Control, Incentives and Penalties in the Transit Contracting Process

by

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ABSTRACT

The last decade of the twentieth century was characterized by financial and budget constraints in almost all government activities. Transportation was no exception, and many countries moved to private operation as a way to reduce their need for operating and capital subsidies, and acquire technical competency to produce higher quality public services. Private participation, however, may require the implementation of a regulatory instrument to ensure the accomplishment of public goals. The most common form of regulation for large transit systems is the use of concession contracts. They govern the relationship between the government and the private provider, converting government's objectives into the economic variables that guide the private firm behavior.

This thesis analyzes a variety of issues that should be considered by a government agency studying private involvement in transit operations by bringing together concepts from different fields such as economics, law, political science, negotiation, policy making, engineering, and transportation science. First the entire menu of alternatives for private participation and regulation is presented, and the advantages and disadvantages of contracts as legal instruments are analyzed. Next, a qualitative approach uses a six stages project evolution framework to identify the most relevant variables that can considerably affect the outcome of the concession process and analyzes them in detail. Third, a quantitative approach uses a business model to study the relevance of the incentives and penalties arrangement in the contract and its influence in the service outcome. And finally, three case studies provide the evidence and lessons from real experience to fund and explore the findings of the entire analysis.

The theoretical analysis and the case studies show that competency and honesty in both the government oversight and the concession are a requirement to run the concession process efficiently and effectively. Transparency and publicity, labor negotiations, asset deterioration during the process, adequate timing and flexibility in operations and control have been identified as extremely relevant variables affecting concession results. Contract incentives and penalties can affect contract outcome, but the agency-contractor relationship and the parties' optimization horizon are the most important consideration in successful concessions. Only competent and honest management are capable of achieving win-win opportunities.

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For those interested in this topic of research, worth reading are the theses of Julie Kirschbaum, Mark Schofield, and Anneloes Hesen which cover 'funding for transit', 'economic justification for transit funding', and 'Performance indicators for evaluating structural reforms' respectively.

Dedicated to Amelia

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Chapter one: Introduction

The last decade of the twentieth century was characterized by financial and budget constraints in almost all government activities. To overcome these restrictions, many countries around the world shifted to private production of public services as a way to increase governments' efficiency, reduce the amount of public funds needed for operating and capital programs, and achieve technical competency to produce higher quality public services.

Public transportation was not the exception. Private production of transit services has become increasingly common in the past decade or two. In United States in the year 2,000 8.8% of the total transit operating expenses were in purchased services, accounting for approximately $1,760 millions. Overseas, the experience gets much richer in some countries like the United Kingdom and Argentina where almost no service is directly provided by the government.

When a private company takes the responsibility of providing public transportation services, the government needs legal instruments to ensure that the quality and quantity of the services provided are in line with the public policy. Although the government-contractor relationship can be regulated by a variety of instruments, concession contracts have been the most commonly used approach for guided transit systems.

This thesis analyzes the use of concession contracts in transit procurement and compiles relevant issues that must be considered for a successful transition to private production. Based on the analysis of three case studies the thesis builds a conceptual long range theoretical framework to analyze a concession process. Using a six stages structure, the most significant activities and stakeholders involved in the concession process are analyzed. Their relative leverage and their evolving interests are studied to identify potential risks that could lead the contracting process to failure. At the same time the research focuses on the issues that can cause deviations from a healthy agency-contractor relationship and their potential consequences.

To complement these findings, this thesis present a quantitative analysis based on a business like optimization model that predicts the effect of different structures of incentives and penalties in the contractor behavior. This model, based on the application of concepts from the field of contract economics, was used to simulate a single line transit contract and study the advantages and disadvantages of five alternative payment schemes.

All in all, the objective of this thesis is to provide basic guidelines to government officials studying the feasibility of private participation in the transit business. It brings together a variety of important contracting issues and they are systematically analyzed in the transit environment. The development of such analytical framework bridged, probably for the first time, a diversity of fields including economics, law, political science, negotiation, policy making, and engineering with transportation, setting the bases for further analysis on the topic.

The document is structured in four blocks. The first one, which includes chapters two and three, presents a menu of primary alternatives for private participation and regulation, and discuss the pros and cons of concession contracts as a legal instrument to guide the government-contractor relationship. Next block, in chapter four, introduces a selection of three case studies that provide the evidence from the real world to fund and explore the entire analysis. The third block, contained in chapter five, presents the qualitative approach where a six stages project evolution framework is applied to identify the most relevant variables that can considerably affect the outcome of the concession process and analyze them in detail. Chapter six, the last block, presents the quantitative approach that uses a business model to study the relevance of the incentives and penalties arrangements in the contract and its influence in the service outcome. Finally, chapter seven contains the cases findings and general conclusions.

Chapter two: Government and Private Motivations

Transportation as a public need

In modern nations, the existence of transportation, the ability to move people and goods from one location to another, is assumed to be an obligation of the government. Many nations grant it within their constitution as means to provide for the common defense, promote the general welfare, and secure the blessings of liberty. Not all inhabitants of urban areas can afford or want to depend exclusively on the automobile, and they rely on the existence of public transportation for their needs. Moreover, economic development and equity considerations compel governments to ensure universal access to a basic level of services that are thought to be important for the protection of equal opportunity of citizens.

