Supply of water to urban households by tanker truck in developing and advanced developing countries is often associated with early stages of urbanization or with the private markets on which water vendors serve households not connected to the piped network. Despite Mexico City’s high household network coverage rate and recent improvements in billing, collection, and network maintenance and upgrading, the public sector supplies bulk water to households by truck in response to persistent water scarcity and insufficient network service levels in some areas. Analysis of the public trucked water delivery services in two of Mexico City’s sixteen delegations—or districts—shows two distinct paths to improved trucked service performance in a shared new environment of democratic governance. Although both delegation administrations are led by the same political party, in one delegation officials pursue accountability in the public trucked water service through an evolving set of new internal business practices. In the other delegation, organized residents and elected politicians support service accountability through co-production with delegation authorities and external oversight. This thesis asks how and why two distinct models of accountability in trucked water service delivery operate across two Mexico City delegations, and asks what the implications of the distinct accountability models are for improved household access to water.
ACKNOWLEDGEMENTS

This project would not have been possible without the extraordinary generosity of those I was so fortunate to speak with in Mexico City. My evidence in this paper comes from the successes, hopes and remaining challenges so generously shared with me by a range of individuals interviewed. Although I do not include names in this document in keeping with MIT policy on research involving human subjects, I extend my deepest gratitude to all who agreed to speak with me.

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All errors of fact and of incomplete or incorrect interpretation remain my own, and should in no way be linked to anyone associated with this project.
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<td>ALDF</td>
<td>Asamblea Legislativa del Distrito Federal</td>
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<td></td>
<td><em>Legislative Assembly of the Federal District</em></td>
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<td>CNA</td>
<td>Comisión Nacional del Agua</td>
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<td><em>National Water Commission</em></td>
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<td>CONAMUP</td>
<td>Comisión Nacional del Movimiento Urbano Popular</td>
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<td><em>National Commission of the Urban Popular Movement</em></td>
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<td>EDOMEX</td>
<td>Estado de Mexico</td>
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<td><em>State of Mexico</em></td>
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<td>Gobierno del Distrito Federal</td>
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<td></td>
<td><em>National Action Party</em></td>
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<td>PRD</td>
<td>Partido de la Revolución Democratica</td>
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<td><em>Party of the Democratic Revolution</em></td>
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<td>PRI</td>
<td>Partido Revolucionario Institucional</td>
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<td></td>
<td><em>Revolutionary Institutional Party</em></td>
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<td><em>Mexico City Water System</em></td>
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<td>ZMCM</td>
<td>Zona Metropolitana de la Ciudad de Mexico</td>
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<td><em>Mexico City Metropolitan Area</em></td>
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SELECTED TERMS IN SPANISH

*Colonia*  
Neighborhood, officially demarcated

*Garza*  
Water filling station; trucks fill up at the city’s *garzas.*

*Pipa*  
Water tanker truck; informal term, but most common one used by public officials, elected officials, and consumers

*Pipero*  
Water truck driver

*Tandeo*  
Rationed network service

MEASUREMENTS

*Currency*  
The January and April 2005 exchange rates were approximately 11 Mexican pesos to the US dollar.

*Volume*  
I use the metric system, employing the liter and cubic meter volume measures utilized in Mexico City’s water sector and internationally.
CHAPTER ONE: INTRODUCTION

1.1 Origins and Questions

A summary review of water distribution to Mexico City’s 2.1 million households reveals a household network connection rate of 97%\(^1\), high by most standards for an advanced developing country capital\(^2\). Evolving reforms begun in the 1990s to better the performance of the city’s water system respond to the accumulating pressures of metropolitan growth on the city’s water supply and engineering works: new service contracts to private firms modernized metering, billing and collection and also facilitated concerted new progress on network repairs and upgrades. While water revenues and other financing sources remain insufficient for a range of needed infrastructural investments, measurable improvements city-wide resulted: unaccounted-for-water (UFW) fell from approximately 40% in 1997 to 32% in 2001\(^3\); household metering coverage rose to 70%\(^4\); and collection rates improved\(^5\). By 2003 decision-making authorities of several city institutions responsible for water management were consolidated into a single new entity, the *Sistema de Aguas*, reporting to the Ministry of Environment and newly tasked with achieving improved financial self-sufficiency. A new special commission on water in the city’s legislative assembly (ALDF) works to consolidate legislative and oversight

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\(^1\) Households and network coverage from INEGI, 2000 Census, Tabulados Básicos, in Anuario Estadístico Distrito Federal, 2004. Percentage calculations mine. “Connection” is defined by the Census as located inside the dwelling or within the outside area of the property on which the dwelling is located (such as a yard tap). Original definition of figures: “*Comprende viviendas que disponen de agua entubada dentro de la vivienda y fuera de ella pero dentro del terreno...*”

\(^2\) Also derived from the census: 98% of the federal district’s households have drainage, and 99.5% electricity; INEGI 2000, Tabulados Básicos.

\(^3\) CADF, 2001, in Soto, et al, p. 4, and field interviews. Exact figures appear to vary among sources, but the 32% appears to be the accepted current UFW level.

\(^4\) CADF, 2001, in Soto, et al, p. 4

\(^5\) INEGI 1999, in Soto, et al, p. 3 reports that “…only 52% of supplied water is invoiced, and just 33% is actually paid...”
functions with respect to the city’s water supply and sanitation services. Mexico’s federal
government will host the World Water Forum in 2006.

Despite these gains and new commitments, water in the network remains scarce in some
locations in the capital. While many areas enjoy 24-hour networked water supply, more than one
million residents, or at least 12% of the city’s population of 8.6 million, are reported to receive a
rationed or intermittent supply through their household connections. In short, high coverage
rates achieved through major network expansion through the 1980s mask a great deal of spatial
inequalities in service levels today: while the regions of the city affected by scarcity remain
fairly constant, the degree of supply irregularity varies widely, ranging from service once or
twice a week to service once a month or less. The present challenge to improved household
access to potable water in Mexico City is thus one of greater, more regular and more equitably
distributed supply through the existing network infrastructure, and not network expansion into
unserved areas and increased or more affordable household connections—often the principal
targets for improved household water access in developing or advanced developing country
urban environments.

Tanker trucks, or pipas, compensate for persistent low network performance: trucked
water is a public sector tool to ameliorate the impacts of insufficient supply to households with a
network connection. The trucks deliver a share of their water to the few households in the City
without network connections, and they respond with the remainder to system shortages at
households, schools, and other public facilities where the taps run dry. The sub-city delegation

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6 Named the Comisión Especial para la Gestión Integral del Agua
7 Reforma, March 30, 2001, reporting an affected Mexico City population of 1 million, in Soto, et al, p. 3, and
Reforma, graphic, April 29, 2005 reporting 1.28 million persons in the Federal District suffer “scarcity”.
8 Data on the variation in degree of irregularity was not available, though it can be partly inferred from truck trip
records to various colonias, maintained, for example, by the Tlalpan and Iztapalapa delegations.
9 Pipa is the colloquial term for tanker truck, used by everyone from residents and truck drivers to journalists to
senior utility managers. Very formal usages often refer to the trucks as carro-tanques.
(delegación) authorities operate this service, dispatching the trucks daily from local bulk water pumping stations to in-need neighborhoods, often at the city’s edges. Neighborhoods suffering the highly intermittent network service associated with trucked delivery are generally of the lowest-incomes among connected households. Although the absolute number of city residents depending on trucked water is unclear, as is the frequency of their dependence on this source, the figure can certainly top several hundred thousand.

The performance of the public trucked delivery services in Mexico City merits examination because few studies of it have been conducted. To be sure, many excellent recent academic, public sector, and donor analyses address the piped network supply, including system improvements to date, remaining challenges and reform priorities (including Haggarty, et al 2001; Libreros and Quiñones 2004; Martínez Omaña 2002; Montesillo 2004; Noll, et al 2000; Saade 2001). Several other important reviews of water service in Mexico City address the consumer access and demand perspectives: two include a contingent valuation survey of willingness to pay for network maintenance and improvement scenarios (Soto, et al 2003), and a set of rich empirical analyses of peri-urban water access in the city’s Milpa Alta delegation.

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10 Mexico City is divided into sixteen delegations, or districts. The delegations function similar to borough governments in the United States; each performs a range of tasks decentralized from the city government. However, despite Mexico City’s state-like characteristics for many federal government purposes, the sub-city delegations are not considered autonomous municipalities, as are local elected governments in Mexico’s 31 states. Delegation service provision is financed through transfer of budget resources from the city government, in amounts authorized by the Federal District’s legislative assembly. I will use the terms “delegation” and “delegation authorities” interchangeably throughout this discussion to refer to the delegation authorities. I do so drawing on usage in Mexico City, in which “the delegation” (la delegación) refers to the delegation authorities as well as to the territorial demarcation.

11 Tlalpan serves an estimated 120,000 residents with its trucked service (field interview). Press reports mention 400,000 in Iztapalapa receiving water by truck in certain instances, for example in Reforma, March 18, 2005, and the 35 colonias first exempted from network payments in Iztapalapa in 1999 for service levels too irregular even for flat payments were reported to have a population of 650,000 (see Chapter 2). While I in no way suggest that all of these residents are supplied by truck, I do suggest that a large share do, and that therefore the actual dependent population numbers are likely higher than officially reported by the city, as cited in Libreros and Quiñones, 2004. The remaining delegations also provide trucked service to more limited numbers of consumers. I was unable to obtain colonia-level population data, and/or to correlate this data to the actual colonias listed in various sources as receiving trucked water to suggest a better estimate.
capturing rural community strategies to secure water and sanitation services, including recourse to trucked supply (Torregrosa Armentia, et al 2003, 2004). One of the several important contributions of these demand-side studies is their demonstration of the ways that Mexico City’s network limitations create a far greater diversity in kinds of water service and forms of access utilized by households than is often acknowledged in network-centered analyses of water system performance and reform in the city.

The trucked services also merited analysis because the public structure of household delivery by truck in the Mexico City case contrasts in two ways with usual assumptions about tanker trucks in urban water supply in developing and advanced developing countries. A first contrast is that trucks are generally associated with early stages of urban upgrading in developing and advanced developing country cities, a noisy and economically inefficient mode of distributing an essential public good: the service is often described as provisional, and assumed to disappear once an expanded piped network and increased connection rates enable more cost-efficient water distribution. Such descriptions are also the centerpiece of the important historic analyses of urban upgrading in Mexico (see Ward 1986, 92). While today the trucks indeed still serve the remaining households not connected to the network, they also continue to service network-connected but water-shortaged dwellings. As performance of installed networks in other developing and advanced developing country cities begins to decline due to insufficient maintenance or growing water scarcity, the persistent coexistence of trucked and networked services in Mexico City gains relevance.

A second contrast is that in Mexico City trucked water to households is publicly provided for free or for a nominal transport charge, while water trucks usually figure in the literature on household water access in developing countries as a delivery mode operating on private and
often informal markets for water in urban areas where piped networks do not reach. Trucked water in such cases is more a story of private entrepreneurship, where truck operators deliver water to households for a price (see Crane 1994, Lovei and Whittington 1993, Mitter 1999, Solo 1998, Zaroff and Okun 1984). The literature on this subject explores the important role of competition in mediating for poor households the often-monopolistic pricing that can result from the market power of these entrepreneurs, and some analyses also review experiences with public or private utility formalization and regulation of these private vending markets, in acknowledgement of the costly or incomplete reach of piped networks (see Mitter 1999, Solo 1998). Yet in Mexico City, 95% of the bulk water loaded into trucks city-wide in 2004 was loaded by trucks for public (oficial) purposes; only 5% was loaded by private trucks (particulares). While private trucks certainly operate in the city, the city allocates resources to the delegations to subsidize trucked delivery to households--out of an ethical imperative that households without water in their pipes should be compensated--such subsidies preclude the largely private markets for truck-transported household water seen elsewhere.

However, implicit challenges of equity in access and transparency in supply are more embedded in the public provision of the trucked service than the private variety. Additionally, the mobile technology of trucked delivery is quite distinct from that of a sunk network, creating an entirely different context for understanding and evaluating performance. In this light, answers to key questions are not immediately obvious: Who gets the service? How is service secured?

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12 I was also unsuccessful in locating analyses of similar publicly operated trucked services in other countries, which might otherwise have helped to frame the Mexico City case.
13 My calculation, based on 2004 data provided by the Sistema de Aguas in January 2005.
14 The household share of the private (particular) trucked business appears small; most clients reported by private truck operators are small and medium-sized businesses, who officially cannot benefit from the subsidized delegation programs servicing households. While private trucks generally do not compete with public trucks for household service, often during peaks in the shortages during the dry season they compete with private trucks from the bordering State of Mexico who drive into Mexico City to sell; bulk water in the State of Mexico is less tightly controlled, and can be purchased by a truck operator for a fraction of the bulk water volume charges in Mexico City.
How much does the service cost? How promptly does service arrive once it has been requested? Who decides? Research conducted into the operations of the trucked water service in two city delegations, Tlalpan and Iztapalapa, revealed that despite several important constants shared by the two delegations, the operational structure of the household trucked water service is remarkably different in each. These differences reflect distinct paths forged over time in each delegation to confront the service’s implicit access and transparency challenges, and produce two very distinct models for improved accountability in trucked service provision. The research question guiding this thesis therefore asks how and why two distinct models of accountability in trucked water service delivery operate across two Mexico City delegations, and asks what the implications of the distinct accountability models are for improved household access to water. A principal expectation is the contribution of empirical analysis of the operation of Mexico City’s trucked water services to the rich existing policy and performance literature on the city’s network supply, in the hopes of further informing paths to improved household water service in the city.

1.2 Two Case Studies

To address the research question, I focus on the Tlalpan and Iztapalapa delegations in Mexico City. These delegations are the most relevant for two reasons. First, Tlalpan and Iztapalapa deliver the most water by truck of the sixteen delegations: authorities in these two demarcations together deliver 70% of the city’s total trucked water volume --Tlalpan 40%, and Iztapalapa 30% --these shares far exceeding the shares of any of the other delegations. As a further indicator of the scope of the water challenge in these two delegations, from 1985-1992 46% of water-related protest events documented in the Mexico City press took place in the Iztapalapa, Tlalpan, and Gustavo Madero delegations (Castro 2004, 332), the rest distributed in smaller shares across the remaining thirteen delegations. I was particularly curious about the level of network supply in the Gustavo Madero delegation, particularly as a point of comparison to my two cases: Gustavo Madero shares similar income characteristics, has a
Second, the share of trucked services most indicative of the network’s performance challenges are those delivered to network-connected households; trucked services in the city’s remaining more rural, unconnected communities in some delegations were not a central focus of the research. 97% of Iztapalapa’s dwellings have a water connection, suggesting that households served by trucks in Iztapalapa are also almost entirely covered by the piped network. 89% of Tlalpan’s households have a water connection, representing the greater number of still-rural communities in the jurisdiction, although up to 35% of Tlalpan’s trucked water is delivered to network-connected households. Other delegations also provide trucked services, but in far lesser volumes, and most likely to the less urbanized populations of their jurisdictions or in response to acute and more infrequent needs.

