation in São Paulo, Brazil," 59–60.

¹²⁵ *Ibid.*, 59–64.

brigades helped to reduce the timeline of service expansion and its construction cost.¹²⁶

COBES and EMURB, for the most part, spearheaded PROFAVALA. SABESP was an unenthusiastic participant. Both COBES and EMURB worked to convince SABESP to lower its engineering standards and accept a PEAD water infrastructure. Under a formal agreement SABESP agreed to provide service to the 14,200 new water connections with the caveat that the municipality covered the expansion cost.¹²⁷ PROFAVELA was SABESP first experience with providing service to the favelas. Institutionally the utility maintained its resistance to servicing the favelas; however, this would change with Brazil's continued democratization.

In 1982, Franco Montoro, candidate of the newly formed Brazilian Democratic Movement Party (PMDB)¹²⁸ won São Paulo's first open democratic gubernatorial election. Initially, Governor Montoro did not respond to the favelado protest. In response, protestors continued marches on the governor's mansion, the state capital, and SABESP

¹²⁶ Markoff and Baretta, "Economic Crisis and Regime Change in Brazil," 7.

¹²⁷ Watson, "Water and Sanitation in São Paulo, Brazil," 60.

¹²⁸ The PMDB was formed in 1979 after the military regime eliminated rules limiting Brazil to two-party system. The PMDB was the MDB successor.

headquarters. In 1985, Governor Montoro finally responded by replacing SABESP's president. The new president used SABESP's employees connected with PROFAVELA to expand water and sewage service to all favelas within the utility's service area. Under SABESP's new leadership, with the assistances of the favela work teams, and the use of PROFAVELA construction techniques- piped water service expanded to 99 percent of favelas by the end of the decade.¹²⁹

Democratization, Clientelism, and the Recovery Program

During the 1980's Brazil suffered from hyperinflation brought on by high external debts and low growth resulting in a decrease of the availability and effectiveness of federal funds.¹³⁰ While federal funding was decreasing the state of São Paulo's spending increased. A decrease in federal funds and the roll back of the military regime resulted in a decentralization of power to the states. Governance at the state level

¹²⁹ Watson, "Water and Sanitation in São Paulo, Brazil," 47–55.

¹³⁰ *Brazil*, 173–180. Much of this economic crisis can be attributed to the military regimes foreign financed industrialization programs of the 1960's and 70's.

was plagued by clientelism and rent seeking behavior, which led to the manipulation of state owned companies and banks.¹³¹

São Paulo's governing administrations used the states' two commercial banks- BANESPA and Nossa Caixa- to provide loans to the state treasury and state owned companies. Frequently, SABESP was used to take out loans from the BANESPA or Nossa Caixa to cover the government's budget short falls. Such loans were used for government spending unrelated to SABESP.¹³² During the late 80's and early 90's SABESP's water infrastructure decayed. Non-revenue water increased and service quality deteriorated. By 1994, six million consumers located in the MRSP frequently experienced water rationing. Additionally, in that year, a currency crisis of Brazil's Cruzeiro led to collapse and federal takeover of BANESPA and Nossa Caixa. The collapse of São Paulo's commercial banks revealed that SABESP was R\$223 million (USD\$232 million) in debt and had an immediate liquidity problem.¹³³

In 1995, São Paulo's incoming governor Mário Covas and SABESP implemented policies to improve operational efficiency, reduce cost, and

¹³¹ Gay, "Rethinking Clientelism," 10. Author Robert Gay provides a survey of clientelism and systems of patronage in post-authoritarian Brazil

¹³² Mirandola, "Hybrid Capital Structures and the Governance of State-Owned Companies," 28-29.