In developing economies, urban transportation is expected to be one of the most important motors of development. Organizations such as the World Bank and regional development corporations promote and finance many transportation projects as part of their portfolio for fighting poverty and increasing growth opportunities. The World Bank strategic review document, Cities on the Move, states "Urban transportation can contribute to the reduction of poverty both indirectly, through its impact on the urban economy and consequently on economic development, and directly, through its impact on the daily needs of poor people" (World Bank, 2003. author's translation).

Governments find themselves needing to provide a minimum urban public transportation service level for their citizens. Most of the time, ensuring even a minimum service will require some degree of intervention by the government in the urban transportation market because private entrepreneurs rarely entirely satisfy social demands. This intervention can range from simple regulations of private producers through special franchises to public production companies. Examples of the use of above strategies are the United Kingdom bus system, the Buenos Aires bus companies and the Boston bus service respectively.

Government Objectives and Decision Making Process

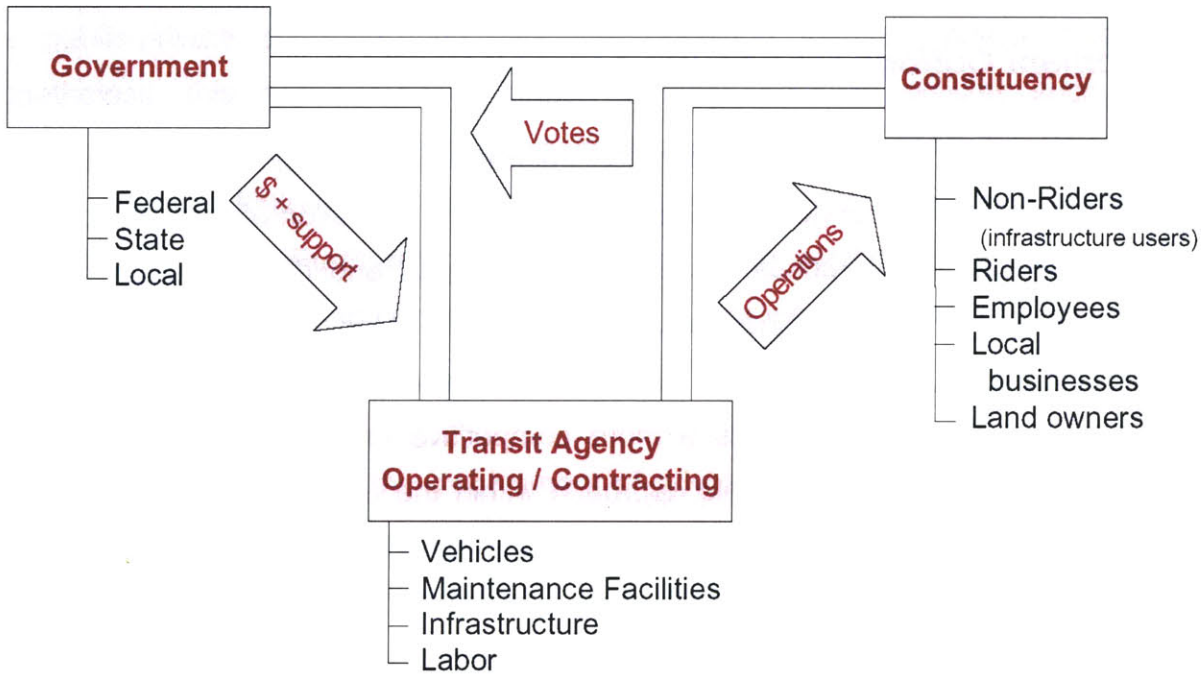
Regardless of who effectively produces the transportation services, the government has to decide the service standards that are socially desirable, and allocate the necessary resources to ensure that they are met. It might be the case that the envisioned quantity and quality of service is already present in the market without any type of public intervention and, consequently, authorities should only occasionally scan the market to make sure the standards are being met. This is, indeed, the prevailing case for intercity passenger services in some countries including, with some exceptions, the US. Unfortunately, this is seldom the case in urban transportation. Transit demand patterns and infrastructure costs make unregulated private production rarely meet socially desirable standards.

As in any other public policy decision, government faces a complex set of interests when building public transportation service policy. Transit should ideally be provided everywhere and at anytime in the urban area, at reasonable fares and with frequent, high quality service. Unfortunately, total resources are scarce and transportation competes with many other issues for the available public funds. Therefore, governments should balance coverage, quantity and quality of service with fares and subsidy. Defendants of these attributes usually diverge: users want a good service, but many cannot (or do not want to) afford expensive fares and they demand public subsidy. Non users (and some users too) don't like to see their taxes spent to provide a service they only occasionally benefit from. Politicians, who ultimately decide on these attributes, will probably support the strategy that maximizes their local support and political career.