The two delegations also share a number of constants that frame this analysis. The chief commonality of the two demarcations is the challenge they confront: the flow of water through their piped networks is insufficient to satisfy the basic water requirements of their connected households. Several other constants also frame the analysis of their respective trucked water services. First, as all of the sixteen delegations bear the same degree of authority and responsibility, Tlalpan and Iztapalapa share the same formal reporting and budgetary relationship to city-level institutions. Second, each delegation is governed by the same political party: the PRD has headed both delegations since 1997, and the PRI before then. Third, the affected areas high population, and shares the topographic challenge of steep sloped neighborhoods. However, it appears that Gustavo Madero was urbanized much earlier. While most people interviewed with city-wide perspectives acknowledged the problem of scarcity in Tlalpan and Iztapalapa, few mentioned a similar degree of scarcity and/or need for trucks in Gustavo Madero.

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17 Author calculation based on INEGI, 2000 Census, Tabulados Básicos, in Anuario Estadístico Distrito Federal, 2004
18 Author calculation based on INEGI, 2000 Census, Tabulados Básicos, in Anuario Estadístico Distrito Federal, 2004
19 Interviews, Tlalpan delegation
20 The distance between the most central of the water-scarce areas of Tlalpan to the water-scarce area of Iztapalapa at lunchtime is equal to about a two-and-a-half hour series of bus and subway rides.
of both delegations share the sloped geography that is common to most delegations on the periphery of the city, where the difficulties of up-hill water pumping stand as a persistent, if incomplete, explanation for the water scarcity. Fourth, the trucked service serves similarly low-income *colonias* (formally demarcated neighborhoods) that populate these slopes. Finally, the two delegations operate their service under the same city-level regulation that water supplied to under-served households by truck must be delivered free of charge.\footnote{This is a regulation enforced by the city’s Contaduría Mayor de Hacienda, or chief financial oversight and auditing institution—responsible for auditing city-level agencies as well as delegation-level expenditures—as reported by a Tlalpan delegation official.} Funds for delivery are allocated to the delegation authorities as part of their annual budget request approved by the city legislative assembly.

However, the trucked service models in Tlalpan and Iztapalapa proved to be quite distinct. The Tlalpan authorities today deliver the trucked service through a tightly run business model, seeking more accountable service through implementation of several innovative new management practices, including structuring the distribution of trucked water to consumers through several forms of contracts with both private suppliers and consumers. The trucks making water deliveries to households are privately owned and privately operated: the delegation authorities issue annual service contracts to seven private associations of truckers, requiring late-model trucks and insurance coverage of all kinds. The delegation authorities pay each association for the transport cost at the negotiated rate for the deliveries billed. Household accounts for trucked service eligibility populate a sophisticated database, and bar-coded photo-identification cards provided to each registered household accord access to the trucked water service and facilitate the delegation’s record-keeping and supply rationing. Those who require water choose from one of several designated access locations to request a truck delivery (specific offices or the bulk pumping stations, called *garzas*). Customers pay in a delegation-level
In light of the constants shared by the two delegations, I suggest that the distinct trucked service structures in the two delegations indicate distinct organizational evolutions towards fairer and more transparent delivery. Accountability in public service provision carries many meanings treated in a vast literature, and I will not embark on a review of these meanings here. The use of
the term *accountability* throughout this thesis will refer to two features central to the public nature of delivery of water by trucks to households in Mexico City, mentioned earlier. First, accountability here indicates the opportunity for *more equitable access* to a scarce service or good. Second, the term will indicate greater *service transparency*, particularly that which minimizes negative effects of many of the service’s historic discretionary practices for consumers—including but not limited to the taking of unauthorized payments for trucked water. Such practices are reported by residents and elected officials in Mexico City, and are mentioned in press accounts.\(^{22}\)

The literature is diverse with respect to the organizational models most appropriate for delivering public services more accountably (see Joshi and Moore, 2004). Review of the trucked water services in two Mexico City delegations revealed that each service has transited a remarkably distinct path towards the improved accountability features identified in each delegation. Both paths reflect an implicit desire among consumers, authorities, and other stakeholders to improve the quality of household service over past practice and in response to the several fundamental challenges to better service. Most importantly, both paths demonstrate distinct models for constructing the relations between the public sector and the private stakeholders making claims on the service in both delegations. In this section I briefly review four distinct vehicles through which public service provision is often modeled, as relevant to the trucked service-- the public sector, private sector firms or actors, user or consumer participation, and politics, respectively. While the case studies will reveal that these four vehicles combine and interact in a range of ways, the review in this section will frame the discussion of the two

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\(^{22}\) See, for example two reports of requests for payments (or price speculation) by drivers resulting from the scarcity effects of a recent upstream electrical problem which limited water supply to Iztapalapa below usual levels: “Reparten agua amarilla” *Reforma - Ciudad*, March 16, 2005; “Bloqueo demanda agua” *El Universal - Ciudad de México*, March 18, 2005.
case studies in succeeding chapters by mapping briefly the chief elements of each delegation’s accountability path.

1.3.1 Service Delivery and the Public Sector

Access to publicly provided water transported by a truck relies on a degree of human decision largely absent in piped network water delivery. I pin a share of the problem of improved transparency on the concept of *discretion* in public service provision. In utilizing this concept I draw on Lipsky’s pioneering work on street-level bureaucrats and front-line workers in the United States (1980): performing their jobs often out of view of supervision by superiors, the tasks of many front-line workers (of which delegation-employed truck drivers and dispatchers at the garzas may be examples) present great latitude for decision-making about who to serve, or when. The 2004 World Development Report (World Bank, 2003) extends this concept to its discussion of *discretionary services*, described as *transaction-intensive*, of which the Mexico City trucked services are certainly an example. Discretion yields positive and negative outcomes. The negative outcomes of discretion as a feature embedded in the nature of trucked water delivery in Mexico City comes as no surprise: when a scarce good is priced by law at zero, is supplied by public workers or by workers exclusively contracted to the public sector out of view of bureaucratic oversight, and is delivered by means of highly mobile technology (a truck on wheels), the formal delivery of a public good can—in the absence of controls of the forms now in operation in both delegations as reviewed later—run up against the ability of truck drivers, bulk pumping station supervisors or dispatchers, or other front-line office personnel to draw unauthorized payments (or “tips”) from the transactions their job functions require. The service can tend towards favoring access to those consumers willing to pay unauthorized amounts, at the
expense of those unwilling or unable to make these payments. I suggest that unchecked, the
transaction intensive, discretionary public trucked service in Mexico City can indeed start to
mimic the informal markets populated by private entrepreneurs in the water vending literature
described earlier.

While the negative impacts of discretion serve as one challenge to accountability in the
narrower context of consumer willingness to pay tips or rents, equitable access also depends
more broadly on the problem of rationing excess demand, and on the difficulty of assuring that
those in need of a vital service have fair access to it. A highly mobile technology and transaction-
intensive service challenges delegation providers to effectively meet the demands of many
individual customers (and often changing customers, depending on the performance of the
network). Knowing where to send the water and delivering it in an efficient and timely manner
is an inherently difficult task, moreso in the trucked service case where price cannot be formally
used for rationing purposes (see Gomez-Ibanez 2003 on challenges of providing and regulating
public services with many customers). Uncertainty in the public sector’s delivery environment,
as examined by Lawrence and Lorsch (1969), is one factor contributing to the public sector’s
challenge of assuring access (see also Pfefer and Salancik, 1978). The degree of risks to human
health and the risks of social or political conflict generated by network scarcity are other factors
which also may guide public sector decision-making with respect to shaping means of access to
tucked water services.

1.3.2 Service Delivery and the Private Sector

Even if the public trucked service in Mexico City can tend towards price features that
make it appear in some ways like an informal market of the vendors described earlier, the
service’s provision by a public agency makes it deeply answerable to the types of claims that citizens make on the state in individual and collective forms, and makes the service’s access and distribution structure subject to a broader range of social, political and institutional influences.\(^{23}\)

The new service management systems implemented by the Tlalpan delegation authorities tasked with trucked water distribution echo a share of the literature which suggests that public sector partnership with or participation of the private sector in service delivery is one way to improve transparency, equity, access and efficiency for services so openly subject to public claims. For sunk-infrastructure-intensive urban services, such improvements hinge on the combination of new business models with infrastructural upgrades, and frequently, with greater participation of the private sector. The reforms begun in the 1990s in Mexico City’s piped water network operations—to be taken up in greater depth in the next chapter—are one example of this model.

For non-infrastructure intensive types of services—of which the trucked water delivery is an example—similarly-spirited reforms seek value in a role for the private sector, bundling responsibility into contracts or other agreements with private actors, deflecting it to some degree from perceived public sector responsibility. For example, the literature on New Public Management (NPM) points to accountability-improving practices including contracting out of service delivery functions to private firms or entities, “...disaggregating traditional bureaucratic organizations into separate agencies... decentralization of management authority within public agencies...increasing emphasis on service quality, standard setting and customer responsiveness” (Pollit 134, 1995). Critics such as Pollit suggest that such reforms do not always produce intended outcomes, although “…even skeptics see in it many elements and ideas of value” (Joshi

\(^{23}\) I accept at face value the city and delegation regulations regarding no-cost or low-cost provision of public trucked water in compensation for low levels of network service in order to explore the distinct ways in which two public entities in Mexico City respond to the challenges of providing trucked service. There is ample room to take up in a review of the trucked services the question of tariffs and charging for this and other water services—a topic amply considered in the water supply literature—but I will not address in depth these topics here.
and Moore 32, 2004). The Tlalpan delegation’s private service contracts with truck owners reduces the hard-to-solve problems of inequitable service provision from discretion by delegation-employed truck drivers. Such service contracts, coupled with Tlalpan’s bar-coded household accounts are an example of more consumer-oriented service with roots in business practice. Perhaps not surprisingly, officials responsible for the design and oversight of the new service features in the Tlalpan delegation all have professional experience in the private sector.\(^2\)

1.3.3 Service Delivery and Participation

I will also argue, however, as other authors have, that the trucked service model in Iztapalapa provides evidence that more accountable service can be achieved by other paths and other models, in ways distinct from business-oriented internal management and administrative reforms. These other models rely more heavily on thick webs of local relationships, and on public-private alliances distinct from the more formal private sector contracting evident in the Tlalpan case. In this view, service accountability relies not exclusively on control mechanisms internal to the public sector, such as alignment of incentives and monitoring through institutional hierarchies, but on their combination with a greater role for the public (consumers) in producing better performance (see Paul 1992). In a monopoly liked public trucked water in Mexico City—even if an artificial one—household consumers have few exit options, and the public is limited to producing accountability through Paul’s notion of voice.

In Iztapalapa, few of the internal management features found in the Tlalpan case appear: there is no real consumer list, and truck dispatching depends on practices which at first glance appear to be institutionally quite informal. Instead of Tlalpan’s more formal practice, organized residents and their local elected officials have linked in a range of ways to each other and to the

\(^2\) Interviews, Tlalpan delegation
delegation authorities--over the course of many years--to help the authorities deliver trucked water. The Iztapalapa case demonstrates that improved accountability (as access and transparency) is not only achieved from the inside by innovators within public agencies crafting new means of linking outwards with the private sector and with consumers, but that it can also be achieved from the outside, through the formal and informal practices collectively negotiated with public agency authorities by organized consumers and their political representatives.

Several analytical angles help to frame the Iztapalapa case. The principal accountability features in the Iztapalapa trucked service are the informal yet highly institutionalized ways in which organized citizens and politicians co-produce the trucked service with the delegation authorities: the delegation provides the trucks, the drivers and the bulk water, and consumers and their representatives resolve for the delegation authorities their very real challenge of determining where to send its trucks through a number of mechanisms to aggregate and channel consumer requests for water (on co-production, see Evans 1996a and 1996b, Joshi and Moore 2004). In this way, external actors resolve a share of the problem of household access generated by a transaction-intensive service. More interestingly, they do it in informal ways, quite distinct from the more formal participation in service design seen in demand-driven approaches to more time-bound water and sanitation initiatives in developing countries, such as network upgrading projects.

As an example of the "institutionalized co-production" described by Joshi and Moore (2004), consumers and politicians also resolve through their oversight function some of the problems resulting from discretion in ways that the delegation hierarchy may not be able—for a variety of reasons—to resolve on its own: organized residents and politicians conduct awareness

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25 In this way, trucked water provision is perhaps more similar to the water and sanitation network maintenance tasks carried out over time, rather than the more time-bound construction tasks of network expansion or upgrading.
campaigns regarding the right to free water, they collect information regarding the requesting of tips, they channel it upwards to legislative representatives, who in turn assure that truck drivers play by the rules by bearing their organizational and political weight on the upper levels of the delegation administration locally, and in the city-wide legislative arena. Organized residents and politicians carry out these activities through what appears to be a very symbiotic relationship with delegation authorities, in which agreements are made and deals are struck that assure that the interests of both are met: residents get their water, and public protest and other difficult internal decisions are avoided by the delegation authorities. In this way, state strength in Iztapalapa derives not from the administrative “strength” of the sophisticated internal controls in Tlalpan, but rather in more weak-appearing ways which may even appear disorganized: in succeeding chapters, this flexibility, adaptability, and permeability will be shown to support accountability in Iztapalapa, rather than act against it.

1.3.4 Service Delivery and Politics

Finally, in the Mexico City context public sector provision, private sector provision, and participation are not easily unbound from politics. Corporatist associational traditions and clientelist practices infuse the history of demand channeling and urban servicing in the city, and until the electoral transition of 1997, one-party rule was a central solution to the difficult challenge of urban governance. The organizational structure of the trucked services presently operating in Tlalpan and Iztapalapa emerge from these traditions of politics intermingling with service provision, yet they also reflect the evolution of these practices and the transformation of some of their elements, distinct perhaps from their disappearance as more democratic,

26 See Davis, 1994 for discussion.
competitive politics take hold. Such transitions from client to citizen are explored by both Fox (1994) and Gay (1999 and no date).

Independent of the Mexican context, the importance of support by elected officials as allies in deploying commitment and resources for new and better water and sanitation services has been demonstrated (see Davis 2003, Nance 2004, Watson 1995). I build on these examples, however, by suggesting that in the Iztapalapa case politicians not only enhance outcomes through their support at policy and project or budget-decision making levels, but they also engage in very localized collaboration in day-to-day service delivery. This local engagement aggregates interests, collects information, and transfers knowledge (see Nance 2004) up and down party hierarchies: politicians are legislating at city or national levels at the same time their field offices are collecting and channeling to delegation authorities resident requests for trucked water and complaints about the service. These patterns may appear to inherit from an old politics of patronage, yet while the role of politicians channels demand and ties constituent consumers to state resources, it will be suggested that these patterns reflect new forms of public service access and oversight mechanisms, rather than a persistence of clientelist practices. At the same time, elected representatives were remarkably absent from the information gathered for the Tlalpan story. In this case, the claims of consumers and of the truck owners are mediated through direct service contracts and household account systems implemented by the delegation authorities, rather than through the voice and influence of community organizations and politicians. Traditional claims in each delegation have not disappeared, yet the role of politics in pinning these claims to the state has evolved in distinct ways.