¹³³ *COMPANHIA DE SANEAMENTO BASICO DO ESTADO DE SAO PAULO- 20F- 20030603*, June 2, 2003, 20.

increase revenue. First, the government of São Paulo addressed SABESP's liquidity problem by providing a capital injection of R\$800 million. Second, SABESP began selling company shares on the Brazilian Stock Exchange (BOVESPA) resulting in an additional R\$507 million of revenue in by 1998.¹³⁴ Third, SABESP reduced its workforce from 20,516 in 1994 to 19,340 in 1998, while at the same time increasing connection per employee from 330 to 440.¹³⁵ Finally, SABESP implemented a new tariff that increased revenue by including service charges to new connection in the favelas. SABESP tariff structure uses a progressive block pricing structure that prices households based on economic status. SABESP's tariff has two separate consumer categories- residential and non-residential. Non-residential consumers are commercial, industrial, and governmental users. Residential consumers are domestic households that are further categorized as standard residential, social¹³⁶, and favela; the latter two are classifications created for the benefit of low-income¹³⁷ consumers.¹³⁸ The categories are used

¹³⁴ Mirandola, "Hybrid Capital Structures and the Governance of State-Owned Companies," 37–40.

¹³⁵ Lobina and Hall, "Public Sector Alternatives to Water Supply and Sewerage Privatization," 50.

¹³⁶ Customers classified under Social have a legal residence but are low-income households.

¹³⁷ Brazil's Census Bureau- the Instituto Brasileiro de Geografia e Estatística (IBGE) defines 'low income' by calculating the purchasing power of households in comparison to abrogated basket of consumer goods.

to identify customers price levels based on a progressive block pricing system. SABESP's 2004 block pricing uses tier groupings with price increases as consumption increases. Both non-residential and standard residential have higher prices per tier group and have only 4 tier groups compared to the low-income categories 5 tier groups. The purpose is that Non-residential and standard residential consumption and pricing levels are designed to bring in higher revenue in order to offset service and connection cost to both social and favela consumers.¹³⁹ Changes implemented in the Recovery Program helped SABESP go from a net profit loss of R\$223 million in 1994 to a net profit of R\$25 million in 1995 and R\$542.1 million in 1998. Additionally, SABESP's improved fiscal situation allowed the utility access to foreign loans.¹⁴⁰

During the Recovery Program Brazil's economy improved. From 1991 to 1994 Brazil's currency the Cruzeiro was averaging and inflation rate of 2,375 percent.¹⁴¹ This was the economic environment that contributed to the collapse of BANESPA and Nossa Caixa. In 1994, Brazil introduced the Plano Real, an economic stabilization plan that

¹³⁸ *COMPANHIA DE SANEAMENTO BASICO DO ESTADO DE SAO PAULO-SABESP - 6-K - 20050919 - FORM*, 64–65.

¹³⁹ Marques, *Regulation of Water and Wastewater Services*, 53.

¹⁴⁰ Mirandola, "Hybrid Capital Structures and the Governance of State-Owned Companies," 35–41.

¹⁴¹ Sachs and Zini Jr., "Brazilian Inflation and the Plano Real," 18.

reasserted the federal government's fiscal authority. Failing Banks like Nossa Caixa and BANESPA were taken over by the federal government effectively ending the revolving door of disguised loans from state banks to state governments. Additionally, the Plano Real also introduced a new currency called the 'Real'. Within two years Brazil's inflation rate fell to an annual rate of 20 percent.¹⁴² The Plano Real helped to create a stable economic environment that allowed for SABESP to access foreign financial markets, attain lower rate loans, and establish long-term construction contracts.

With the Recovery Program and Brazil's improve economy SABESP repaired its aging infrastructure, increased water processing capacity, and expanded service coverage. By the end of 1995 water service coverage expanded from 84 percent to 91 percent.¹⁴³ Since, SABESP has maintained nearly universal levels of water coverage- most recent 95 percent in 2011.¹⁴⁴

SABESP Summary

¹⁴² *Brazil*, 230.

¹⁴³ Lobina and Hall, "Public Sector Alternatives to Water Supply and Sewerage Privatization," 55.

¹⁴⁴ "IBNET Indicators."

Under a military regime SABESP was focused on providing water to support industrialization. However, São Paulo growing economy attracted migrant's seeking better jobs resulting in rapid population growth especially in the MRSP. Population growth quickly outpaced infrastructure and service capability leaving the favelados with poor water access. The gradual democratization of Brazil was a driving factor in SABESP's expansion of water coverage. The onset of democracy gave civic movements more agency and in forcing SABESP to expand services into the faveledos. However, rapid service expansion coupled with economic instability led to a decaying infrastructure with frequent service interruptions by the mid 1990's. SABESP was able to turn this around through a capital injection from the Brazilian government coupled with changes to its governance model and tariff structure.