The transit authority, acting either as an operator or as a policy maker, finds itself in a very complex situation to define the service level. A direct approach might suggest that they should look at their customers' interests for making the decision. But defining who the real customer is in such an organization becomes a challenge, and defending their interest is even more difficult. Transit users should be the agency's preferred customers

because they consume the service produced. Nonetheless, they cannot all be satisfied when interests conflict among them geographically and temporarily, and in service quantity and quality. They also conflict with non-users who compete for the street space and public budget. Moreover, they are not the only customer to the authority. The transit authority is imbedded in a public organization that usually reports to the executive branch of the government, so they unquestionably need to accommodate to the executive's expectations to ensure a supportive environment. Furthermore, when they rely on public subsidies for their operations, they usually also depend on the state house or congress to approve their funding, so legislators' interests can not be forgotten by an authority needing a predictable flow of funds. Internal and external customers are linked because transit riders are part of the elected officials' constituency (based on Salvucci, 2003). Figure 2.1 illustrates this relationship.

Figure 2.1: The Government-Agency-Constituency relationship



Other important stakeholders within the transit environment are the workers' unions. Being such an important and visible public service, transit workers know they have an important leverage. Strikes may threaten transit authority and local officials, so they

often have to compromise to accommodate unions' demands. Moreover, transit is a labor intensive industry encompassing an important group of workers, and usually become targets for partisan politics and favoritism. The media also has an important role in transit authorities' decisions and requires transit officials' attention because they know their performance can be magnified by the news, especially when performance is not good.

With all these constraints and unaligned forces in play, defining service coverage, quality and quantity, fares and subsidy is an extremely complex task for a transit authority that is subject to many conflicting interests and requires special competency. Moreover, it has to be resolved within the inertia of existing networks and working organizations, where changes and innovation are usually resisted. Nevertheless, ensuring adequate public transportation is a non-delegable responsibility of any public administration and, for better or worse, actively or passively, decisions are always taken.

Government Options for Ensuring Transit Services

Government has a variety of options for ensuring the provision of transportation services. They basically range from different degrees of regulation of private production companies to public enterprises. There are advantages and disadvantages to each approach and they have been alternatively been used around the globe during the last 200 years. However, the tendency in many parts of the world is, after many decades of public operation, to move towards a more competitive environment. The European Parliament has been promoting this approach within the European Union and it has been proposed by Multinational Funding Organizations as a requirement for infrastructure funds in developing economies. Although private production does not solve government conflicting interests, it does force authorities to decide and state a clear transportation policy in order to attract serious private investors that demand clear regulation rules.

Many governments decide to produce the transportations services themselves within publicly owned transit companies. This approach provides the government with direct control over the company's policy, but public companies are vulnerable to partisan employment and other political pressures, and usually end up being less efficient than their private counterparts. Defenders of public operations stress the importance of having total control over the service. It is indisputably an important advantage over other approaches, but it might be more the case in theory than what it is in reality, as government companies are embedded in the complex decision making process previously outlined. Another benefit of public companies is the perception of public use of taxpayer's money and direct accountability. Although this argument can also be disputed, it is certain that some societies have preferred to see public taxes spent on public companies.

Public companies can have access to lower interest rates for funds as governmental institutions, and capital investments are less intricate because they are not subject to the public-private conflicting interests that condition them in private businesses. Nonetheless, this has not eased transit finances because policies such as fare increases have proved really difficult to pass through public companies' decision making process even in inflationary times and are usually perceived as unfair in the domain of a non-profit company. Furthermore, workers' wages in public transit agencies have tended to be higher than in comparative private sector jobs and service standards have been difficult to enforce.

Other governments permit the involvement of private firms in the production of public transportation. Unlike government enterprises, private companies have a simpler decision making process because they are usually considered to have only one main objective: increasing their profits. Although this might not hold true in the short run, it is almost always true in the long term. Furthermore, when the cost and risks increase, as the project size gets bigger, the space for relegating profits to gain other sort of benefits is reduced. Private companies can get involved in public transportation, as in other

business, if they perceive the opportunity for getting a reasonable return for their investments.

Urban Public Transportation and Monopoly Issues[1]

Public transportation systems require the construction of durable and immobile investments, compete with other alternatives for the use of congested infrastructure, and are responsible for generating a considerable amount of pollutants. Moreover, transportation systems are subject to economies of scale or traffic density. All these reasons favor the conception of urban transportation as a natural monopoly and, therefore, the need for some kind of regulation. In the presence of a potential monopoly, measures have to be taken to prevent abuse of a dominant position and adverse social damage.

The degree to which urban transportation is a monopoly market is subject to discussion. Guided transportation systems on exclusive right of ways are durable and immobile investments and are subject to large economies of scale. Moreover, they are responsible for important externalities, especially in the value of the land and the real estate market. They are a natural monopoly. Bus services, on the other hand, require no durable or immobile investments. Nonetheless, they are responsible for pollutant emissions, compete for a congested infrastructure, and their performance can affect the synergy of the entire system in feeder networks. The relative presence of guided modes versus non-guided, as well as the congestion on the highway network and demand patterns will affect the degree to which a transportation system constitutes a natural monopoly. Nonetheless, the presence of even small elements of monopoly power should alert the possible need for some form of government intervention.