1.4 Methodology
To understand the influences of these four service provision elements in the distinct trucked water service provision models in Tlalpan and Iztapalapa—the public sector, private sector, participation and politics—I conducted fieldwork for this study during one four-week visit to Mexico City in January, 2005 and one four-day visit in April, 2005. My research methodology consisted of semi-structured interviews with actors engaged in the water sector, including public officials, private sector officials, elected representatives, private truck owners, community activists and residents, NGO representatives, and academics. A list of interviews is provided in Appendix A.

Second, the location of some of my interviews also enabled utilization of a small but relevant degree of participant-observation: interviews carried out on sidewalks in affected neighborhoods as well as inside the busy offices of public and elected officials provided an additional window on the trucked water services analyzed. Third, I also reviewed available quantitative data, as provided by primary and secondary sources. Fourth, I reviewed digitally archived Mexico City press accounts for the last 5-7 years. Finally, I reviewed existing analyses of the water sector in Mexico City and elsewhere, as produced by other authors.

1.4.1 Sample Selection

I approached my study with the intent of interviewing respondents representing an appropriate cross-section of elected officials, appointed officials, community representatives, NGOs and researchers engaged in the water sector or otherwise dedicated to concern about its performance. Due to the extremely short time frame available to me for primary field research, my access to subjects was the essential criterion for selecting interviewees: I interviewed those with whom I was able to establish contact with and who were willing to participate in an
interview. My selection was also shaped to an important degree by the networks of the several individuals who were kind enough to assist me in setting up interviews. A final and critical influence on my selection of interviewees and my access to them is the fact that the topic of water and of tanker trucks is in many ways a matter of extraordinary sensitivity in Mexico City.

1.4.2 Data Collection and Record-Keeping Procedures

I conducted 22 interviews, in Spanish\textsuperscript{27}. I was also informed by several more informal and unplanned conversations sustained with stakeholders in the trucked water services at times when the opportunity arose, but I do not count these as formal interviews. I did not tape record, with the exception of two interviews. I took hand notes, and added in any remaining details or impressions following the interview. Most interviews were conducted with a single individual; a few were carried out with two or more individuals representing the same institution.

Prior to beginning my fieldwork I obtained exemption from the MIT Committee on Use of Humans as Experimental Subjects (COUHES) from obtaining written consent from subjects to participate in interviews for this study. However, given that I was only likely to meet most of my subjects once, I did obtain written consent to be named in the Thesis document from some subjects at the time of the interview, principally public and elected officials and representatives of city-wide NGOs. For purposes of consistency, however, I omit names of interviewees from this final document.

1.4.3 Limitations

\textsuperscript{27} While Spanish is not my native language, I speak it fluently, and I am confident that language was not an impediment to data collection.
A number of critical limitations frame this paper. A first limitation is the very short duration of the entire project, approximately five months from start to finish. A second limitation was my Massachusetts location, which reduced the time I was able to spend in the field in Mexico City to the two visits described above. The short duration of field work precluded me from conducting a number and range of interviews sufficient to obtain and cross-check data for purposes of telling a more accurate and more complete story that I am able to tell here. When this limitation is added to the unavailability of other analyses of the institutional performance features of public trucked services in Mexico City or elsewhere, I acknowledge the partial nature of my account and the possibly limited scope of evidence I am able to present.

A third limitation was my reliance on handwritten notes, rather than taped interviews. Errors in accuracy and failures to capture the breadth of information shared with me by interviewees likely resulted. However, I felt strongly about the possible perceived intrusions of a tape recorder by the majority of my interviewees, and accept responsibility for errors that may have resulted from the decision. A final limitation is that quantitative data that might have served as evidence to strengthen or modify the arguments made in this paper were not available to me. Examples include but are not limited to year-to-year historical data on volumes of water trucked in the city; more exact numbers of households or residents that consume trucked water; and colonia-level population figures.

1.5 Scope of Thesis

Chapter Two reviews the formal institutional arrangements for water distribution in Mexico City and the piped network water delivery context, both of which frame in fundamental ways the distinct trucked service accountability paths forged in the two delegations. The chapter
concludes with an introduction of the trucked service as a key response to the present network challenges. Chapters Three and Four present the evidence from the Tlalpan and Iztapalapa trucked service delivery models, respectively. Chapter Five will conclude by exploring the implications findings for improved household access to water in Mexico City.
CHAPTER TWO: NETWORK CONTEXT AND TRUCKED RESPONSE

As the trucked services are the public sector's last defense against localized water scarcity in the network, and as they are the only affordable exit option for consumers, the piped network performance environment is a fundamental backdrop to the distinct structuring of trucked access and delivery in the Tlalpan and Iztapalapa delegations\(^2\). Regular requirements for trucked service by some network-connected households are compounded by the effects of uncertain events on a fragile piped network and fragile water sources: prolonged seasonal droughts, upstream mechanical or electrical problems, planned or unplanned shutoffs for purposes of repair or upgrading and variabilities in water pressures can magnify already-low piped network service levels in some areas of the city, dropping them below survival volumes or frequencies. Low network performance in some areas of Mexico City presents risks to public health and often leads to public protest (see Castro 2004). For example, in March 2005 high winds damaged power supply to pumping systems in almost half of the wells in the Lerma System, one of city's principal incoming water sources.\(^2\) 142 public schools in Iztapalapa closed as a health precaution given the lack of water to restroom facilities; a reported 50,000 students stayed home for two days.\(^3\) While daily per capita water consumption levels in some parts of the city are very high, physical network expansion to most homes in the city has not yielded equity in water access. This section first explores the formal institutional division of

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\(^2\) Although illegal tapping of underground water lines or sources is also reported, see “Ordeñan vecinos registros de agua” Reforma – Ciudad, March 15, 2005. “Revisan las valvulas manipuladas en la Venustiano Carranza”, Notimex-Distrito Federal, March 3, 2005.

\(^3\) “Enfrentan la sequia 400 mil personas”, Reforma-Ciudad, March 17, 2005

\(^3\) “Dejan secas 142 escuelas”, Reforma-Ciudad, March 17, 2005
responsibilities and resources for the network water supply, then, the causes and consequences of water-scarce network performance are reviewed. Finally, I introduce the trucked response.

2.1 Assigning Responsibility

In 2003 Mexico City’s primary network extended for 1,031 kilometers, and the secondary network 11,818 kilometers. There is pride in the city’s water network at every level, mixed with fear about the future. A senior official in the city’s Ministry of Public Works and Services said that “… the city’s [water] infrastructure... is formidable, and we applaud the generations and generations and generations that have assured that [something] of this size survives...” The same official went on to say that “the size of this city is irrational, it’s absurd. We are proud, but knowing a little about urban development, we are more worried than proud.” Community residents and activists in water-scarce areas served by trucks in both Tlalpan and Iztapalapa told in interviews of the early advocacy and agitation with city officials to win approval of the installation of piped networks in their neighborhoods, and beginning in the 1980s, of the community-led laboring with pick-axes and shovels to complete the works with city-provided materials. Today these networks perform poorly in some locations, and community and political energies are divided between tending to the problems of network access and tending to the problems of the compensatory trucked access.

2.1.1 Political Landscape

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31 Reported in Anuario Estadistico Distrito Federal, INEGI, 2004
32 I learned of no instances of independently constructed or operated water distribution networks, common in some other Latin American cities (Solo 2003); this absence is unsurprising given the level of public subsidy and public control embedded in the Mexico City water system.
33 Translation mine.
34 Translation mine.
The formal and informal institutional environments for the provision of water in Mexico City are interwoven with the political evolution of a historically strong Mexican state. Nonetheless, the institutional climate for water supply in Mexico City is today one of increasing checks and balances between the executive and legislative functions and between city-level and delegation-level institutions, afforded by increased inter-party and intra-party competitiveness and improved public management. The 1997 and 2000 elections brought to an electoral conclusion Mexico’s protracted transition to democracy: the PRI’s seventy years of one-party rule endured in Mexico City until 1997, when elections for mayor were held for the first time. Prior to this year the president hand-picked the mayor.\textsuperscript{35,36} The left-leaning PRD party won the election, and has since this time held on to the mayor’s office and to a majority in Mexico City’s 66-seat legislative assembly (ALDF). By 2000, the PRI was unseated in the race for president, with a win by the center-right PAN party.

The authorities of the city’s sixteen delegations, or sub-city territorial units (similar to boroughs in the U.S. context) historically carry out the city’s more local administration, decision-making, and service provision. Such city-level decentralization eases a range of management tasks for the city and absorbs the localized demands of residents. The delegations also historically maintained the political allegiances and social stability targeted by the PRI’s corporatist structures. Writing in the mid-1980s about water servicing since 1977, Peter Ward describes “…of course the delegado [head of the delegation] receives technical advice and feasibility studies from his own engineers, but his final decision cannot be wholly based on technical criteria. Of primary concern to the delegado is the maintenance of stability and control

\textsuperscript{35} The reforms stipulated that the first 1997 mayoral race would for a 3-year term, with all subsequent mayoral terms for 6 years (with no re-election), starting in 2000, coinciding with the six-year presidential terms. 
\textsuperscript{36} Mid-term federal elections were also held in 1997, in which the PRI’s historic majority in the lower house of the National Congress was unseated for the first time by the PRD and PAN opposition.
and the avoidance of upsurges of public protest. He is likely to accommodate political criteria alongside the technical advice that he receives from his subordinates. A [n urban housing] settlement is likely to receive speedy attention where it is compliant with the delegado’s view, presses hard for services, and where the costs of installation are not prohibitively expensive.” (Ward 1986, 93). The delegations and the city generally also historically conspired to each other’s benefit as needed, each serving to deflect political pressure from the other. The sea-change in the city brought on by the election of a PRD mayor in 1997 also swept in sixteen new PRD delegados, traditionally appointed by the mayor. Starting in 2000, delegados also are elected, for three year terms; the majority of the delegations, including Tlalpan and Iztapalapa, continue to be governed by the PRD. While the political changes beginning in the late 1990s brought the same left-leaning political party to power at the city level and in the Tlalpan and Iztapalapa delegations, the effects of the transition yielded distinct evolutions of the trucked water service operations.

2.1.2 Managing Water

The right to store and sell bulk water is controlled by the Mexico City government, but as all water is constitutionally owned by the nation, water use rights are conferred on municipalities by the federal government’s National Water Commission (CNA) (Pargal 389). The city government is responsible for maintenance of the primary water distribution network and for all metering, billing and collection; these responsibilities are executed by the Sistema de Aguas (SAMEX), created in 2003 as a decentralized unit of the city government with financial self-sufficiency requirements, reporting to the city’s Ministry of Environment. The creation of the Sistema de Aguas is the result of a reduction in the multiplicity of institutions overseeing the

37 The CNA reports to the federal Ministry of Environment
water sector: prior to 2003, two institutions oversaw water supply, the Dirección General de Construcción y operación Hidráulica (DGCOH), which reported to the city’s Ministry of Works and Services, and the Comisión de Aguas de la Ciudad de México (CADF). Each of the city’s 16 delegation authorities has full authority over management and maintenance of its corresponding territorial share of secondary distribution network, although its budget request passes through the Sistema de Aguas before approval by the city legislative assembly. The delegations also have exclusive authority to operate the trucked water services to connected and unconnected households; the city government weighs in no formal way on delegation decision-making with respect to the trucked service. The quality of the secondary network infrastructure is generally reported to be higher in the older, central delegations than in the newer, more peripheral delegations; early construction works in the center city were sounder than those of more recently populated and less carefully planned and supervised locations at the city’s edges. The delegations finance all of their water and sanitation responsibilities—including trucked water delivery—through budget transfers—authorized annually by the city’s legislative assembly (ALDF). On average, delegations designate 8.5% of their annual budget total on the distinct activities in the budget related to potable water, drainage, and wastewater treatment.

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38 Many bibliographic sources referenced prior to 2003 are were produced by these institutions.
39 See Libreros and Quiñones, 2004 for an excellent review of the role of the delegation authorities in water and sanitation service provision. It appears that the importance of the delegations’ role had generally not previously been so well acknowledged in the system-performance literature, and nor had disaggregated delegation-level performance data been presented in such a consolidated fashion.
40 Interview, Sistema de Aguas
Delegation Expenditure on Water and Sewer, as percent of Delegation and City Total

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent of Total Delegation and City Expenditure</th>
</tr>
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<tbody>
<tr>
<td>1999</td>
<td>16%</td>
</tr>
<tr>
<td>2000</td>
<td>14%</td>
</tr>
<tr>
<td>2001</td>
<td>21%</td>
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The principal vehicle for primary and secondary network improvements achieved during the last ten years is a set of service contracts issued to large private firms for network tasks of metering, billing and collection and for network upgrades, including repair of leaks and replacement of aging pipes. Originally issued by the CADF, the Sistema de Aguas now controls the contracts. The city’s piped network was horizontally unbundled into four service regions, each comprised of several delegations. A distinct private consortium holds a contract for each region. The four firms perform all work in the city’s name: payment and customer care offices and telephone hotlines all bear the name of the city or the Sistema de Aguas.

However, private participation at the network level is limited to these service contracts; private investment—which would bring new private capital to bear on network upgrading, yet require greater returns—has not been pursued, although critiques of the present structure charge that heavier private sector involvement would generate the resources required to carry out the works necessary for improved cost recovery (Haggarty, et al 2001). While the billing and collection functions are budgeted for annually (to the extent that costs are not recovered), upgrades of the primary and secondary networks depend on explicit work orders from the...
Sistema de Aguas for which budget allocations vary from year to year\(^\text{44}\). While the cost recovery function is fixed, the reach and pace of network upgrades appear more subject to the city and agency budget priorities and process. The city’s initial set of ten-year service contracts expired in 2004: five year extensions were just signed by the city, with some modifications.

### 2.2 Network Performance: Causes, Effects And Coping

#### 2.2.1 Causes and Effects

At least five inter-related features contribute to the insufficient levels of network performance with which delegation authorities must contend in some areas of Mexico City: scarce natural water sources, pressures of metropolitan growth, seasonal fluctuations in water availability, condition and reach of infrastructure and engineering works, and the low water pressure in the network that results.\(^\text{45}\) At the same time, some of the northern and western areas of the city enjoy 24-hour network service in the same types of steep sloped, difficult-to-reach neighborhoods urbanized contemporaneously with southern and eastern Tlalpan and Iztapalapa. While it can be argued that these neighborhoods are geographically closer to incoming water sources, it can also be argued that political and investment decision-making are equal if not more important contributors to network performance. However, as the delegations finance their water distribution tasks through budget transfers from the city (and do not have their own revenue generation or debt authorities), and as it is the delegation-level network context that is most relevant to an understanding of the delegation-level trucked services, the politics of past or present city-wide network upgrading decisions are not pursued here: I focus on the immediate

\[^{44}\text{Interview, private service firm}\]

\[^{45}\text{A fundamental question that emerges from a review of the piped network performance in Mexico City is to what extent the network shortage in the investigated areas of the city can be attributed to low levels of maintenance or of investment in the network’s physical assets, and to what extent the network shortage can be attributed to actual water scarcity in relation to the demands placed on supply—these questions are not taken up here.}\]
city-wide physical features which inform daily delegation network management and which therefore frame demand for and dispatch of the trucked service. While it may be suggested that the scope or depth of the causes of network scarcity have political origins, or that the “scarcity” itself is a matter for debate, I will leave these questions for other analyses.