Decentralized : The Santa Cruz de La Sierra Water Cooperative

This final case study will focus on the Cooperativa de Servicios Públicos Santa Cruz (SAGUAPAC), a water and sewage utility serving the city of Santa Cruz de La Sierra, Bolivia. Often literature reviews, water sector professionals, and international lenders (like the World Bank) cite SAGUAPAC as one of the best water and sanitation utilities in Latin America. They note SAGUAPAC's consistencies in maintaining full cost recovery, high levels of water coverage, low levels of non-revenue water, and strong performance in staff efficiency. Such success is often credited to SAGUAPAC's cooperative model. A dominant narrative argues that the democratic nature of SAGUAPAC's cooperative model shields the utility from external political influence and profit motive allowing the utility to be more consumers focused.¹⁴⁵ Arguably, attributing SAGUAPAC's success to its cooperative model is an oversimplification. There are other factors that have contributed to SAGUAPAC's success: 1) fractured water market; 2) wealthy service

¹⁴⁵ Ruiz-Mier and van Ginneken, "Consumer Cooperatives."; themes also found in Nickson 2000, Vasquez 2004, and Yavari, Birchall 2003

area; 3) World Bank loans for service expansion; and 4) high tariff charges.

Service Area

The water market in Santa Cruz de la Sierra can be considered geographically fragmented. Water service is provided by SAGUAPAC plus seven additional smaller water cooperatives. This fracture reflects a historical socio-economic divide between the city's wealthier core and impoverished periphery.

With over 1.6 million residents Santa Cruz de la Sierra is Bolivia's most populous city. Its urban area consists of nine concentric rings of neighborhoods that radiate out from the city's colonial center. Paved roads encircle each ring demarcating boundaries. The four inner rings are locally referred to as the Casco Viejo. They are the city's original core and contain most of the affluent residents and profitable business; such as financial services, banking, insurance, advertising, and main offices for the department's extractive industries. Additionally, many of Bolivia's multinationals are headquarter in the Casco Viejo¹⁴⁶.

¹⁴⁶ Kirshner, "Migration, Informalization and Public Space in Santa Cruz, Bolivia," 164.

Established as the city's first water and sewage utility in 1973, SAGUAPAC's service area originally encompassed the Casco Viejo. Later, as the city expanded, SAUPAC's service area encompassed parts of the 5th ring. Today SAGUAPAC is the city's largest water utility- providing water service to approximately 64 percent of the city's population (1 million residents) with water coverage averaging between 95 to 100 percent¹⁴⁷.

The remaining outer rings are locally referred to as the Mancha Urbana, which translates into 'urban stain'. The Mancha Urbana is characterized by high levels of poverty, illegal settlements, and lacks infrastructure development. Much of its economy is characterized by informal work in domestic service, construction, transportation, and food service.¹⁴⁸. The remaining seven cooperatives operate in the city's outer rings and provide water service to the remaining 36 percent of residents. Compared to SAGUAPAC the periphery cooperatives are significantly smaller. Listed in Table 9, the Cooperativa de Servicio Públicos Tres Mil (COOPLAN) is the city's second largest cooperative

¹⁴⁷ Salaués, "Decentralised and Direct Finance from Multilateral Agencies to SAGUAPAC."

¹⁴⁸ Kirshner, "City Profile."

providing service to more than 147,000 residents with water coverage approximately 78 percent¹⁴⁹.

Table 11 Santa Cruz de La Sierra Water Coverage

Name	Acronym	Service Area Pop.	% Water Coverage
Cooperativa de Servicios Públicos Santa Cruz Ltda	SAGUAPAC	999,582	100%
Cooperativa de Servicios Públicos Plan Tres Mil	COOPLAN	147,423	78.2%
Cooperativa de Servicios Públicos 1° de Mayo Ltda	COOPAGUAS	114,898	90.3%
Cooperativa de Servicios Públicos Andrés Ibañez	COSPAIL	67,472	92.3%
Cooperativa de Servicios Públicos Pampa de la Isla	COOPAPPI	54,587	89.0%
Cooperativa de Servicios Públicos Los Chacos Ltda	COSCHAL	17,064	79.0%
Cooperativa de Servicios Públicos Humberto Leigue	COSPHUL	15,465	96.9%
Cooperativa de Servicios Públicos Limoncito	COOPLIM	7,638	88.1%

Source: Living without Sanitary Sewers in Latin America

¹⁴⁹ Ortuste, “Living without Sanitary Sewers in Latin America,” 21.