When no natural monopoly elements are present, such as in the case of many bus networks, the rationale for regulating the private producers is weaker, reducing the level

[1] Based on Gómez Ibáñez, 2003

of public intervention. Current practice in the United Kingdom is an example where private companies with a very modest regulatory framework compete in the street for providing public transportation. Nonetheless, demand patterns can make certain routes or times of the day unattractive to private companies from an economic perspective. Because government is responsible for spatial and temporal coverage of the service, it is forced to intervene in order to ensure universal access. In the UK, this is done by the so called "non-commercial" services, which are identified by the local authorities and awarded to private operators for three year periods after a competitive bidding process.

Competition in the market, however, raises street safety issues and aggressive competition between operators can ultimately affect the quality of service. In cities experiencing high congestion of their road network this alternative is rarely preferred and, in fact, it was not adopted in London. In Buenos Aires, where bus services are provided by many private operators, a route licensing scheme generates geographical franchises to regulate in-street competition, provide reliable schedules, and ensure public safety. Competition in the market is also not recommended in the case of guided modes of transportation. In such networks characterized by frequent headways and complex control systems, sharing the infrastructure becomes impractical and risky. There is no urban guided system in the world where different operators compete on the same tracks. The UK adopted a vertical unbundled approach in their railroad network privatization, but commuter rail franchises in the Greater London Area do not overlap geographically.

When the government policy is not to allow unregulated competition in the market, options for government intervention to ensure appropriate levels of public transportation includes public enterprises, concession contracts and direct regulation of private companies.

Public enterprises, as explained earlier, have the advantage of leaving the entire transportation system under direct control of the government. It is advantageous in that policy changes can be, at least in theory, immediately recognized and implemented,

and it may eliminate the need of control and regulation offices. Public inefficiencies, wages' competitiveness, bureaucracy, and difficulty in attracting and retaining competent management are the principal disadvantages of this alternative. Also, a more direct political control can make public company's decisions more grounded on political reasons than on real user needs, generating an organization that serves political interest more than traveler needs. Nevertheless, in some cases, the non-profit nature of public company can produce the service at a lower price.

Concession contracts involve a mid to long term relationship between the government and a concessionaire. They establish clear commitments for the parties by describing the obligations of the parties in advance as comprehensively as possible. Government typically requires that the operator provides a limited menu of services because that eases the monitoring and tariff setting tasks and it often seems fairer to consumers. Usually, a regulatory agency monitors the company's compliance to the contract but cannot unilaterally change the terms of the contract once it is awarded.

Often, the government specifies the minimum quality of service to be provided and then awards the concession to the bidder proposing the lowest tariff. Another common variant is for the government to specify both the minimum service and the maximum tariff and then award the concession to the bidder offering the largest concession fee or requesting the lowest subsidy. Either way, the government must estimate what consumers want when it drafts the basic concession contract. Government should ensure that market forces are involved to drive suppliers to offer terms that reflect true costs. If the concession expires and is rebid periodically, then the terms should reflect up-to-date market conditions. The major disadvantages of concession contracts are the limitation of contract completeness and the difficulties of transitions.

Discretionary regulation, also known as commissioning regulation in the US, is the direct regulation of a private company by a public institution. The electric and telephone utilities in the US, prior to the deregulation of the 1990s, are examples of this type of regulation. Discretionary regulation is usually the result of government attempts to

control a private monopoly or non-competitive industry. The basic advantage is its flexibility, enabling the government to adapt the regulations to unforeseen circumstances. This approach does not attempt to anticipate all the developments that may happen. Instead, a regulatory commission or individual regulator is granted substantial discretion to set prices and service standards for the regulated firm. The authorizing statute usually constrains the regulatory body to some degree by, for example, setting out the factors that it must consider. Discretionary regulation has two major disadvantages. The first one is that the influence of market forces is drastically reduced because the regulator can no longer rely on competitive bidding to ensure the operator is not earning excess profits. Markets presence is only indirect in that capital markets will not finance new investments if the regulator treats the regulated company too harshly. The second drawback is the risk that the agency will be captured by special interests and therefore will not excise its discretion in ways that are in the long term interest of the customers since political pressures inevitably affect regulators. This argument is, however, weaker in transit contracts where the government subsidizes both the operating and capital costs.

In practice, regulatory schemes are often mixtures or hybrids of the concession contract, discretionary contracts and private contracts. Experiences worldwide include many examples of concession contracts and some cases of discretionary regulation. This thesis will concentrate on the use of concession contracts.

Rationale for Private Intervention

Even though public operation is extensively used in urban transportation, two main reasons are argued in favor of private production: Efficiency gains and private financing.

A primary motivation has been a widespread belief that the private sector is inherently more efficient than the public sector. A privately managed enterprise or a private contractor, motivated by the possibility of profit, might have stronger incentives to be more cost conscious, efficient and customer oriented than a public enterprise (Gomez

Ibañez, 1993). These efficiency gains, if real, should eventually reduce the cost to the taxpayer and increase the quality of service to the user. Many examples show efficiency gains due to the concession of previously public companies. The concession of the Argentinean commuter rail and underground services reduced the subsidy per passengers from approximately $ 0.74 (assuming a 35% fare evasion) in 1986 to $ 0.20 in 1997 in constant 1997 Pesos values (FIEL, 1999). Part of this efficiency gains, nevertheless, came at the expense of important layoffs with a high cost to the society. Of course, the degree of efficiency gains that can be achieved through concessions is directly related with the level of efficiency of the public company under consideration. Ultimately, there will be no gains in the concession of an efficient public company.