A share of the explanation for the scarcity in areas like Iztapalapa and Tlalpan is that there is not enough water entering the city’s primary networks, which feed the delegations’ secondary networks. In 1987, 82% of the city’s water came from its own underground sources (Noll, et al 2000); the city today draws only approximately 65% of its water from these sources, and the remaining 35% from sources flowing in from neighboring states. Yet in January 2005 the city completed ten years without an increase in the total volume of water entering the city’s system: the only increases in water available to consumers are recovered physical losses through network repairs and upgrades. Most observers agree that the most important and most viable area for attention is not the increase in new water sources (through politically complicated interstate agreements), but rather greater review of price to improve economic signals shaping demand, network repairs to reduce UFW, and continuation of present efforts to promote better recharging of the city’s aquifer.

Mexico City’s network grew with the spatial expansion of the city. In general, the older, central delegations of the city have far better quality water infrastructure than the more recently urbanized periphery, where Iztapalapa and Tlalpan are located. Both delegations absorbed extraordinary numbers of migrants to Mexico City and underwent rapid and unplanned

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46 See Castro 2004 for a discussion of a range of perspectives on sources of water scarcity and appropriate paths to improvement.
47 The rationing of water supply has historically been alleged as a tool of political and electoral control. Larger dilemmas of financing, subsidy levels, and private sector participation in the system may also be cited by some as less immediate but more fundamental causes of the apparent physical water shortage, but as these are largely decisions taken at the city level, and not by the delegations, they are similarly beyond the scope of this paper.
48 Interview, Secretaria de Obras y Servicios.
expansion. Household water connections were largely installed in these two delegations in the mid-1980s, a result of both active advocacy on the part of organized residents and a certain degree of patronage from authorities and politicians, or the least an interest in averting the types of protest that might have challenged local stability. While this network construction included an important community labor component, one elected representative commented, however, that as there was little supervision, the resulting works were of poor quality. Built for the demand levels at the time, continued population growth and increasing household connections has yielded demand on pipes and other network equipment that exceeds their original capacity.

Most individuals interviewed concurred that the massive growth, urbanization and land invasions of Mexico City’s earlier decades has slowed: there is not much land left on which to build, and its prices are high. Today urban growth has shifted to the State of Mexico, where land is more plentiful and costs are lower. The state’s urban areas border the Federal District to form the Mexico City Metropolitan Area, and draw from the same water sources as Mexico City. Mexico City’s officials see urban growth in the State of Mexico as perhaps the principal threat to water supply in the city: metropolitan coordination in water management is no easier for water than for other sectors such as transport, all challenged by political party distinctions-- while Mexico City has been governed by the PRD since 1997, the State of Mexico has been led by a PRI governor.\footnote{One of the most acute, time-bound recent examples of the challenges of metropolitan coordination is the federal government’s cancellation of a proposed new Mexico City airport due to conflicts exacerbated by political difference in the metropolitan region.}

There is also a seasonal dimension to water scarcity, system vulnerability, and peaks in demand for trucked water: the rainy season lasts from approximately May to September, the dry season extends approximately from October to April. Variability in length and degree of the dry season impacts in important ways the scope and responsiveness of the trucked service in any
given year. For the delegation trucked service providers, rainfall was the principal determinant of their total annual volumes delivered; more water is distributed in dry years, less in rainy years. Residents remember drought years as those of greatest social unrest. I assume that each delegation’s decision on number of trucks and drivers in service is related to the requirements of their annual service peak during the dry season; I was told by a Tlalpan driver that sometimes the Iztapalapa delegation contracts out for short periods with additional private trucks as a way to improve delivery response times in the dry season.

Persistent water deficits in each delegation’s principal sources generates the problem of low water pressure, which is central to the network service irregularity reported in Iztapalapa and Tlalpan. There are at least two explanations for this low pressure. First, Iztapalapa and Tlalpan’s geographic distance from the entrance points of the out-of-state water leaves little left at the end of the journey. While delegation officials in the northwest of the city complain of the water main ruptures caused by excess pressure, delegations on the southern and eastern edges, like Tlalpan and Iztapalapa suffer the opposite. While these distinct high pressure - low pressure trends remain fairly constant throughout the city, the problem of variability in low pressure of incoming water can bear down even more critically. Iztapalapa battles daily with the variability in the pressure of the water entering its secondary network: the delegation’s water department monitors the pressure hourly at key intake points in the secondary network, and there is constant reporting from the delegation offices to the city. A second factor contributing to the low pressure precluding supply through household connections is topography, the most water-

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50 A water agency official from the water-abundant Miguel Hidalgo delegation reported that one of the chief maintenance problems in his demarcation was main breaks (fugas) owing to excessive pressures of up to 5 kg in the secondary network. Minutes, Foro De Consulta Sobre La Problemática Que Enfrentan Las Delegaciones En La Gestión Del Agua, July 21, 2004.
51 One form of this reporting is a daily morning fax transmitted to the head of the Sistema de Aguas, reporting on the measured water pressures.
scarce areas of Iztapalapa and Tlalpan are steep-sloped neighborhoods. When the incoming water pressure is low to begin with, insufficient localized pumping capacity challenges the system’s capacity to reach household connections.

2.2.2 Coping

The delegation authorities ultimately bear locally the challenges of equitable water distribution in the city’s primary network. They also absorb the distribution challenges embedded in the expanse of their own secondary networks. Finally, they manage the challenge of distributing trucked water to fill in the gaps—the subject of this thesis. In this way, the delegation authorities bear a large share of the water access burden in the city. To preview an introduction of the trucked services in the next section, this section explores network coping mechanisms. First, I review delegation strategies for managing secondary networks in conditions of scarcity. Second, I review the city-authorized network price and cost-recovery coping mechanisms. Finally, I describe household strategies for maximizing water availability under scarce conditions.

From the perspective of consumers, the delegations appear to households as the authorities most directly responsible for water supply, and often as the only authorities with an immediate solution to network problems: the trucks. In Iztapalapa and the network connected areas of Tlalpan, it is the delegation authorities that must pick up the pieces of the primary network failings: they must decide on a daily/hourly basis how to “make” the secondary network function as best as possible despite shortages and low pressures received from the primary network; decide who to serve, when, and with how much piped water, and then operate the trucked service to fill in the gaps. Therefore, one of the delegations’ principal tasks is coping
with network unpredictability. They cope in two ways. First, they ration water. Second, they deploy trucks. The principal tool delegation water authorities use to ration limited supply is the opening and closing of valves among distinct areas of the delegation. This service level is formally known as *tandeo*. In Iztapalapa, the water department showed me an elaborate, color coded set of maps indicating the days of the week distinct areas of the city are to receive their water. The most shortaged areas of the delegation are scheduled to receive water once a week. The time lapses between service increase during the dry season, although I did not see a similar schedule for this “peak”. A household I spoke with in Iztapalapa in January (the beginning of the dry season, but hardly its height), had not received water from its yard tap in a month.

I was told by an Iztapalapa official that in the rainy season approximately 70% of the delegation receives “normal” service, and 30% irregular service. In the dry season, the share of irregular service climbs above 30%. This picture suggests that the delegations contend with a more serious irregular service situation than provided by city-level data (for example, as contained in Libreros and Quiñones, 2004). In addition to Iztapalapa’s problem of insufficient absolute quantity, one of the chief delegation concerns is the frequent drops in water pressure in the primary network lines serving the demarcation. Perhaps even more frustrating to the delegation authorities is the variability in this low pressure: the delegation maintains rationed network service plans, in which color-coded maps indicate the days of the week of that distinct neighborhoods are to be served. The rationing itself is effected at street-level network access points, where small teams of delegation employees (*cuadrillas*) open and close valves.

While the Iztapalapa delegation relies on daily SAMEX data generated at key intake points as well as on pressure trends over time to manage the rationing, this variability in water pressure weakens the delegation’s ability to stick to the rationing plans it has carefully laid out.
As low pressure can occur unexpectedly in a range of locations, assurance of a reasonably equitable supply results in a host of immediate daily—or even hourly—decision-making with regards to alterations in the rationed service plans. I suggest that this technical instability in the network is an important factor shaping the organizational and bureaucratic flexibility—and shaped by consumer and political influence—that appears to be associated with trucked delivery.

A less clear picture of network performance emerged in Tlalpan: interviewed residents and truck drivers all spoke of their perceptions of greater scarcity over time: residents felt they had less water, and private truckers spoke of encountering limited supply in the garza when they arrive to load.

### Pricing Network Diversity

The city’s tariff structure accounts in several ways for the variations in network service levels throughout the city. The Sistema de Aguas maintains two classifications for type of service at the colonia level: *regular* service and *intermittent* service. Regular service implies constant supply, intermittent service refers to service that is rationed, by means of the *tandeo* system, which moves available water flow to distinct locations in the network. In regular service *colonias* where 70% or more of the connections are metered, an increasing block tariff structure applies 14 different tariffs based on consumption volumes, with rates increasing based on increasing consumption ranges. In *colonias* where a 70% metering rate has not been achieved, 5 distinct flat rates are applied to all of the connections in the colonia, determined by the average cadastral values in the colonia. This is a pricing structure based on property values, not

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52 I did not have the opportunity to interview any officials responsible for the delegation’s secondary network performance.
53 Montesillo, 2004, 103-105, from GDF, Estructura Tarifaria
54 Montesillo, 2004, 103-105, from GDF, Tarifas fijas para Usuarios Domesticos
incomes. Flat rates are also applied to colonias which may be metered, but where the service is intermittent, and distribution is rationed by tandeo.

In July 2004 the city declared 201 colonias as officially receiving their water in a rationed manner (tandeo), and therefore subject to flat rate billing\(^5\). The declaration designated 50 colonias in Iztapalapa, or 18% of 278 colonias, and 72 colonias in Tlalpan, or 32% of the 225 total.

### Rationed Service Declared by GDF, July 2004

<table>
<thead>
<tr>
<th>Delegation</th>
<th>Number Rationed Colonias</th>
<th>Total Colonias</th>
<th>Percent Colonias Rationed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alvaro Obregon</td>
<td>10</td>
<td>278</td>
<td>4%</td>
</tr>
<tr>
<td>Cuajimalpa</td>
<td>16</td>
<td>55</td>
<td>29%</td>
</tr>
<tr>
<td>Gustavo A. Madero</td>
<td>8</td>
<td>201</td>
<td>4%</td>
</tr>
<tr>
<td>Iztapalapa</td>
<td>50</td>
<td>278</td>
<td>18%</td>
</tr>
<tr>
<td>Milpa Alta</td>
<td>8</td>
<td>33</td>
<td>24%</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>72</td>
<td>225</td>
<td>32%</td>
</tr>
<tr>
<td>Tlahuac</td>
<td>5</td>
<td>73</td>
<td>7%</td>
</tr>
<tr>
<td>Xochimilco</td>
<td>32</td>
<td>113</td>
<td>28%</td>
</tr>
</tbody>
</table>

Source: Column 2, Gaceta Oficial, July 7, 2004, pp. 2-7; Column 3, Libreros, Quiñones 2004, p. 82 for total colonias; Column 4, author calculation.

There is, however, a certain degree of disagreement among residents and authorities on what accounts for “regular” service and what accounts for “intermittent” service. Two interviewed community leaders in Tlalpan, for example, recounted their struggles securing compensatory trucked services or tariff structure changes: their colonias were officially registered as “regular”, and they mentioned struggles to convince authorities that their service was “intermittent”.\(^6\) This problem can become an important one for purposes of household access to trucked water.

Beyond the flat rate system applied in many shortaged colonias, beginning in 1999 both billed amounts and unpaid balances for network service were waived (condonados) in 35

\(^5\) Gaceta Oficial del Distrito Federal; July 7, 2004, pp. 2-7

\(^6\) I therefore suggest that it is possible that actual numbers of colonias with intermittent service may be higher than those reported above.
colonias of Iztapalapa with the poorest network service, representing according to the press, a population share of 650,000\textsuperscript{57}. These neighborhoods coincide with those most dependent on the trucked services, particularly the Sierra de Santa Catarina area. The waiver has since been approved every year since its inception: by May, 2004, the City waived payments and balances for 42 colonias\textsuperscript{58}, and by February 2005 the number of colonias in Iztapalapa had risen to 51\textsuperscript{59}. The increase in condoned water payments from 35 colonias to 51 in six years suggests either that the water scarcity worsened during that time or that the extent of its reach is increasingly acknowledged by authorities.\textsuperscript{60} This bill payment cancellation is of the successes of the zone’s elected representatives: peering out of a bus window as I was arriving to Iztapalapa one day, I saw the ubiquitous political party graffiti on a low wall in Itzapalapa, celebrating in paint the waived water payments as one of the important achievements of a local elected legislator\textsuperscript{61}.

Making Do at Home

There are few affordable opportunities for exit for families struggling with irregular, rationed network service, although it is difficult to obtain a clear picture of the population affected by intermittent or tandeo service\textsuperscript{62}. Households cope with low network service levels

\textsuperscript{57}“Perdonan Adeudos de Agua en Iztapalapa”, El Universal, June 29, 1999.
\textsuperscript{58}Gaceta Oficial del Distrito Federal; May 24, 2004, p. 10. Translation mine.
\textsuperscript{59}Gaceta Oficial del Distrito Federal; February 7, 2005, pp. 3-6.
\textsuperscript{60}Colonia-level population data was not available. However, if the 35 colonias in 1999 had 650,000 residents, I assume an important population share increase by the time the waived colonias rose to 51.
\textsuperscript{61}These representatives are also heavily involved in supporting residents to follow the associated administrative procedure: bills are still issued, and they must be brought to the SAMEX payment offices where they are stamped as “condoned”. These stamped bills provide residents with protection in the event of any future City claims of unpaid balances. One of the services that elected representatives provide is getting the stamp: residents bring their bills to a local representatives neighborhood field office, the bills are brought in bulk to the water department for their stamp, and then residents return to the field office to pick them up.
\textsuperscript{62}Inconsistencies in data have been importantly identified by Libreros and Quiñones (2004). I also suggest that a factor complicating the identification of the population actually served by water trucks owes to both the range of variation in demand for trucked water: demand which varies with both the seasons (rainy vs. dry) and with the fact that I assume that the terms “intermittent” and “rationed” mask great variation in amount and frequency of water delivery in the affected delegations and colonias.
in at least three ways, tied both to income and to the type of their dwelling. First, many purchase bottled water for drinking, typically in 20 liter containers. Bottled water sold city-wide by large, formalized bottling companies has been a constant in the city for many years. A 20 liter bottle from a well-known bottler costs about US$2.50. This cost is high, and at least in Tlalpan and Iztapalapa there is a recent increase in informal, unlicensed bottling plants in some water-shorted areas of the delegations. These bottlers sell water for half this cost or less. The emergence of these smaller, unlicensed businesses was variously described in interviews as a “boom” and a “plague”; their entrance into the bottled water market seems to have everything to do with growing demand in an important niche.