A criticism of SAGUAPAC is its failure to expand services beyond the Casco Viejo resulted in a fractured water market with high number of service providers¹⁵⁰. Discussed in the following, much of SAGUAPAC's lack of expansion can be contributed to exponential population growth, poor urban planning, a weak regulator, and challenges in obtaining financing.

Historical Context

In the 1950's, Santa Cruz de la Sierra was an impoverished and isolated frontier town. There were no major arteries of transportation connecting the city to the rest of the country. The city's 42,000 residents lacked paved roads, sufficient electricity, and telephone lines. Water services, if any, were primarily provided through private initiatives¹⁵¹. By the end of the 1990's Santa Cruz de la Sierra surpassed Bolivia's capital La Paz as the country's economic center. Both the city and the Department of Santa Cruz account for 30 percent of Bolivia's GDP and the city's per capita income is 23 percent above the national

¹⁵⁰ Nickson, "Organizational Structure and Performance in Urban Water Supply The Case of the SAGUAPAC Co-Operative in Santa Cruz, Bolivia," 7.

¹⁵¹ Kirshner, "City Profile," 1-4.

average. A modernized agro-industry, a growing export sector, and a strong oil industry made Santa Cruz de la Sierra Bolivia's most prosperous city¹⁵².

Santa Cruz de la Sierra's dramatic economic growth started in the 1950's and was fueled by resource rents from the department's petroleum reserves and a public expenditure program called 'March to the East'. Launched in 1954, The March to the East aimed at offsetting Bolivia's over-reliance on tin mining by developing the economies of Bolivia's eastern departments. A departmental government committee called the *Comité de Obras Publicas* or the Committee of Public Works (COP) served as the main institutional vehicle for financing 'March to the East' projects and played a primary role in shaping the city's urban growth for decades¹⁵³.

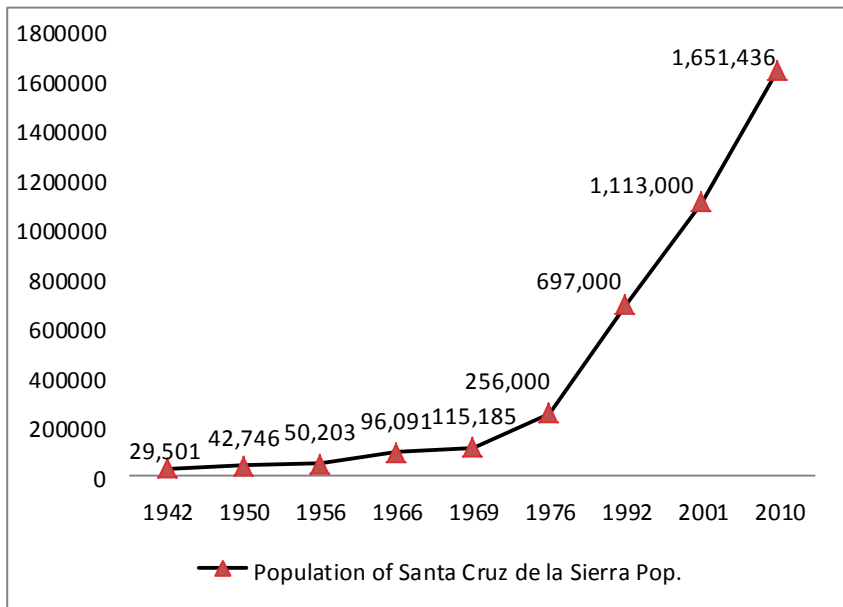
In 1957, the COP contracted an Italian-Brazilian firm called *Compañía Técnica Internacional* (Technit) to create urban development plans for Santa Cruz de la Sierra. Technit's plan was a modernization of

¹⁵² Ibid., 6.