Another motivation for private engagement is the desire to tap new sources of funds to supplement the constrained resources of the public sector. This is especially true for capital investments. Public sector might not have the financial resources to undertake them and private companies may offer the potential for financing infrastructure without overt increases in taxes. Nonetheless, the prospects of immediate financial gain to government applies only to the outsourcing of existing state-owned enterprises that can generate income in excess of that needed to cover operations (Gomez Ibañez, 1993). From a wider perspective, this should be taken with care. Because capital is usually more expensive for private companies than it is to the government, infrastructure financed this way will almost certainly end up being more expensive to the taxpayer in the long run. This argument, therefore, is strongest when the public sector's access to capital markets is restricted for some reason.

Chapter Three: Contracts

Background and Definition

Concession Contracts are probably the most commonly used strategy in the transit industry for private involvement. Contracts are usually preferred to discretionary regulation because it provides the parties with a relationship commitment that can be enforced through the local courts, and is similar to any other commercial transaction. Both parties get to know their responsibilities beforehand and, since it cannot be arbitrarily changed, parties enjoy predictability and a sense of security. Moreover, discretionary regulation use is more complex in services that cannot recover overall operating cost, not even through the use of cross subsidies.

According to the Encyclopedia Britannica, a contract is, in the simplest definition, a promise enforceable by law. The promise may be to do something or to refrain from doing something. The making of a contract requires the mutual assent of two or more persons, one of them ordinarily making an offer and the other accepting it. If one of the parties fails to keep the promise, the other is entitled to legal recourse (Britannica Online). The Black's Law Dictionary defines a contract as (1) an agreement between two or more parties creating obligations that are enforceable or otherwise recognizable at law, and (2) the writing that sets forth such agreement (Black, 1999).

Because the contract must specify the obligations of the parties, it should include a complete schedule of services to be provided or, at least, a clear description on how they will be determined, and the payment or compensation to the contractor. Additionally, contracts usually include performance standards and some means of enforcing them. Most common standards include ridership, on-time performance, trip completion, service quality, record keeping and reporting, and safety regulations. These performance standards are generally enforced through the use of incentives and/or penalties provisions. The fundamental principal of these provisions is that the profit motive is the driving force in business (Halvorsen, 1993).

Opportunism, Hold-up Risks and Contract Completeness

In a situation where a private company is providing transit services, both the government and the contractor are subject to opportunism once the required decisions and investments are made. It would be expensive, both economically and in public image, for the government to re-take control of the public assets once they have been transferred to a contractor if he is not performing adequately. At the same time, the contractor might fear unexpected and unjustified policy changes in the government can affect their business. Contracts provide a solution to this problem. If the parties sign a long term contract before making the relationship-specific investments and decisions, they can increase the guarantees of each others' behaviors.

Long term contracts are one of the most common forms to allow suppliers and customers to make relationship-specific investments by protecting them from opportunism. They are used in transit because it is expensive and politically complex for the agency to set up the contracting process, and because contractors usually spend an important amount of resources to establish the environment and assets required for the operation. These durable and immobile investments help make all parties, the contractor, the customers, and the government, vulnerable to opportunism and desirous of stability and commitment (Gomez-Ibáñez, 2003).

Contracts can be explained as devices that are designed to allow the parties to engage reliably in what is essentially a joint production effort by reducing the behavioral or "hold-up" risks present in long-term business relationships. "Hold-up" risks refers to the possibility that transactors may violate the intent of their contractual understanding by expropriating quasi-rents from the specific reliance investments that have been made by the transacting parties (Klein, 1992). "Hold-up" risks are, basically, the threat associated with the possibility that, once one of the parties has made a relation-specific investment, the other party, knowing that that investment has became a sunk cost for the first party, opportunistically modifies the terms for his advantage. A common example is the auto-

part manufacturer that buys special stamping machines for a particular brand and model. Once the parts manufacturer has made the investment, the auto company can demand lower prices, knowing that the parts manufacturer has no alternative use for that stamping machine.

In the transit case, "hold-up" risks examples can take many forms, and affect can both the government and the contractor. An example of the first case would be the contractor, knowing how expensive and embarrassing it might be for the government to re-bid a concession, might perform poorly without fearing being fired. An example of the second case would be the government, once the contractor has incurred all the set up costs and is fully running the concession, deciding to change the payments terms in a way that seriously reduces the contractor's income, but would not justify leaving the concession and losing the sunk costs.