Second, network rationed households store piped water, letting their faucets run into storage containers when water arrives. Household storage capacity reflects the relative privilege of those who can afford it and those whose dwellings permit it. The most well-off residents of one or two story homes will construct an underground cistern; the largest cisterns in these neighborhoods had a capacity of 8m³, and half or quarter cisterns also appear to exist. These cisterns usually are often accompanied by pumps to boost the water up to the roof into a smaller container, from where it falls by gravity. Buckets are also used to draw water from the cisterns. Families who cannot afford to construct an underground cistern maintain one or more surface level drums on their property. An Iztapalapa official told me that a particular delivery challenge is servicing families living in multi-story apartment complexes, where such storage options are few. Finally, households access bulk water delivered by truck.

2.3 The Trucked Response
Trucked water services on the periphery of Mexico City date to when there was no network at all, and they persist today, mostly in public hands, to respond to several needs. The trucks supply rural or otherwise unconnected communities in the delegations, including both households and public facilities such as schools; they respond to neighborhoods with acute needs, both needs known in advance, due to shut-offs for major repair work, or more immediate needs arising from main breaks; and they supply households and public facilities with network connections but with rationed or otherwise deeply irregular network service. Today the services are a permanent complement to a weakened network. In some ways, the trucks may also represent something of a budget choice: the allocation of resources to trucked water supply over the allocation of resources for network upgrading and maintenance.

The city’s surface access points for bulk water are tightly controlled. The Sistema de Aguas owns and operates pumping/loading stations throughout the city. These stations are called *garzas*. It is at these points, exclusively, where tanker trucks can fill up with bulk water. Trucks in official service as well as private trucks fill up at these stations. Access to and payment for bulk water is controlled by a system of *vales*, or tickets. Trucks in official service (either owned and operated by a delegation, or contracted/hired by the delegation) load up through *vales* purchased by the delegation. Private trucks must be registered with the Sistema de Aguas. Once registered, they pay for their *vales* at a centralized office of the city Treasury, and then cash them in for water at one of the *garzas*.

The Sistema de Aguas and the delegation authorities maintain detailed registry systems to cross check the *vales* presented with the loads in and out of the *garzas*. A range of delegation

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63 I was not able to obtain data to indicate changes in total city or delegation volumes of water delivered by truck over a period of years, to identify any patterns of increased or decreased dependence.
64 Literally, *heron*. I assume the name draws from the long-necked hoses which feed water into the trucks. The SAMEX operators who oversee the filling operations are called *garzeros*.
and city-level Sistema de Aguas employees are present at the garzas, including dispatchers and supervisors. The vale system appears to be a relatively new one, and was put in place by the Sistema de Aguas to achieve greater control over truck access to bulk water at the garzas. Interviews suggested that this system assures that the City recovers the cost of delegation bulk water consumption, reduces the possibility of diversion of water in public trucks to unpermitted uses (i.e., sale, or distribution to commercial uses), assures that private trucks pay their fair share for the good, and controls on-site payments to personnel at the garzas.

The delegations together devote the third-largest share of their water and sewer resources to water delivery by truck: 15.9% of total funds assigned to the sixteen delegations city-wide for 32 distinct water and sewer operations activities was allocated for distribution of water by truck; this percentage is exceeded only by “Conserve and Maintain the Secondary Drainage Network” (budget code 62), at 17.7%, and “Conserve and Maintain the Secondary Potable Water Network” (budget code 61), 18.2%. Resources for the delegations to deliver the trucked service are allocated annually. While budget management is certainly important, interviewed delegation officials did not suggest greater financial efficiency in the trucked services as a principal objective: assuring service whenever and wherever needed within the existing budget constraint appeared to be the greatest priority. In this vein, I do not use cost of the trucked service as an indicator to compare performance in the two delegations.

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65 Author calculation, derived from Libreros and Quiñones 2004, p. 70, table 2.
Trucked Water Expenditure and Volume Delivered, 2004, by Delegation

<table>
<thead>
<tr>
<th></th>
<th>Tlalpan</th>
<th>Iztapalapa</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Budget Expended on Trucked Water, 2004</strong></td>
<td>54,000,000 pesos</td>
<td>~32,000,000 pesos**</td>
</tr>
<tr>
<td></td>
<td>(~US$5.4 million)</td>
<td>(~US$3.2 million)</td>
</tr>
<tr>
<td><strong>Total Volume of Trucked Water Delivered, 2004</strong>*</td>
<td>1,426,600 liters</td>
<td>1,092,050 liters</td>
</tr>
</tbody>
</table>

* I assume these totals represent all trucked water delivered, including household deliveries and deliveries to schools and public facilities. Figures specifically disaggregating household and other delivery shares were not available.

** I was told that the operational expense was 16 million pesos, plus “a similar amount” for personnel costs; the 32 million figure is my rough representation based on this information.

Source: Information provided in interviews with Iztapalapa and Tlalpan officials, January 2005

Finally, the trucked water services operated by the Iztapalapa and Tlalpan delegations are available exclusively for residential use. According to water officials in both delegations, water may not be delivered to properties zoned for commercial use. Commercial users requiring bulk water must purchase it from a private vendor. Anecdotal evidence suggests that one historic problem associated with the household service is the unauthorized sale of water intended for household consumption to commercial users.

Importantly, and as an important area for further investigation, it was not possible to determine the number of households or individuals depending on trucked water services in the two delegations examined. A figure was available for Tlalpan: approximately 120,000 residents depend on trucked water, which is approximately 20% of the delegation’s population, derived from the number of households on the delegation’s trucked water access registry. I was unable to obtain Mexico City colonia-level population data to derive for Iztapalapa the population share dependent on trucked water, to match this data, for example, with the number of officially designated Iztapalapa colonias with waived network payments and rationed service to create a

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66 Interview, Tlalpan delegation
likely proxy for trucked water consumers. I was also unable to determine the shares of total household water consumed by truck versus that consumed from the network at the colonia or delegation level: this would require disaggregated household trucked delivery volumes, as well as total household network consumption amounts.
CHAPTER THREE: TRUCKED WATER SERVICE IN TLALPAN

Approximately 20,000 households presently benefit from trucked water services in Tlalpan, which represent approximately 100,000 to 120,000 residents out of a total delegation population of approximately 600,000\(^67\). The Tlalpan delegation authorities today pursue improved accountability in the trucked water delivery service through implementation of modernized administrative systems to manage water access by household customers and to manage water distribution by private truck owners under contract to the delegation. These systems directly address the challenges of access and of discretion, and align tightly with service provision prescriptions recommending such bureaucratically driven customer-oriented and private supplier-oriented business models to make efficiency and equity gains. I will also suggest that the present model reflects the delegation’s efforts both to maintain and to modify the nature of many of the traditional localized state-society relationships embedded in the trucked water service. This chapter reviews the means by which the new measures improve service accountability and suggests explanations for the origins of this particular service structure. Some pitfalls of the model are also reviewed.

The delegation administration taking office in 2003 initiated many of the present practices and reforms.\(^68\) Today, consumer access to the trucked service is managed by means of a detailed consumer account list (padrón) maintained by the delegation. While the list mechanism was utilized prior to 2003, in that year the delegation authorities began efforts to re-organize the list, better linking entries to consuming households and tying the accounts to new bar-coded

\(^{67}\) Interview, Tlalpan delegation

\(^{68}\) I acknowledge that it may be early to attempt to understand both the performance and the motivations for the changes in the trucked service. However, I suggest that they are both a significant enough break with the service’s past and, more importantly, sufficiently distinct from Iztapalapa’s present service model that examination and comparison are justified.
photo identification cards issued to households registered to receive the delegation’s trucked water. While city regulation dictates that trucked water must be delivered free of charge, the Tlalpan delegation now levies a small charge to consumers for the transport component of certain kinds of its trucked services. Finally, while the delegation has long contracted out its delivery to associations of private truckers, new performance features appear now incorporated into these contracts.

3.1 Background

While the political party, steeped topography, and low incomes in served areas are shared, characteristics of the Tlalpan delegation relevant to trucked service provision contrast with Iztapalapa in three ways. First, fewer Tlalpan households in Tlalpan are connected to the network—89%, in contrast to 98% in Iztapalapa. At the same time, more network-supplied water is consumed in Tlalpan, 172 lpcpd in Tlalpan, in contrast to 138 lpcpd in Iztapalapa. These distinctions are in part explained by the more heterogeneous income and residential patterns of Tlalpan’s 600,000 residents. Tlalpan’s GDP per capita is higher than in Iztapalapa, but this figure masks a great deal of income inequality in Tlalpan, captured in part by the variety in the delegation’s housing patterns: 1) several very wealthy areas of the demarcation, 2) a range of gradually upgraded popular settlements (first settled in the late 1960s and early 1970s), which climb the delegation’s steep slopes, and 3) a number of still-rural pueblos, which hug the edges of the Ajusco mountain at the extreme southern edge of the city and are largely not connected to the network.

69 See Montesillo, 2004, p. 113. Figures rounded. I suggest that these averages mask great inequality in consumption, and that the water-scarce households accessing water by truck likely consume far less per day.
Second, Tlalpan’s residents also coexist with a distinct history: while Iztapalapa came quickly to life during Mexico City’s period of rapid urbanization, Tlalpan is an old community, with both a historic town center and surrounding communities, originally located at what was perceived to be a great distance from Mexico City, and then ultimately part of it as it was absorbed by the expanding city. While the urbanized popular settlements evolved at a time similar to Iztapalapa, the Tlalpan neighborhoods are inscribed within a distinct and much older history. The final and critical distinction between the two delegations is that Tlalpan continues to contract out its trucked water distribution to associations of private truck owners and drivers, unlike Iztapalapa, where since the 1990s, the truck fleet is owned by the delegation, and the drivers are delegation employees.\footnote{Interview, Iztapalapa delegation}

3.2 The Structure of Supply

Prior to 2003, Tlalpan’s trucked service were housed in the same delegation department that operates the network, similar to the arrangement today operating in Iztapalapa. In 2000, the service was moved out of the network operations department, and into its present location, the Department of Urban Services. Two-thirds of the Urban Service Department’s budget targets the trucked water supply, the remaining one-third is allocated to the department’s street lighting, parks, garbage collection, and streetscape responsibilities\footnote{Interview, Tlalpan delegation}. This organizational distancing of the trucked service from the delegation’s secondary network service may reflect the extent to which Tlalpan’s trucked service in part really is separate from the network, given that between 65 and 75\% of trucked water is delivered to customers not connected to the network. A second explanation offered by the delegation is that the move away from the network afforded a greater
administrative control over the trucked service. The isolation of the trucked service in its own
department may have been undertaken to insulate it from more historic claims linking it to the
network.

The delegation officials interviewed expressed pride in the service changes they have
implemented. While the water director in Iztapalapa tasked with oversight of the trucked service
remains in place after decades of service, management of the trucked water service in Tlalpan
has changed in each three-year PRD administration since 1997. The present head of the Urban
Services Department was appointed by the new 2003 administration, and choosing his team was
an important first step: the truck service operations manager is an expert in information systems
management/engineering, and the administrative manager is a certified public accountant.
Neither were experts in water or in infrastructure: information and financial management were
determined to be the two most important skill sets to design and carry out the reorganization
desired. All key team members worked in the private sector prior to joining the delegation. On
the front lines, some former private truck owners or drivers were hired to fill service oversight
positions in the delegation, including inspectors and dispatchers at the garzas.

The Tlalpan delegation today issues annual service contracts to seven associations of
private water truck owners (and drivers), all of whom have long lived and worked in the
delegation. Like most public entities in most parts of the world, the delegation allows for limited
competition or sole sourcing of service providers under certain pre-established conditions.72
Tlalpan uses this right as the basis for issuing the contracts only to associations based in Tlalpan
(and not, for example to truckers from other parts of the city), with the objective of promoting
local economic development by supporting local small enterprises. The number of associations

72 Including in the United States
has risen and fallen over the years, it appears that during the 1980s there was one or two associations with exclusive contracts with the delegation, but over time new entrants and changing allegiances among truck owners brought the number of associations to fifteen, and then the number fell again\textsuperscript{73}. The associations are formally registered with the city for tax purposes under federal regulations for incorporation of for-profit and non-profit enterprises. There appears to have once been a small number of delegation-owned trucks operating as well, but as of 2003, none of these remained in service. Roughly 94 8m3 trucks are today under contract to the delegation, and 65 16m3 trucks in service, for a total of 224 8m3 units.\textsuperscript{74} The associations’ trucks fill up at the garzas located in Tlalpan, and bill the delegation for the transport cost based on rates negotiated in the annual service contracts; the cost of the vales for bulk water is paid directly by the delegation authorities to the Sistema de Aguas. 

Even though the trucks are privately owned and operated, they are required to bear the same simple white paint and “exclusive service to the Delegation” message as the publicly owned and operated trucks in Iztapalapa. This requirement is not new to recent management changes—this existing practice assures that the private trucks with delegation contracts cannot be used to service the private market for trucked water; the paint job keeps the household delivery task in the public eye, seeking to minimize driver discretion in re-sale and/or delivery of the delegation’s water to unauthorized customers.