¹⁵³ Gill and others, *Peasants, Entrepreneurs, and Social Change*. Much of the March to the East plan was based on recommendations from a 1943 report written by US economist Mervin Bohan. Petroleum reserves in the Department of Santa Cruz's were discovered in the 1930's. In 1938, the central government passed a law allocating 11 percent of taxes on revenue from the department's petroleum to be spent on basic services.

the city that envisioned a versatile urban space capable of expanding with rapid economic and population growth. The plan structured the city into four radio centric rings of urban living space that radiated out from the city’s colonial center. The city’s structure resembled a target with the historical colonial center as the bulls-eye. Unfortunately, Techint’s plan underestimated population growth. Projections placed the city’s population at 500,000 by the end of the century. In 2001, the city’s actual population was more than 1.1 million¹⁵⁴. Discussed below better accessibility and a growing economy fueled population growth.

Table 12: Santa Cruz de la Sierra Population Growth



Source: Kirshner, "City Profile: Santa Cruz de la Sierra"

¹⁵⁴ Kirshner, "City Profile," 545–547.

During the 1950's the Department of Santa Cruz's economy transitioned from an antiquated plantation system to a large scale agribusiness. By the 1960's Santa Cruz de la Sierra was attracting international business and funding. Better opportunities from the city's economic growth coupled with the 1954 completion of the Cochabamba to Santa Cruz highway attracted new arrivals. At first, the city's new arrivals were mostly lowlanders migrating from rural parts of the eastern departments. Starting in the late 1970's new arrivals were migrating from the western departments and settling beyond the fourth ring. By the 1980's population growth outpaced anticipated urban plans. City planners were unable to meet the basic needs of settlements in the outer rings¹⁵⁵. SAGUAPAC was established in 1973 as a department of the COP in the midst of Santa Cruz de la Sierra's exponential population growth. In 1973, the city's water coverage was approximately 88 percent. However, due to the city's population growth outpacing service expansion water coverage decreased to 78 percent in 1977.¹⁵⁶

Recognizing a need for an alternative water service model SAGUAPAC

¹⁵⁵ Kirshner, "Migration, Informalization and Public Space in Santa Cruz, Bolivia," 160–164.

¹⁵⁶ The World Bank, *Bolivia: Water Supply and Sewerage Sector Study Volume 2*.

separated from the COP in 1979 and was established as Bolivia's first water-cooperative¹⁵⁷.

There are several reasons SAGUAPAC adopting a cooperative model. First, there was familiarity with the cooperative utility model. Santa Cruz de la Sierra already had two utility cooperatives providing electricity and telephone services. Both were popular with city residents and served as models.¹⁵⁸ Second, a private model was not a viable option. At the time Bolivia's private sector was not large enough to generate/provide the necessary capital¹⁵⁹. Finally, there was a strong opposition by city residents to government ownership of local utilities¹⁶⁰. Such opposition was largely due to resident's strong sense of regional identity and self-reliance derived from a long history of the city's geographical isolation and neglect by the central government. Since Bolivia's independence in the 19th century up until the 1950's a majority of government spending and largesse went to the mineral rich western departments. The eastern departments were largely ignored leading to pattern of uneven development between the two regions. Since the

¹⁵⁷ Ruiz-Mier and van Ginneken, "Consumer Cooperatives," 8.

¹⁵⁸ Ibid.

¹⁵⁹ Salaues, "Decentralised and Direct Finance from Multilateral Agencies to SAGUAPAC," 58.

¹⁶⁰ Ruiz-Mier and van Ginneken, "Consumer Cooperatives," 8.