Two elements prevent opportunism in a long-term relationship: contract specifications and private sanctions. Contract specification implies an attempt to write down all elements of intended performance under all contingencies, which therefore, implies being aware ex-ante of all potential "hold-ups". Nevertheless, there is an "ink cost" associated with writing things down and transaction costs associated with the search and negotiation of more completely specified contracts in an uncertain environment. Moreover, most future events can be accommodated at lower cost after the relevant information is revealed, making it wasteful for transactors to try to anticipate very unlikely potential contingencies. Consequently, all contracts are incomplete to a certain degree because it is impossible to foresee all possible future events and because the costs of attempting to perform such a task can be economically inconvenient. Additionally, the existence of "measurement costs", associated with determining contractor's performance, can be very high if contract specifications became extremely extensive to increase contract completeness.

Private sanctions occur outside courts, and define the degree of self enforcement of a contract. They consist of two parts: The future loss directly associated with the

termination of the relationship, estimated as the present values of the rent that the parties could have obtained if they performed to the agreement, and the depreciation of the transactor's reputation in the marketplace (Klein, 1992).

A central limitation of long term contracts is the possibility that the contract may prove to be incomplete or become obsolete if circumstances change. To protect against opportunism the contract must last as long as the lives of the relationship-specific investments that it is designed to protect. The longer the contract, however, the more the circumstances of the parties are likely to change over the contract's life. If the contract proves to be incomplete before it is scheduled to expire, then the parties will face the choice of either living with unsatisfactory terms for the remaining life of the contract or exposing themselves to opportunism by renegotiating the contract (Gomez-Ibáñez, 2003).

Asymmetric information

"Hold up" risks and contract incompleteness are not the only hazards in long term contracts. One of the main challenges in any contract, but particularly important in transit, is the problem of asymmetric information. This problem arises when one party to the transaction, at some time, holds important information that the other does not possess, or important information cannot be verified by an impartial third party, and is used advantageously. What happens in either of these situations is that the agreement between the parties, to be enforceable, is limited to those matters that will be known to both parties and can be verified by an impartial third party. The information asymmetry problem is magnified in the case of long-term contracts.

The theory of contracts economics has provided a framework to analyze asymmetric information. Under this framework, asymmetric information can be divided into two different problems: adverse selection and moral hazard. Adverse selection refers to the situation in which one of the parties starts with information unknown to the second party but which relates to the benefits or risks that entering into a contract will have for the

parties. Moral hazard refers to the problem in which both parties start out with equal information, but one person does not later get full information about either the relevant actions of the other person (hidden action problem) or the circumstances surrounding these actions (hidden information problem) (Halvorsen, 1993).

Even though economists have been able to mathematically formulate adverse selection and moral hazard, complexities of real contracts still exceed current capabilities of models. Nonetheless, this framework not only permits a much better understanding of the problem, but it also allows outlining simple models to compare different contractual approaches.

Contracts are important because they protect the parties against "hold up" risks, even though there is a chance that the contract might prove incomplete. They can also be unsafe because of the information asymmetry problem. Nonetheless, when joint efforts require the commitment of relation-specific investments, long term contracts are probably the best possible approach for the parties. Therefore, when considering the possibility of involving the private sector in the production of public transportation, concession contracts are the most commonly used approach.

Converging interests

When a transit agency and a private company enter a contract for the production of transportation services, they have different individual objectives. The transit agency is looking for a specific quantity and quality of service to be provided by the contractor. Its objective, as it was explained in the previous section, is very complex but has materialized in a set of service requirements. The private firm, on the other hand, is looking for a profitable activity. The transit agency has reasons, either economic or competency related, to believe that the private contractor will do better at providing the transit service that the agency itself. The private contractor thinks that providing transit services can be a lucrative activity. If each part performs accordingly, both could be better off by engaging in a common relationship.

To avoid "hold-up" risks and define the objective of the common endeavor, the parties should sign a contract. It will become the element expected to ensure the convergence of parties' misaligned priorities. Within the transit contract, the most important tool used to encourage appropriate contractor behavior and to prevent abuse is a set of incentives and penalties. The intent is to translate service performance (agency's objective) into monetary values (contractor's objective) to guide the contractor towards the desired outcome. They act, to a certain extent, as a transformation function from transit agency's objectives into contractor's objectives by converting quality and quantity of service provided into payments or charges.

The most important incentive is the regular payment for the service provided. Other incentives include premiums for exceptional quality of service or outstanding ridership, but are not always present in transit contracts. Penalties embrace punishments to inappropriate quality or quantity of service by looking at performances in punctuality, cleanness, customer relations, and are almost always present in transit contracts. The adequate design of incentives and penalties play a vital role in the outcome of the contract because their arrangement can determine the success or failure of the concession.

In theory, any system of incentives and penalties should produce similar results as long as incentives are greater than the marginal cost of producing the desired service and penalties are greater than the marginal savings of not producing it. Nonetheless, particularities of the transportation business, as well as external factors such as the behavior of the control agency, can seriously affect the outcome of transit contracts. Therefore, not every incentives and penalties scheme will produce equal results. Each particular arrangement has advantages and disadvantages and there might be situations where one fits better than others. Some selected examples are presented later in this section, and chapter six will analyze the role of incentives and penalties in transit contracts in detail.