Delegation officials suggested that there were important cost advantages to contracting for the service with the associations, as the delegation avoids the capital, maintenance and labor costs. One way that the delegation restricts or controls entry into the market for service contracts (and, it is assumed, assures safety) is by limiting the model year of the trucks in service to the

\textsuperscript{73} Interview, Tlalpan association representative
\textsuperscript{74} Interview, Tlalpan delegation
delegation\textsuperscript{75}. This began in 1999 (much before the present administration), when trucks that were model year 1994 or newer were required by the delegation authorities. This may have been a problematic change: the existing associations owned older trucks, and the difference in capital cost is significant. A new truck, including the tank trailer and other accessories, has an approximate cost of almost US$60,000, whereas a 1980 model truck (which can be used for private service) can be had for US$5,000\textsuperscript{76}. The delegation regularly performs mechanical inspections of the contracted trucks. In addition to the negotiated prices paid by the delegation for transport services, each trucker is required to have his own third-party damage insurance. The service contracts contain legal liability clauses, in the event of any damages or violations by a truck owner, and provisions for 30-day suspensions if any of the terms of the contract are violated. While the terms of the contracts appear to be evolving towards greater stringency, there are also advantages to associating for both truck owners and for the delegation: the leader of one of the associations currently contracted by the delegations told me that the associational structures permit an important degree of leverage with the delegation authorities at the time of negotiating their contracts and resolving disputes\textsuperscript{77}. For the delegation, the transaction costs of negotiating the contracts with many suppliers are reduced, and the billing and payments process is streamlined.\textsuperscript{78}

\textsuperscript{75} Interviews, Tlalpan delegation and truck association representative
\textsuperscript{76} Interview, truck owner
\textsuperscript{77} This contrasts with the characterization of the private trucking industry's "go-at-it-alone" approach as described to me by a private trucker: competition for customers and market share precluded any apparent utility in associating. There are also advantages to being a private truck driver in private business, instead of holding a contract with the delegation to provide the public service. Both drivers I interviewed said that they earned much more money in providing a private service than in providing a public one: fees charged were higher than the payments from the delegations. Second, capital costs are lower, as old trucks can be used, while the delegation requires a newer, more expensive truck. One said that he would have liked to have been a better-earning private trucker in the 1980s when he entered the business, but that there was "too much corruption" involved in securing water from the \textit{garzero} responsible for the bulk pumping station. He perceived working with the delegation as more transparent.
3.3 The Roots of Change

The private water truckers in service to the Tlalpan delegation authorities—like freight truckers (*transportistas*) country-wide-- appear to have long been an important constituency for the PRI delegation authorities in Tlalpan. The 1997 sweep of the PRD into the mayor’s office effected a meaningful political shift at the delegation level, where PRD officials took over from their PRI predecessors for the first time. Political changes—the PRD election in 1997 and subsequent turnover in delegation personnel—appear to have altered the historic public-private relationship between the delegation authorities and the private truck associations, evidenced in at least two ways. First, it appears that the most recent 2003 innovations in trucked water service management implemented by the current delegation administration respond at least in part to public evidence of a disrupted relationship (or at least to stronger legislative oversight): as reported in the Mexico City press, a city-level legislative audit found that “...in 2001, the owners of the pipas...were accused of charging 848 trips that were never realized, according to an audit conducted by the Contaduría Mayor de Hacienda of the Legislative Assembly [ALDF]...”\(^{79}\) The overpayment was reported in the same article as now being paid back by the drivers, a sum of almost US$700,000.

Second, a truck association representative interviewed—and I acknowledge a necessarily partial account—said that before 1997 there was a “good” relationship between the truckers and the delegation, and he described a shift towards less stable relations upon the election of the PRD in 1997. I was told by this truck owner that the PRI had an “excellent control of the *pipas*”, including assuring that the number of associations didn’t grow too much, which I infer to mean restricting entry to assure sufficient work for those currently contracted, and essentially maintaining a more circumscribed distribution of claims on public resources. The current

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evolving contract systems enable out-sourcing of the public trucked water service, but they also return structure—more modern structure, perhaps—to the mediation of truck driver access to state resources. These are both examples of how some of the benefits of discretion for truck operators in Tlalpan tend towards being obtained from outside of the bureaucracy inwards: if not fully checked by contracts and other related other enforcement mechanisms, private trucks secure resources from a public sector client. In Iztapalapa, the challenges of access and discretion will be shown to yield exaction of resources in the opposition direction—from inside the bureaucracy outwards-- by public workers from private consumer/household clients.

3.4 The Scope of Access

As will prove distinct from the Iztapalapa case, the current mechanisms of consumer access to trucked water in Tlalpan were remarkably unmediated ones. In Tlalpan the delegation provides its residents with several distinct forms of trucked service, broadly categorized among those that are provided for free to residents not connected to the network (servicios gratuitos) and where homes do not have their own cisterns or above-ground storage tanks (where water is deposited in shared community drums), and those trucked water services that are provided to residents in urbanized colonias, connected to the network but receiving intermittent (tandeo) network supply. Service to these customers is provided for a small

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80 As mentioned before, I was unable to speak with individuals who were direct consumers in their own households of the new, post-2003 trucked service. However, I did speak to representatives from two leading community organizations long affiliated with water struggles in Tlalpan. In these interviews and in my interviews with the delegations and the truckers, I asked about the role of the legislative assembly representatives, and in no instance was told of a role similar to the one played in Iztapalapa. I also did not learn of any specific community organization efforts to weigh in on/mediate the trucked services—either alone or in coordination with politicians—as in Iztapalapa. I will stand corrected if some of these elements do exist in the Tlalpan trucked water story and I was unable to identify them.
transport charge: the charges range from approximately US$5 and US$12 for a full 8m3 truck of water, depending on the truck’s travel distance from the garza to the dwelling.\textsuperscript{81}

The tool which today appears to be the principal mediator of the space between consumer demand and delegation supply of trucked water is the padrón, or consumer list. This is a database, essentially a list of accounts, or eligible users, much like a utility-wide consumer list for networked services or a system of voter rolls. It seems that the list system has been in use for many years, but that over time duplications in listings developed, such that households may have been able to expand the scope of their access to trucked water. The list was described as “disorganized” when the present administration took office, and a first task was the list’s reorganization\textsuperscript{82}. This effort was undertaken in stages. The delegation’s sub-regional offices were responsible for spreading the word to household consumers. Zone by zone, trucked water customers during a specified time period came to delegation offices, presented proof of residence and a hand drawn map showing the location of their dwelling. With this information, the delegation sends out an inspector to check the status of the household’s storage facilities, assuring presence of either an underground cistern or above ground storage tanks. The result for the consumer is a record or account (folio) in the new list, and the issuance of a bar-coded identification card with a photograph of the head of household. The bar-code system helps to streamline the payment process for subsidized consumers, identify associated account numbers, and enable truck drivers to more easily locate the dwelling, based on maps on file with the delegation.

\textsuperscript{81} It was unclear what share of total delivery costs were recovered from these charges, and/or how these revenues were utilized. I wonder if this payment also serves to reduce consumers’ willingness to pay with respect to tipping drivers, but have no evidence to support this.

\textsuperscript{82} Interview, Tlalpan delegation
Once households have established their accounts (their “eligibility” to claim a public good conferred), there are several ways network connected residents access water. A first means of access is to go to the Urban Services Department to solicit the water. From there, residents go to pay at a delegation Treasury office, open each day from 7am to 2pm. They leave a hand-drawn map describing the location of their dwelling at the payment office, and the request is then transferred to the garza. I was told in an interview that in the best case water is delivered the same day, sometimes up to three days later, and possibly “up to five days” during the busy dry season. A second access mode is to go directly to one of three of the delegation’s four garzas, and wait in line. At the garzas, the delegation provides what it calls a “token” service (servicio de fichas): 50 “tokens” are distributed to the first 50 people in line each day at the delegation’s three major bulk supply stations, and water is delivered to the households the same day. Payments must still be made at the treasury office, and a map left on file—the advantage of this services is prompt delivery. Various delegation-employed supervisors and dispatchers oversee operations in the garza, together with the Sistema de Aguas personnel similarly assigned. The delegation employs a three part-receipt system to assure completed deliveries: one copy stays with the payment office, one copy is signed by the household upon delivery and delivered by the driver to the delegation as proof, and the third copy stays with the household for its records. The delegation can cross-check the receipts if a consumer calls to report an expected water delivery that has not yet arrived.

The trucked services provided at no cost are those that supply unconnected consumers, principally those living in the delegation’s rural locations. There are three forms of free service: the card service (servicio de tarjetas), the programmed stop service (servicio de paradas), and
the support service (servicio de apoyos). The support service is provided to public facilities that suffer either ongoing water shortages or temporary ones (such as those that might result from a temporary shut off due to a network repair.). The programmed stop service is provided at approximately 220-240 different “stops” in the delegation, located principally in the higher elevation locations in the delegation. Forty 200 liter drums are located at each stop, and the contents shared among neighbors. Trucks fill these drums on a regular schedule. The “card” service is also provided in areas of the delegation where there are no network connection. Groups of 15 to 20 families, generally those that live around a block, share a “card” which grants access to water. The families organize to circulate the card among each other, and an individual family, when it is their turn, presents the card to the delegation to solicit water.

3.5 Conclusions

I will suggest that in Tlalpan, reformist decision-makers within the delegation government mediate the discretion of constituencies external to the bureaucratic structures through the evolving new management structures—the most important constituency is the contracted private truck drivers. These administrative forces exerted from inside Tlalpan’s delegation organizational structure also shape access by consumers, whose demand is rationed by whether they are on the list or not. Features such as whether or not a resident’s colonia is “registered” as having intermittent supply is one means of access. A second means of access (of rationing demand) is the bar-coded identification system, which keeps track of who solicits and receives water, and how often.

Somehow, however, the public-private relationship between the truckers and the delegation authorities in Tlalpan does not look like the loose synergy we will see in Iztapalapa.

83 Interview, Tlalpan delegation
nor does it look like co-production. It looks more like the evolution of claim-making, like the changes in the way state structures attend to their constituencies. In Tlalpan, an orderly, businesslike system appears to presently preclude the shaping of equitable access to trucked water by the voice or influence of consumers or by their political or organizational agents. Based on limited interviews, access to trucked water in the Tlalpan case appears to be fully controlled by the consumer list system. What influence has existed seems exerted by the private truck owners external to the delegation bureaucracy, through the scope of their historic relations with delegation authorities. One possible pitfall to more equitable consumer access was reported by an interviewed leader of a long-active community organization dedicated to improving network access in Tlalpan: the city classifies networked colonias as having regular service, or as having intermittent service. However, the uncertainties implicit in the city-wide network (and other factors) make this classification an imperfect one. The activist I interviewed mentioned that access to trucked water was not so easy under the new system: the “right” to access trucked water in Tlalpan was apparently restricted to colonias registered with intermittent service. Those neighborhoods with network service classified as “regular”, even if their service was not, were reported as not authorized to access the trucked service. While I was not able to confirm this with the delegation authorities, if colonia water service classification is indeed a feature of the registration process, then the structure of the padrón may be restricting access, even as it protects against undue influence.

3.5.3 Accountability

The trucked water delivery structure in Tlapan in many ways mimics the accountability-enhancing consumer-oriented network reforms city-wide: updated consumer list, improved
billing, and better collection. Accountability in the Tlalpan trucked water service is pursued along two paths. First, improved access and transparency are achieved by means of the contracts with the private associations. Truck transporters of all kinds were historically one of the PRI’s important sectoral bases of support: in this way, the contracts provide regulatory control, and the contracts also formalize historic and ongoing claims of the truck constituency on delegation resources. The potential dangers to equitable access by consumers of thick relations between private truck owners and the delegation authorities are ameliorated by keeping the trucks at a contractual distance.

Second, improved access and transparency are achieved, even prior to the 2003 modifications, by means of a consumer list that deploys the service in an individual, household-based manner: the new individual transport payments and ID cards deepen this structure. An interviewed Tlalpan official stated that residents really “liked” having the photo identification: the ID confers a sense of a right of access, and of a right to public goods, similar to the way electoral identification cards, issued to combat electoral fraud in Mexico, extended confidence in the right to a free and fair vote. At the same time, as with the contracts with the truck associations, relations of consumers to their authorities become more distanced, and less collective or mediated.

Finally, the history of the pipas in Tlalpan is—as in Iztapalapa—similarly tied to the delegation’s history of rapid expansion and upgrading. The shape of present operations in Tlalpan, however, may be influenced by the fact that an important share of Tlalpan’s current trucked water consumers are not connected to the network due to their more rural locations. In this way, the service becomes a primary one, rather than a compensatory one. The delegation authorities are in these cases a first-line provider of a primary service, rather than principally of a
compensatory one. The organizational structure of the delegation’s trucked water service may be
tightly linked to the nature of its task, more aligned with the first-line service features of an
important share of consumer demand for trucked water in Tlalpan.
CHAPTER FOUR: TRUCKED WATER SERVICE IN IZTAPALAPA

Water remains a hard won good in some parts of Iztapalapa; the piped network context, as described in Chapter Two, generates a highly variable distribution environment, with very low performance in some areas in comparison to other regions in the city. The variability challenges even the strict maintenance of the delegation’s network water rationing plans, and the trucked water services are deployed to households in compensation. Distinct from the Tlalpan case, in this chapter I suggest that the Iztapalapa example presents a path to accountable provision of the trucked water service more associated with structures of consumer participation, representation and oversight than with highly structured administrative measures internal to the delegation authorities. A share of the challenges of access and discretion embedded in the trucked water services in Iztapalapa are addressed not through the highly structured internal management processes evidenced in Tlalpan, but by more administratively informal yet deeply institutionalized accountability arrangements crafted largely by organized consumers and their local elected legislative representatives. The delegation authorities’ relationship to private actors is not one of service contracts to suppliers and customer accounts, as in Tlalpan. Rather, community and political stakeholders external to the delegation authorities resolve on the delegation’s behalf—and with their implicit approval—a share of the service’s distribution and oversight tasks. Drawing chiefly from field interviews with delegation officials, local legislative representatives, and community organizations and residents, this chapter explores the trucked water context principally in the Sierra Santa Catarina region on the eastern edge of the delegation, an urbanized, network-connected area of historically strong social organization.
4.1 Background

With a population of 1.7 million, Iztapalapa is the most populated of the City’s sixteen delegations, home to 3 times the population of both Tlalpan and of almost every other delegation in the city, excepting Gustavo Madero. Iztapalapa is also the most densely populated delegation, and has the third-lowest GDP per capita. The only local challenge cited in interviews of greater importance than water is the improvement of public security to combat persistent high crime rates. The scarcity effects of pressures of urban growth on water resources available to the delegation are not new. Rapid and largely unplanned urbanization began at the eastern edges of Iztapalapa in the 1970s. Housing development activities of both government institutions and private developers continued in the succeeding decades, not without problems of land speculation, titling, and limited service access (see Moctezuma, 2001 for discussion of urbanization in Iztapalapa). Water resources in Iztapalapa were scarce even in this early settlement period.

Rapid and unplanned urbanization 30 years ago also left important space for community mobilizing—not unlike in Tlalpan—yielding self-help housing development and urban upgrading as well as collective advocacy and demand channeling for state-provided urban servicing resources. Such organizing was often independent of the PRI’s structures of local participation and representation, and resistant to them. Resistance to authorities and to traditional structures of patronage also gave life to community-based urban popular movements; the Unión de Colonos de San Miguel Teotongo is one of the oldest and most important of these. The coalescing of opposition interests country-wide led to the formation of the left-leaning PRD party soon after the 1988 presidential election. With a new political party to represent urban interests on the low-income periphery, new inter-relationships, alignments, and alliances began
to take shape between community organizations and the PRD, altering the balance of previous
relations between citizens and PRI-led public institutions and the balance of the often deep
divides between citizens and government. The patterns of participation, influence and control
visible today in Iztapalapa’s trucked water service will be shown here to be deeply embedded in
the evolution of socio-political relations over the past 30 years.