1950's, Santa Cruz de la Sierra has been center of an aggressive regional autonomy movement that not only seeks more political control from the Bolivian government but economic control as well¹⁶¹. This regional autonomy contextualizes the social fragmentation between the Casco Viejo and the Mancha Urbana. The inner rings, mostly wealthy lowlanders, viewed the outer rings, predominately Andeans, as invaders.¹⁶² This fragmentation could also be another explanation for SAGUAPAC lack of service expansion. Nickson notes a widely held view that SAGUAPAC's lack of expansion is due to the 'Toborochoi' a secret society of professional males belonging to traditional crucenos lowland families.¹⁶³

Despite being established in 1973, SAGUAPAC did not have a legally defined service area until 1997. This was largely because of rapid urban growth and a weak water regulator. First, the rapid expansion of the outer rings during the 80's and 90's outpaced the city's government's ability to define municipal boundaries. The city did not establish municipal jurisdictions until 1994. Furthermore, the lack of

¹⁶¹ Gill and others, *Peasants, Entrepreneurs, and Social Change*.

¹⁶² Kirshner, "Migration, Informalization and Public Space in Santa Cruz, Bolivia."

¹⁶³ Nickson, "Organisational Structure and Performance in Urban Water Supply The Case of the SAGUAPAC Co-Operative in Santa Cruz, Bolivia."

infrastructure development and urban planning in the outer rings discouraged service expansion¹⁶⁴. Second, until the late 90's Bolivia had a weak water regulator. Water and sewage oversight bounced between the Ministry of Housing and Urban Affairs (MHUA) and the Ministry of Health. There was very little oversight and no established service standards. The lack of federal involvement is partially attributable to Bolivia's 1906 Water Law (Ley de Aguas) which places municipalities in charge of water regulation and development. Bolivia's 1994 constitution changed the government's role by establishing the state's ownership of all water resources. Water utilities would be required to get concession rights from the state. In 1997, Bolivia's first water and sewage regulator the Superintendencia de Saneamiento Básico (SISAB) was established. SISAB granted SAGUAPAC a concession contract establishing operator's right for 40 years¹⁶⁵.

Organizational Structure and Governance

Often academic literature about SAGUAPAC will credit its success with its cooperative structure. The utility's democratic governance

¹⁶⁴ Salaues, "Decentralised and Direct Finance from Multilateral Agencies to SAGUAPAC," 66.

¹⁶⁵ Ruiz-Mier and van Ginneken, "Consumer Cooperatives," 11.

impedes external political influence and profit motive allowing the utility to be consumer focused¹⁶⁶.

SAGUAPAC's service area is divided into nine districts, each containing approximately 8,000 to 12,000 members. Households and businesses connected to SAGUAPAC are members of the cooperative. New water service connections pay a one-time membership charge of a US\$100 for a Certificate of Cooperation. The certificate is place-based meaning that if a household is sold than membership is transferred with the property¹⁶⁷. Every two years members vote for three district representatives to serve in the Delegate Assembly. Through the 27 members Delegate Assembly cooperative member's interest as consumers is represented. Once the Delegate Assembly convenes representatives select six members to serve on the Oversight Board and nine members to serve on the Administrative Board. The Oversight Board is responsible for ensuring SAGUAPAC compliance with accounting and legal norms and hires external auditors. The Administrative Board is best identified as the link that connects the administration of

¹⁶⁶ Nickson, "Organisational Structure and Performance in Urban Water Supply The Case of the SAGUAPAC Co-Operative in Santa Cruz, Bolivia," 8.

¹⁶⁷ Ruiz-Mier and van Ginneken, "Consumer Cooperatives," 8–15.

SAGUAPAC to the interest of cooperative members. The Administrative Board defines SAGUAPAC's policies, approves its budget, and hires and supervises the General Manager. To minimize the influence of political parties on the Administrative delegate members who have been active in a political party in or have been a candidate in an election within the last five years are disqualified for service to the Administrative Board¹⁶⁸.

A critique of SAGUAPAC's is that its cooperative structure creates challenges in raising capital for service expansion in both the private sector and government. First, the not-for-profit nature of the cooperative model deters private investors. Second, because SAGUAPAC's political autonomy and its success it has few friends and advocates in government. As a result SAGUAPAC is often passed over or ignored when lobbying for government investment funds¹⁶⁹.

Tariffs and Finance

Despite limitations in raising capital SAGUAPAC has had success in maintaining full cost-recovery and the expansion of services. This is

¹⁶⁸ Ibid.