Contract Enforcement

Independent of the adopted contract arrangement, its outcome will be seriously influenced by the performance of the agency in charge of enforcing it. In the transit case, these are usually ad-hoc planning and control agencies that are subject to budget constraints and vulnerable to different degrees of political pressures. Some contractual arrangements such as the cost of penalties or the degree of discretion to set incentives can affect the likelihood of an efficient control. Therefore, the enforceability of the contract will also be dependent on contract specifications.

Contract design and oversight capacity is a major component of any concession process because contractor's performance is linked to the agency's ability to control and enforce the contract terms. In the absence of a serious agency, the contractor can take advantage of the many subtleties that transit operations have to make an extra profit and harm the government and the riders by providing lower quality of service. But oversight capacity can also affect the contractor. Transit operations need some degree of flexibility because they periodically have to deal with unexpected events. An incompetent agency can harm the contractor by not approving temporary measures or persisting in strictly enforcing with the contract in unusual situations. As in any other relationship, competency on both sides boosts the advantages of the joint effort. Agency and contractor's honesty and competency will be subject of further study in chapter five.

Because contracts establish the obligations of the private contractor, its design affects the contract outcome. Once the contract is in place, it becomes the "rules of the game", and the contractor will try to maximize its profit subject to the constraints imposed by the contract. This means that contractor will probably take advantage of contractual opportunities as long as they might increase its profit. Furthermore, it will possibly examine the enforceability of the contract, trying to take advantage of any weakness to perform by the control agency. The appropriate design of the contract document is, therefore, vital to reduce the risk of undesired performance by the contractor.

Under a concession the parties can appeal to the local courts to enforce the contract. When one of the parties feels that the other has failed in honoring its commitments it can initiate a legal action against the other. Unfortunately suing is very time consuming and expensive, especially in the transit context where judges are not familiar with the particularities of the business and need the aid of external experts to provide proficient advice. Furthermore, most discrepancies that arise in every day operations from penalties or incentives charges and payments are of small economic value individually.

A very interesting approach that has not been widely used in transit contracts but that should be subject of further research is the use of arbitration. Arbitration is the reference of a dispute to an impartial person or persons, called arbitrators, for a decision or award based on evidence and arguments presented by the disputants. The parties involved usually agree to resort to arbitration in lieu of court proceedings to resolve an existing dispute or any grievance that may arise between them (Encarta, 2003). Depending on the economic prejudice, the arbitration could then be appealed through standard legal procedures but for reduced amounts, the arbitrator's decision will stand. Arbitration can have numerous advantages. First, it reduces the time needed for simple and low value conflicts resolution. Second, it can be much cheaper than using the standard legal system with the associated attorneys' fees. Third, disputes are attended by competent and experienced staff with knowledge of the transit problematic. Fourth, it can provide higher credibility in cases where the local legal system independence is questionable. Consequently, it increases the bidders' confidence in the entire process reducing its perception of risk and improving its financial offer. Moreover, it reduces the pressure on the traditional legal system that is usually overwhelmed, providing both financial and public image benefits to the public authorities by improving the judicial system efficiency.

The selection of the arbitrator is vital for this approach to be effective. The arbitrator should be competent and independent, and should be able to be available for at least the duration of the contract. To be able to comprehensively understand the contract as a whole, the arbitrator should be engaged in the concession since the planning stages. In that way it can encompass the vision that the citizenry had for the project, the

objectives that guided the contract design, the negotiations that took place during the concession process and the reasons for contract modifications, and the problems that might have occurred during the transition phase. Given the duration of transit contracts, the arbitration responsibilities should rely on an institution rather than an individual or a group of persons. If a large number of concessions coexist in time, it might be wise to create an ad-hoc institution to arbitrate in public transportation concession contracts. In cases where incurring in such expense is not economically sound, a prestigious university can hold this responsibility.

Arbitration is common in the US in labor and commercial disputes, and is increasingly being used in international commerce. Its use in public services is more limited, but many states have included arbitration clauses in public utilities regulations. The US Supreme Court has recognized that the advantages of arbitration are many: it is usually cheaper and faster than litigation; it can have simpler procedural and evidentiary rules; it normally minimizes hostility and is less disruptive of ongoing and future business dealings among the parties; it is often more flexible in regard to scheduling of times and places of hearings and discovery devices (US Supreme Court, 1995). Countries using the European Civil Law system have been less familiar with arbitration techniques that Common Law nations (Navarrine, 1992).

The contracting process

Whenever government decides to involve a private company in the production of transportation, the process that leads to deploying private operations is time consuming and complex. This political process can affect contract specifications as all the parties involved, usually many government institutions and private companies and lobbyist, come to an agreement. Some actors can feel more attracted to one type or another of incentives and penalties scheme and other provisions in the contract and can use their power to affect the contract design. The outcome will be a consequence of the relative negotiating power and the interest of the actors involved.

It is, therefore, important to stress that privatization is a political process and contract arrangements will be filtered as the involved parties prepare the background for private operation. This process will contrast the best practice with viable contracts in the political environment, helping to recognize further limitations of the different contract specifications. The contracting process will be discussed the in detail in chapter five.