While the rapid urban growth of several decades ago has slowed, concern over population
expansion and water availability continues today. Residents and some elected officials pay close
attention to changes likely to draw a larger population share to Iztapalapa. While some
interviewees cited a housing development slow-down, partly attributable to the development-
restricting Bando 2\textsuperscript{84}, others cited the fact that despite the Bando 2, the Mexico City housing
development authority (INVI) issued 15,000 new housing credits in Iztapalapa in 2004.\textsuperscript{85}

4.2 The Structure of Supply

In contrast to Tlalpan, Iztapalapa operates its trucked service internally: the delegation
owns the trucks and directly employs their drivers. According to an Iztapalapa official, the in-
house nature of the operation affords the delegation authorities greater control over the service.
This is a change from the 1980s, when the delegation’s public trucked service was provided by
private truck owners and drivers. Toward the end of the decade Iztapalapa began to rent trucks
for its own use, according to the official, as a way to assure quality in the service delivered. At
the beginning of the 1990s, the delegation began to purchase its own fleet of trucks, which now

\textsuperscript{84} Edict issued by the Mexico City mayor in 2001, prohibiting new housing construction everywhere in the city with
the exception of the four central delegations, with the dual purposes of slowing population and resource pressures on
the city’s edges and promoting re-densification of the center city.

\textsuperscript{85} Interview with legislative representative. Apparently 15,000 credits for new housing construction in Iztapalapa
were issued by the INVI in 2004.
number about 100\textsuperscript{86}. The delegation permanently employs 115 truck drivers (de base), and holds temporary (eventual) contracts with another 126.\textsuperscript{87} Many of these drivers were private operators that entered into public sector employment as the delegation secured its own fleet. The delegation has the capacity (in trucks, personnel and water supply at the garzas) to deliver 3 million liters of water per day, or 3,000 cubic meters\textsuperscript{88}. The cost to the delegation for a 10 m\textsuperscript{3} water delivery is 400 pesos (~US $40)\textsuperscript{89}. The 2004 operating budget for the trucked service was $17,035,000 pesos (~US $1.7 million), not including personnel costs, which were described as about equal to the operating budget figure\textsuperscript{90}. Officially, water is provided free of charge to delegation households, and no transport charges are formally levied. The delegation does not provide the free trucked service to businesses, except in the event of a shut-off for purposes of network repair or upgrading. Iztapalapa also paints its trucks to embed them in the public eye: the cabs and the tanks of the delegation trucks are plain white, and include a simple statement saying “exclusive service to the Iztapalapa delegation”. As in Tlalpan, the intention of this measure is to remind the public that the delegation water is not to be sold or otherwise delivered to users not sanctioned by the delegation authorities.

The trucked service operates out of the delegation’s Urban Services Department (Departamento de Servicios Urbanos), whose director oversees all secondary water distribution network operations, secondary sewerage, and trucked water services. The closer interdependency among networked and trucked operations—as they are housed in the same

\textsuperscript{86} Some of these trucks are large tractor trailers, but the bulk of the fleet consists of trucks with a 10 m\textsuperscript{3} capacity.
\textsuperscript{87} A private truck driver reported that Iztapalapa also contracts out to private trucks during the peak of the dry season, implying that demand sometimes exceeds the delegation’s in-house delivery capacity, but I was not able to confirm this.
\textsuperscript{88} Interview, Iztapalapa delegation
\textsuperscript{89} Interview, Iztapalapa delegation
\textsuperscript{90} Interview, Iztapalapa delegation
department and overseen by the same person, distinct from the administratively separated 
trucked service and network relationship in Tlalpan-- appears well placed to respond both to the 
physical variabilities in network pressures which often disrupt rationed service plans and to the 
social complexities of a great deal of demand for trucked water. Leadership continuity in 
Iztapalapa may also be a reason for what will be shown to be a delivery system less bound by 
administrative procedure: the head of the Urban Services department remains in his position after 
several decades of service, transcending the political transition in 1997, and bears a long history 
of forging, negotiating and maintaining relationships with the key claimants on delegation water 
service resources.

The Urban Services Department maintains several internal record-keeping systems for 
truck dispatch. Detailed trip records capture the destination of each truck deployed at the garzas, 
and these records generate an annual listing of the number of trips made to each colonia in the 
delegation. Authorities also utilize a three-part receipt-for-delivery system, whereby one copy 
goes to the resident, one copy stays with the delegation, and one copy stays with the driver and is 
signed and returned to the delegation. The Sistema de Aguas vale and record-keeping systems 
are also in operation at the delegation’s garzas, as in all other delegations in the city. While 
these systems enable internal budget and resource management and yield important output data 
over time, I did not learn of a formal list of consumers in Iztapalapa, as operates in Tlalpan. I 
suggest that this absence reflects the more fluid and uncertain network access environment in 
Itzapalapa, as well as the flexibility that delegation authorities must maintain in order to manage 
trucked water supply to a diverse set of local consumer constituencies. However, this looser 
organizational structure can present deeper implicit difficulties for achieving access and
transparency objectives in a context of high consumer demand and few exit options, and access and oversight become largely enabled by other less paper-bound processes.

Iztapalapa’s consumers face two constraints on meeting their requirements for water: getting trucked water (or other compensatory water) at all, and getting it at the price their authorities have set, which is zero. With respect to the constraint on access to the public trucked supply, there are few realistic alternatives for Iztapalapa’s low-income households: purchase of commercial 20 liter bottles is prohibitively expensive for any uses other than drinking, as is the purchase of water from a private truck, which can cost at least between 400 and 600 pesos (~ US $40 to $60), and more in times of drought when demand rises. These alternative costs are many orders of magnitude greater than the network price for a similar water volume. They are also exorbitant in comparison to the 5% rule often used by utility planners and donors to gauge a reasonable cost of water as a share of household income (see McPhail 1993). However, the procedures by which consumers access the trucked water are mostly formalized external to the delegation’s administrative structures, instead of internally, as occurs in Tlalpan.

As for the second constraint on the free nature of the service, latitude for discretion can also be one of the pitfalls of deep demand for a service, few exit options, and a loose bureaucratic structure. In Iztapalapa, the potential pitfalls of discretion bear on the practices of both truck drivers and dispatchers asking households for unauthorized payments in exchange for the water delivery service. Out of these requests an informal—and unauthorized—market for trucked water can grow: those willing to pay may get water more promptly. Interviewed political party representatives and community organizations all spoke of their evolving efforts to build awareness among residents that the trucked service is a free one and that residents should not feel obliged to pay, described in more detail below. An interviewed resident and community

91 Cost estimates provided in interviews by several respondents.
activist acknowledged that “...lifting the [truck’s] hose is hard work...”, and all interviewed agreed that a small, symbolic tip to the driver is certainly appropriate: “for a soda”, as the Mexican euphemism goes. One community leader acknowledged, however, that awareness-building is a difficult task, and that the water scarcity is so great that some people are willing to compensate a driver or other front-line official for service.

In sum, greater complexity in the service environment appears to translate into fewer formalized processes within the delegation’s administrative apparatus to ration this demand, as compared to Tlalpan. The evolution of the service towards today’s delegation-operated model, rather than a contracted-out model, affords the delegation authorities the power of public control as well as the flexibility conferred by this public control to adapt to constantly changing circumstances and demands with more agility. However, the latitude for discretion that can result is not lost on the delegation authorities when combined with the resistance of consumers; the next section describes the co-produced trucked water access and oversight strategies of organized residents and elected officials to improve accountability, in implicit coordination with delegation authorities.

4.3 The Tools of Access

In my interviews with politicians, agency officials, community organizations and affected consumers, I asked the same question again and again: “If I were a resident of Iztapalapa and needed trucked water, how would I go about getting it?” The answers were several. First, residents can stand in line at designated locations in neighborhoods. La Virgen is one of these locations. Trucks arrive in the morning, and water is dispatched on a first-come, first serve basis. Neighbors often organize among each other, distributing a full truck of water among

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92 So named because of a small altar of the Virgin of Guadalupe that has long graced the street corner.
them, thereby both collectivizing access and accommodating the storage capacity of each	household. They often ride along with the truck to the dwellings to direct the drivers. Informal
practices regarding priority of access (first in line, sharing among neighbors) become formalized
over time. A second mode is for a resident to go early in the morning directly to one of the
delegation’s *garzas*, wait in line, and then ride along with the truck to the home.

A third mode was to visit the homes of one of five delegation residents to request water.
These residents are both moral leaders in the community, and several are long affiliated to one of
the principal urban popular organizations in the eastern region of Iztapalapa, the Union de
Colonos de San Miguel Teotongo (UCSMT). The days of the week are divided among the five
residents, all of whom reside in different locations in and around the *colonias* of the Sierra de
Santa Catarina. On the day of the week assigned to each representative, delegation water trucks
drive up, and are dispatched by the community representative to the homes of residents who have
called or visited in advance to place a request for a water delivery. This arrangement was
negotiated many years ago by the UCSMT and the delegation’s water authorities. A community
trick “dispatcher” I spoke with has been performing this function for his neighbors for at least
twenty years. I was told that a delegation official usually visited the homes of these community
dispatchers the afternoon before the designated delivery date to determine the amount of water
that has been requested by residents, so that the delegation authorities know how many trucks to
send out the next morning.

A fourth mode was to secure water with the assistance of the local elected legislative
representatives, at the city legislative assembly level and the federal level. One option was for
residents to visit directly a local neighborhood field office of the representative; the office would
then put the call through to the delegation offices. Another option was to call the central office
of the elected representative downtown for the request to be made to the delegation’s water director. It appears that calls to the central legislative offices are made by local community leaders, closely tied to the party and the politician, who channel household-level requests up the chain of command to the representative. I observed the receiving end of this access mode in action: on two occasions I watched a senior water official field on a cell phone calls requests for trucks, and record the requesting location in a notebook used for this purpose. On one of these occasions, a delegation-employed truck dispatcher was then urged to deploy the trucks quickly: the requesters had stated by phone that they planned on blockading a main avenue in protest if the trucks didn’t arrive soon.

Less clear is the role of the Comités Vecinales in channeling water requests to the delegation: some interviewees said that members of these committees were sought out to place requests for water, others said “not at all”.93 Finally, residents use the tool of public protest: this may not be classified as a regular tool of access, but it happens from time to time. Sometimes it is just the threat of protest, usually in the form of traffic-stopping street blockades, *tomando el eje* 94. In other instances the blockades materialize. News reports from March 2005 reported several protest events in Iztapalapa: these responded to acute lapses in network service in specific locations, but part of the deal struck to between authorities and protestors to end the blockade was the dispatching of an agreed-upon number of water trucks.95 A review of press accounts city wide from 1985-1992 found Iztapalapa to be one of the delegations with the greatest reports of water service-related protest (Castro 2004). Lastly, residents never actually show up at the delegation’s water services department to place a request, as they do in Tlalpan.

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93 *Comités Vecinales* (Neighborhood Committees) were first created and elected in 1999, for three year terms, although there is great dispute in the city about the appropriate scope of their duties, and elections have not been held since this time. The Committees were elected principally along political party lines.

94 Literally, “taking the avenue”

95 “Bloquean avenidas por agua”, Reforma-Ciudad, March 18, 2005.
One explanation provided was the distance: the trip from the most water shortaged areas of the delegation to the water department’s central offices or sub-regional offices could easily involve several connecting bus rides.

My next question with respect to access was when, or under what conditions, consumers chose one of these access modes over another. Perhaps not surprisingly, in a context of “no market”, an informal one begins to emerge: front line workers deliver service to those who most value it, and value is represented by consumer willingness to pay. Payments accrue in the form of tips to truck drivers and tips to delegation-employed dispatchers.96 Resident choices or patterns in the mode they use to access water may owe to the acuteness of the need, the unexpectedness of it, and the associated willingness to make these unauthorized payments for service. The choice of access mode is also a political and ethical one: community organizations and elected representatives have dedicated energies over many years to build awareness among consumers of the free nature of the service—of the “right” to water–and thus offer their services to help households secure water for free as intended.

It appears that the dispatchers at the garzas and drivers tend to know which residents tip (and how much) and which do not (or tip less); the consumers that wait in line at the garzas are often the ones who are often willing to pay directly for immediate service. The more mediated access modes, such as request for water through a community organization representative or through an elected representative, have evolved over time to diffuse or reduce these market effects. When front-line delivery workers receive word that a service request originates from an elected official’s office, or receive the report from one of the local leaders who collect trucked water requests, drivers know that it will be a service from which payment of a tip will not be

96 Residents told me of this phenomenon, but it has also been reported in the Reforma newspaper.
derived. A staff person in a politician’s field office acknowledged that sometimes for this reason the trucks may not come as quickly: service might arrive more promptly to those residents or groups of neighbors known to be willing to pay, yet demand channeling by community organizations and politicians exerts the influence that is necessary to assure that water gets to those who cannot pay or choose not to pay.

4.5 Improving Service

Improved access to the service combines with improved oversight mechanisms initiated by both organized residents and the local elected legislative officials they support. Iztapalapa is today carved into six city-level legislative districts; yielding 6 geographic representatives in the City’s Legislative Assembly. All six of the current legislators represent the left-leaning PRD party. Despite the distinct ideological currents within the party, the PRD now links formal representational voice to community organizations historically contesting the PRI earlier control of institutions and resources (Moctezuma 2001). The PRD party heads the delegation administration and also is the party of the local legislative representatives, nonetheless, party allegiances in common does not absolve the relationship between the two of its complexity. One of Iztapalapa’s elected representatives told me that an important share of his duties consists of oversight of the trucked service in two ways: first, seeking to understand why a request for trucked water may not have been filled\(^9\), and second, gathering constituent reports about the payments of tips to the delegation’s truck drivers. This information is gathered, however, by mobilized citizens, members of community organizations tightly linked to the party. In this way, information flows upwards from constituencies to elected political representatives, who use this

\(^9\) I was told that this sometimes happens, but I do not know with what frequency.
information both to legislate at the city level and to monitor and exert influence locally, securing trucked water delivery to their constituents.

Several external oversight systems crafted by residents and political representatives link tightly to the co-produced, negotiated access processes to achieve improved service accountability. Many of these systems appear to have emerged at least beginning in 1997, with the shift to PRD authorities in the delegation. First, organized residents record license numbers (números económicos) of trucks making deliveries. Second, they collect detailed information from receiving households on whether or not the driver requested a tip from the consumer. Finally, residents and community activists often ride along with the truck, to assure that it arrives at the intended destination, averting diversions to other customers or uses. In one area of the delegation it appears that the practice of accompanying trucks continues, in another area interviewees commented that it was an effort that worked for a while, but that the citizen vigilance was difficult to maintain: people have jobs and families, limiting time for community commitments, and these efforts began to lose momentum. I was even told by a community organization of their proposal at one point to post volunteer “citizen supervisors” at the garzas to observe operations. Thus, as the influence of politicians yields access, it also yields greater accountability, and this accountability comes precisely from the embeddedness of the service’s operations in consumer organizational and representational structures. Residents and activists suggested that they still have a “long way to go” in improving the timeliness and assuring the free nature of the trucked service, but they acknowledged important achievements to date.