¹⁶⁹ Constance, "IDBAmerica: Are Cooperatives a Better Way to Solve Latin America's Water Problems?"

mostly attributed to its tariff, the wealth of its service area, and World Bank loans.

SAGUAPAC's tariff has a progressive structure that marginally increases service cost allowing high water users to subsidize low water users. SAGUAPAC's tariff is one of the highest in Latin America. A significant portion of this is because of high delivery cost due to flat geography and low population density of its service area.¹⁷⁰ SAGUAPAC claims that for a large part of its membership charges account for 4.5% of the average family income.¹⁷¹

The March to the East initiative and revenue from petroleum sales significantly helped in expanding the city's basic services and creating SAUGAPAC. However, following SAGUAPAC's establishment as a cooperative financing service expansion was challenged. Financing from the central government was limited by a period of hyperinflation, brought on by political instability and over borrowing, lasting until 1986¹⁷². Financing from international private lenders was not an option either because, "private investors are not interested in lending to not-

¹⁷⁰ Ruiz-Mier and van Ginneken, "Consumer Cooperatives," 8.

¹⁷¹ Salaues, "Decentralised and Direct Finance from Multilateral Agencies to SAGUAPAC," 58.

¹⁷² Sachs, *The Bolivian Hyperinflation and Stabilization*.

for-profit cooperatives¹⁷³. With the help of two loans from the World Bank SAGUAPAC was able to expand water service to more than 300,000 residents.

In 1979, the World Bank approved a US\$9 million dollar loan to SAGUAPAC for the expansion of water and sewage services. At that time about 259,000 residents received water services and the city's water coverage was approximately 86 percent. The World Bank loan financed the expansion of SAGUAPAC's water pumping and processing facilities plus the placement of 258 km of piping. Additionally, a new sewage pumping station was built and 97 km of sewage lines were added. SAGUAPAC's water and sewage project was completed by 1987 and expanded water service to an additional 128,000 residents and sewage service to 60,000 more. Service expansion was completed in 1987 and provided an additional 128,000 residents with water service and sewage service to another 60,000. Despite the success of the first World Bank Loan the city's overall water coverage decreased to 71 percent in 1987. The World Bank's project completion report attributed

¹⁷³ Constance, "IDBAmerica: Are Cooperatives a Better Way to Solve Latin America's Water Problems?"

the persisting shortfall coverage decrease to the city's high population growth and significant expansion of the outer rings.¹⁷⁴

In 1991, SAGAUPAC again received a World Bank Loan to expand water and sewage services and for institutional strengthening-improving management system and staff training. The loan financed the expansion of water services to more than 225,000 residents and sewage service to 46,000 more.¹⁷⁵ Both loans were considered a success by the World Bank. The loans goals were achieved and SAGUAPAC repaid both loans.

SAGUAPAC Summary

As the city's first water utility SAGUAPAC service area was established in the city's inner rings. However, population growth outpaced urban expansion and the city's water market fractured. The smaller water cooperative service the city's impoverished periphery while SAGUAPAC's service area encompasses the wealthy inner core. This wealth allows SAGUAPAC to maintain one of the highest tariff charges in Latin America. Additionally, SAGUAPAC does not have to

¹⁷⁴ The World Bank, *Santa Cruz Water Supply and Sewerage Project*, 2.

¹⁷⁵ *Major Cities Water and Sewerage Rehabilitation Project*, 13–17.

deal with the challenges of poor infrastructure development found in the city's periphery.

As a water cooperative SAGUAPAC is frequently praised for its democratic structure, its transparency, and its insulation from profit motive and political corruption. A consequence to the cooperative structure is the difficulty in obtaining financing for service expansion. SAGUAPAC's non-profit nature is discouraging to lending institutions. Additionally, SAGUAPAC's political shielding does leave the utility with few friends and advocates in Bolivia's government. Despite this SAGUAPAC has been able to expand and strengthen its infrastructure thanks to its high tariff charges and several World Bank Loans.

SAGUAPAC is an exemplary example of a well-functioning water utility capable of providing universal coverage to over 1 million users. Often this success is attributed to SAGUAPAC water cooperative structure. However, success cannot be simply attributed to the cooperative model. SAGUAPAC has benefited from the wealth of its service area, loans from the World Bank, and high tariff charges.