4.6 Conclusions
Two mechanisms secure improved accountability in Iztapalapa’s trucked water service: state-society synergy and co-production to assure and broaden access, which combines with social oversight to assure service transparency and mitigate the effects of discretion. Neither of these contributors to access and transparency involve the contract and consumer account-based administrative processes seen in the path to improved accountability in Tlalpan. Given the constraints of the local network environment and the scope of demands on compensatory trucked water service, I suggest that the delegation authorities could not assure on its own that trucked water is more equitably and transparently distributed without the efforts and resources that consumers and their mediators (community organizations and elected officials) bring to the task. This is consistent with the literature on public-private co-production in service delivery (see Evans 1996a and 1996b). Out of necessity and out of a culture of advocacy and a local tradition of self-help responses to urban servicing challenges, consumers and their agents mediate and “produce” distribution on the delegation’s behalf. A receptionist from a politician’s local field office interjected during a group interview to say that, “in a way, we do a lot of the delegation’s work.” Not only trucked water, but also, she reflected, fixing street lighting and unclogging street drains.

Just as importantly, not only are organized residents co-producing with a public agency counterpart, yielding a synergy without which the service would not function, but politicians co-produce on their behalf: party legislative representatives (and their staffs and militants) are simultaneously functioning as monitors of the delegation authorities (as required by their duties as city legislators) and as the authorities’ helpers. While the urban service provision literature sometimes sidelines the role of politicians as interference, these emerge in this case as central to channeling demand and producing the service (consistent with discussion in Davis 2003 and
Watson 1992 on the role of politicians in water and sanitation services). Political influence both secures service and assures greater transparency. Elected politicians and the community organizations they align with use their influence to secure access to a service to which access is not secured by other means. At the same time they influence access (by bearing their political weight down on the delegation as formal or informal monitors of the trucked service), they actually produce the access, performing a number of coordination and logistic functions that support the delegation’s service operation. This role is distinct from other analyses which center the role of political support at project decision-making and resource allocation levels (see for example Nance 2004, Watson 1995); in Iztapalapa, elected officials exert their influence by actually “participating” in the delivery of the service at the most local of levels. Part of this distinction may relate to the ongoing, permanent nature of the trucked service task, as distinct from the roll-out of more time-bound construction-oriented projects. Another share of the distinction may relate to tight traditional relationships between some community organizations and elected leaders in Iztapalapa. While this political influence may appear to suggest clientelist practices, I suggest that it rather seems to be supporting the shift among consumers from client to citizen, incorporating consumers into the task of gradually working to achieve greater accountability in service provision.

In sum, I suggest that the apparent informality of the trucked service’s management structure in Iztapalapa is no surprise, it is likely born of both the uncertainties in the networked water supply and of the political and social exigencies of accommodating a range of claims by diverse constituencies which bear on the delegation authorities. It is precisely the service’s flexibility which enables it to engage the challenges of discretion while tending to a diversity of
claims—consumers, elected politicians, and the deeply entrenched front-line public employees
who may take tips for service—while averting more serious conflict over water supply.
CHAPTER FIVE: CONCLUSIONS

In this section, I first revisit my original research question, then I suggest some of the implications for the present operations of trucked services in Tlalpan and Iztapalapa for improved household water access in Mexico City. Finally, I review areas for further research prompted by this study.

5.1 Findings

This thesis asked how and why two distinct models of accountability in trucked water service delivery operate across two Mexico City delegations, and what the implications of the distinct accountability models are for improved household access to water. I suggest that despite fundamental differences in the organizational structures charged with the distribution of bulk water by truck to households in the Tlalpan and Iztapalapa delegations of Mexico City, improvements over time in service delivery accountability to household consumers are evident in both demarcations. While more accountable service provision might be predicted in the Tlalpan delegation given the administrative innovations and formal private sector and consumer partnerships and contracts crafted by authorities to improve service management, improved accountability outcomes are also identified in the trucked water service in Iztapalapa, where almost none of the same internal management mechanisms were identified. Pitfalls to service operations in both delegations certainly persist, and it is impossible to demonstrate that the trucked service in one delegation is performing more accountably than the service in the other. As both delegations are also governed by the same left-leaning political party associated with strong commitments to more equitable access to services by its many low-income constituents, the research suggests that accountability can be achieved in very distinct ways. In spite of the
service improvements identified, the trucked services remain an incomplete and problematic solution to low network performance.

The preceding two chapters described how the distinct accountability models operate in each delegation. Public sector institutions, private actors, consumer participation, and political influence combined in distinct ways to improve access to and transparency of the trucked service. Several answers to why the models are distinct are reviewed here. First, improved accountability is tightly tied to operating environments and to the constraints and opportunities these environments present. One explanatory factor for the distinct trucked service accountability patterns in Tlalpan and Iztapalapa is the degree of uncertainty in each delegation’s network supply context. Greater piped network supply uncertainty in Iztapalapa may be one cause for a looser organizational structure, which, as was demonstrated, relies more heavily on organized community and political influences external to the delegation’s authorities to make the service work. The loose-appearing bureaucratic structure for truck delivery identified in the Iztapalapa delegation is correlated to the high degree of uncertainty in the network supply to households, and this structure contributes to the service’s strength. The controls and accountability measures internal to the bureaucracy in Tlalpan may reflect a lesser degree of uncertainty in network supply (see Lawrence and Lorsch 1969): more of Tlalpan’s trucked water services continue to be delivered to households without a network connection, and as trucked water for these communities is the only source, rather than a complement or substitute for low networked water service levels, the patterns and timing of the delegation’s service to these communities have generated tighter internal administrative processes over time.

A second answer is that the distinct paths to accountability in each delegation are explained by distinctions in the evolution of more historic institutional structures by which urban
claims have been made on the Mexican State, in this case, on the Tlalpan and Iztapalapa
delegation authorities. This is the problem of rationing excess demand, discussed in Chapter
One, and historically resolved by Mexico’s one-party system through a range of associational
structures linking interests to state resources. From this angle, public-private relationships for
service delivery are not new, and while their forms have evolved, they remain fundamental to
mediating discretion and improving service access in both cases. In the Tlalpan case, household
consumers and private truck operators are both historic claimants on delegation resources; the
delegation manages traditional claims of consumers and private truck owners through direct new
relationships: service contracts to truck owners and a “compact” with consumers granting a right
to access trucked water through an updated consumer list and a bar-coded identification card. In
Iztapalapa, the authorities manage this same constituency of truck operators by maintaining them
on the inside: they are contracted largely through civil service arrangements. Consumers in
Iztapalapa forge their service agreements with delegation authorities not by means of Tlapan’s
direct access, but through far more mediated and collective practices.

In Tlalpan, the potential for discretion by actors external to the delegation’s
administrative structures is managed by tightly controlled administrative processes within the
delegation administrative structure. In Iztapalapa, complex social and political forces external to
the delegation authorities influence and control the discretion arising from the delegation
authorities’ choice to improve control by internalizing the truck operations to the bureaucratic
apparatus. These distinctions suggest two different paths from clientelism (or corporatism) to
citizenship: clients become citizens in Tlalpan as they gain rights to access trucked water through
the bar-coded ID system, and would-be clients become citizens in Iztapalapa as they effectively
aggregate and channel demand (with the support of political parties) in ways that produce water
delivery from their delegation authorities when it is needed (see Gay 1999 and Gay, no date, on the shift from clientelism to citizenship). The Tlalpan model seeks accountability through distancing both trucks and consumers from a more embedded relationship with the delegation authorities, the Iztapalapa accountability model survives precisely because of the embedded relationships among authorities, consumers, and elected officials.

The public-private linkages in both delegations replicate traditional patterns of linking constituencies to the state, a central challenge of urban governance, and a problem largely resolved until 1997 through the city’s patterns of corporatist, one-party rule. The high degree of synergy detected in Iztapalapa suggests that the delegation—citizen—political party bonds that yield trucked water delivery are denser and more complex than in Tlalpan, and they also have a longer history: key water department personnel and key local community organizations and their representatives have interfaced for many years. Such a dense set of relationships may make the service less vulnerable to both administrative turnover and to network uncertainty.

5.2 Implications

Given the several constants shared by each delegation, including governance by the same left-leaning political party (the PRD) since 1997 and the low incomes of those connected neighborhoods served by trucked water, findings regarding distinct models for accountability in trucked water provision suggests several implications for improved household access to trucked water.

The most important implication is a simple one, yet deeply relevant for those charged with water sector decision-making in Mexico City: access to water by Mexico City’s network-connected households is far more complex than household network coverage rates and existing
network-centered analyses might suggest. Given the public challenge of allocating a scarce resource by a highly mobile technology yielding transaction-intensive processes, the achievements over time in improving the household trucked water services in Tlalpan and Iztapalapa—as relayed in interviews—are extraordinary. At the same time, many, many challenges to accountability remain, and the trucked service is an imperfect solution to network difficulties. Data over time was not available to determine whether or not the number of households relying on trucked water in Mexico City is increasing. If it is, greater policy-level attention to and analysis of both the delegation trucked services and of the low network performance that generates the need for the service are warranted, as both trucked service models appear to contain important elements of averting tension over allocation of what may be an increasingly scarce resource.

A second implication regards decentralization, or, the appropriate vertical allocation of resources and authorities. While arguments are made for more centralized management of the piped network water supply in Mexico City, the nature of the trucked water supply suggests that its accountability rests far more on the downwards (or horizontal) relationships between delegation authorities and the household consumers, public and private truck operators, and local political representatives than on the formal, upwards relationship between the delegation water agencies and the city water agencies. This research supports the notion that some service delivery tasks are best decentralized, particularly transaction-intensive ones, while others, more tightly linked to the scale economies of the piped network, may benefit from centralization. Consistent with the literature reviewed, very different provision models for a service can yield

98 Such evidence might have to be further controlled for the influence of climate in annual trucked water consumption, or cover a long enough time period that climatic effects are minimized. The increase in the number of colonias whose network water bills are condoned in Iztapalapa, from 35 colonias in 1999 to 51 colonias in 2005, suggests that greater evidence for or against an increase in dependence on trucked water is worth producing.
similar improvements in outcomes. Some types of tasks appear to be more permeable to local conditions than others, and trucked water would appear from this analysis to be one such task.

5.3 Further Research

Several areas for further research arose from this project. First, improved water access could benefit from better quantitative data indicating the scope of household dependence on trucked water. These data sources have been described at various points in this paper. Second, remaining questions about the evolution of historic organizational and corporatist patterns in urban servicing in Mexico City—-as a form of collectivizing and mediating competing demands on state resources—-might be usefully and more deeply answered. There is a great deal of important work on the early years of urban expansion in Mexico and Mexico City, and its interconnections with the politics and the governance of one-party rule (See Bennett 1995, Davis 1994, Ward 1986). A remaining question is how the expression of and response to urban demand for service has changed—empirically, with respect to concrete performance outcomes of specific urban services—-in line with the political transition in Mexico City to more competitive representational forms. The Iztapalapa case illuminated unexpected co-production by elected local representatives, and their concrete role in service delivery city-wide merits a deeper look. For example, I was not able to fully answer a key question: why are elected legislative representatives key producers of the Iztapalapa trucked service, yet barely appear in the Tlalpan story? One explanation may regard tighter alliances in Iztapalapa than in Tlalpan between community organizations and the political parties that represent them, but I can’t be sure.

99 I acknowledge that I did not speak with any local elected representatives in Tlalpan, but at the same time, individuals I did interview did not acknowledge a role for them in trucked service provision when asked.
Finally, and not unrelated to the previous themes, I also wonder what the implications of the distinct trucked servicing patterns are for improved network service in the two demarcations. A question arises from this analysis as to whether and how the structure and evolution of the trucked service may be a factor contributing to explanations about weak incentives for improved network performance in the examined areas of the city, and whether the very existence of the trucked service as a coping mechanism—coexisting with high yet dysfunctional network coverage in many served areas—is somehow crowding out more aggressive pressure on city or delegation authorities for network service improvements. The trucked delivery response appears in part as an alternative to a network maintenance and upgrading response. In Iztapalapa, for example, water service advocacy energies are clearly divided between the struggle for better networked water and the struggle for better trucked water. Consumer voice (of the form raised by Paul 1992), may be stronger with respect to the trucks: information asymmetry for the trucked service is minimal—delivery patterns are both visible and their evolution malleable. Alternatively, information gaps are high with respect to the piped network, with its natural monopoly and far more complex layers of institutional accountability. As the deeper challenge and more ideal solution to the water scarcity in urbanized areas of Tlalpan and Iztapalapa may ultimately be improved network performance, a closer look at the interface between trucked and network service decision-making may be warranted.
## APPENDIX A: LIST OF INTERVIEWS

<table>
<thead>
<tr>
<th>Interview Number</th>
<th>Position of Interviewee</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Legislative Representative</td>
<td>Asamblea Legislativa del Distrito Federal</td>
</tr>
<tr>
<td>2</td>
<td>Legislative Representative</td>
<td>Asamblea Legislativa del Distrito Federal</td>
</tr>
<tr>
<td>3</td>
<td>Senior Official</td>
<td>Secretaría de Obras y Servicios, Distrito Federal</td>
</tr>
<tr>
<td>4</td>
<td>Senior Official</td>
<td>Sistema de Aguas, Distrito Federal</td>
</tr>
<tr>
<td>5</td>
<td>Senior Official</td>
<td>Sistema de Aguas, Distrito Federal</td>
</tr>
<tr>
<td>6</td>
<td>Senior Official</td>
<td>Sistema de Aguas, Distrito Federal</td>
</tr>
<tr>
<td>7</td>
<td>Group Interview, Members</td>
<td>Frente Vecinal por la Esperanza</td>
</tr>
<tr>
<td>8</td>
<td>Senior Official</td>
<td>One of four private firms under service contract to Sistema de Aguas</td>
</tr>
<tr>
<td>9</td>
<td>Senior Official</td>
<td>Coalición Internacional por el Hábitat (HIC), AC</td>
</tr>
<tr>
<td>10</td>
<td>Senior Official</td>
<td>Tlalpan Delegation</td>
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<tr>
<td>11</td>
<td>Senior Official</td>
<td>Tlalpan Delegation</td>
</tr>
<tr>
<td>12</td>
<td>Senior Official</td>
<td>Tlalpan Delegation</td>
</tr>
<tr>
<td>13</td>
<td>Senior Official</td>
<td>Iztapalapa Delegation</td>
</tr>
<tr>
<td>14</td>
<td>Truck Owner</td>
<td>In Private Business</td>
</tr>
<tr>
<td>15</td>
<td>Truck Owner</td>
<td>Association under contract to Tlalpan Delegation</td>
</tr>
<tr>
<td>16</td>
<td>Senior Official</td>
<td>Casa y Ciudad, AC</td>
</tr>
<tr>
<td>17</td>
<td>Group Interview, Members</td>
<td>Union de Colonos San Miguel Teotongo, AC</td>
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<tr>
<td>18</td>
<td>Senior Representative</td>
<td>Movimiento de Pueblos y Colonos del Sur, AC</td>
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<td>19</td>
<td>Community Leader</td>
<td>Tlalpan</td>
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<td>20</td>
<td>Researcher</td>
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<td>22</td>
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REFERENCES CITED


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