Conclusion

Water matters. And who manages water utilities matter just as much. There have been numerous example of contentious and sometimes violent protest resulting from ownership change. In Buenos Aires, Argentina the privatization of their water utility resulted in pushback from the community after a tariff increase. In São Paulo, Brazil SABESP's decision to concentrate on providing businesses and industry water access while largely ignoring the favelas resulted in numerous protests. This thesis sought to investigate the impact that management models of water utilities had on water coverage.

Two levels of analysis were used. First, a statistical analysis of 144 water utilities in 33 different countries was conducted. Each of the 144 utilities was categorized as private, public, or decentralized. Regression analysis was used to identify significance between each ownership model's water coverage and efficiency. Integrating with the data analysis a comparative case study of a privately owned water utility in Argentina, a publically owned water utility in Brazil, and a water cooperative in Bolivia was used to explore the impact of historical,

political, and economic factors that significantly impacted water coverage.

Regression analysis showed that there is the possibility that at some level- management models can impact water coverage. For publicly and privately owned water utilities, plugging leaks can translate into high rates of water coverage. For decentralized water utilities high levels of unit operational cost can increase water coverage. Regression analysis also shows that broad claims about ownership, efficiency, and improved water coverage should be suspect. Not one ownership model established a satisfactory relationship between water coverage and all three independent variables. However, the case studies showed that historical, political, economic, and institutions impact water coverage.

In 1993, Buenos Aires public water utility was to the private water consortium Aguas Argentina (AASA). Privatization was implemented with the goal of achieving universal water coverage through efficiency gains and full cost recovery. However, a rushed privatization process neglected local historical, political, geographical, and economic factors all of which created unique challenges to service provision and expansion. Furthermore, this rushed process created weak water

governance that failed to curtail AASA opportunistic behavior. AASA continuously failed to meet performance targets, which led to the renationalization of the utility in 2006.

Established in 1973, SABESP was created through government development programs aimed at establishing and strengthening state owned water and sanitation companies. SABESP was established during a period of exponential industrial growth and chaotic urbanization in São Paulo. Themes of military rule, industrialization, and urbanization challenged SABESP's ability to expand water services. The gradual democratization of Brazil was a driving factor in SABESP's expansion of water coverage. The onset of democracy gave civic movements more agency in forcing SABESP to expand services into the favelados. However, rapid service expansion coupled with economic instability led to a decaying infrastructure with frequent service interruptions by the mid 1990's. SABESP was able to turn this around through a capital injection from the Brazilian government coupled with changes to its governance model and tariff structure.

Established in 1973, SAGUAPAC's has grown to become one of the world's largest water cooperatives. SAGUAPAC is frequently praised for

its democratic structure, its transparency, and its insulation from profit motive and political corruption. SAGAUPAC was challenged by the rapid growth of Santa Cruz de la Sierra. Despite this SAGUAPAC has maintained near universal water coverage for its service area.

Attributing SAGUAPAC success to its cooperative model is an oversimplification. SAGUAPAC has also benefited from the wealth of its service area, loans from the World Bank, and high tariff charges.

Do ownership models alone impact water coverage through efficiency improvements? Not really. Statistical analysis could not establish a strong relationship between management models' water coverage and water production, non-revenue, and unit operational costs. Perhaps better segmentation of the case studies of management models could yield different results. For example, instead of looking at all privatization models only look at concession contracts. However, the case studies compliment this thesis' statistical analysis. In all three case studies management models alone could not explain successes or failures in water delivery. For AASA the cultural concept of *canilla libre* coupled with Argentinian economic crisis significantly contributed to the utilities failure. In Brazil, protests and democracy pushed SABESP to

expand into the favelas. Finally, SAGUAPAC's success can be attributed to more than just its cooperative model- the wealth of the service area, World Bank loans, and high tariff charges.

This thesis did expect to see decentralized management models performing the best. However, statistical analysis coupled with case studies has concluded that this assumption is wrong. A broad conclusion about management models cannot be drawn. Success and failure are impacted by more nuanced historical, economic, political, geographical, and social factors.

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