Current Practice: Selected Examples in the US and Abroad

Most transit services within the US are directly provided by the government. Similar situations among most US cities led to public monopolies takeover of once private businesses for several decades following 1960. Nonetheless, some of the transit agencies are providing part of their services under contract with private operators. Yet, the amount of service contracted account for less than 6% of total operating expenses in scheduled bus service and grows up to approximately 9% if demand responsive services and other services are considered. In paratransit services private participation is higher, accounting for more than 60% of total operative expenses (Wilson, 2003). In most cases these companies receive their payment based on a fixed revenue-hours or revenue-miles tariff for operating pre-scheduled bus services. This arrangement, by far the most common, accounts for more than 65% of the payment basis in a national survey (TCRP SR258, 2001). A survey conducted by the Transportation Research Board published in 2001 showed that only a quarter of the bus contracts include some form of incentives, and none of the transit agencies that responded pays their contractors based (not even partially) on the passengers carried for scheduled bus services. The report summarizes:

> Only about one-quarter of the reported contracts offer monetary rewards as incentives for good or superior performance. Yet to discourage poor performance, 43 percent include monetary penalties, and 39 percent include related provisions for liquidated damages. Moreover, 63 percent of reported contracts have either a penalty clause or a provision for liquidated damages, and an additional 18 percent have both. These findings suggest that deterrents to poor performance

are much more prevalent than enticements for good performance in transit service contracts.

Retention of fares by the contractor is rarely offered as an incentive for increasing service amounts and quality; very few reported contracts allow the contractor to keep fare revenues as an independent source of income. Nevertheless, more than two-thirds of reported contracts permit the contractor to retain fares as an offset to future payments. This practice can benefit the contractor by improving its cash flow. Likewise, the practice can confer benefits on the agency by reducing expenses incurred in fare revenue collection and counting, although periodic auditing may be required to confirm reported fare revenues (TCRP SR258, 2001).

The TCRP survey report included a qualitative and perceptual analysis performed on a questionnaire that was directed to the general managers of the agencies. Only 15% of the managers advised on the importance of combining rewards and penalties and many urged rewards when standards of performance are exceeded. Author's previous research analyzing a selection of US bus contracts ratified TCRP survey's results. Only one of the contracts analyzed had incentives to promote better quality of service, but penalties were present in all cases, with costs ranging from $50 to $250 per incident. Two selected cases, summarized in Table 3.1, illustrate typical contract arrangements.

Retention of part or all of fare revenue by the contractor can, however, make changes in fare policy difficult to implement. Modifications to the fare system such as zones, prices, discounts, multi mode integration, transfer tickets, or to the competing and feeder services affect contractor's income and require difficult "held-up" negotiations to be implemented if they were not planned in advance. This drawback is magnified in cases with many contractors where integrated fares, although they improve customer service, are difficult to agree upon operators. This scheme works more efficiently if prepaid and off vehicle fare systems are implemented because they increase vehicle commercial speed and provide a richer base of information to monitor the contractor.

Because increasing the number of passengers is inherently a joint product of high quality operator performance and public policy, such as traffic signals coordination or parking and HOV enforcement, the contractor could undervalue fare receipts because of the policy risk. Sharing the revenues between the government and the contractor produces incentives to both parties.

Table 3.1: Payment, Incentives and Penalties in two selected US cases

Contract		Logan Express (Massport, Boston MA)	METRO Northwest BOF (Houston TX)
Payment	Basic	Fixed rate for the service requested in the contract	The basic payment is based on the number of bus-hours satisfactory performed.
	Additional Services	▪ Extended hours of operations charge ($/hour) ▪ Expanded operations Charge ($/hour) if additional buses and drivers are required to operate ▪ Overflow van services charge ($/hour) if parking facility overflows and passengers must park in an adjacent lot All of these charges are part of the contract	The payment will remain firm for all hours consumed between 90% and 115% of the estimated quantity. For those hours outside de 90/115 window the bus-hour rate will be subject to evaluation
	Changes in Service	Changes in service schedule should be notified 14 days in advance. No specific previsions for service change suggest that they should be paid (credited) with the additional (reduced) service scheme.	METRO can modify the services and reimburse them subject to the hourly rate (within the 90/115 window)
	Others	Credit for reduced services ($/trip)	The contract establishes procedures to deal with: ▪ Fuel price escalation ▪ Electric utility price escalation ▪ Gas utility price escalation
Incentives & Penalties	Incentives and Penalties	No incentives have been set in the contract Penalties include: ▪ Late bus (departure more than 10 min but before next scheduled trip) ▪ Cancelled bus (includes running a bus non in compliance with ADA requirements)	Performance standards are defined with a target level. If achieved performance deviates from the target bonuses and penalties apply. ▪ On time performance: 83.7% ▪ Accidents per 100,000 vehicle-miles: 1.23 ▪ Vehicle-miles between service interruptions: 4,817 ▪ Influenced complaints per 100,000 customer Boarding: 17.43
	Bonus and Penalties based on Performance Standard	▪ Late Bus ▪ Cancelled bus	▪ Plus 10%: + .50% ▪ Plus 5%: + .25% ▪ Minus 5%: - .25% ▪ Minus 10%: - .50% In every case, this percentage is calculated of the total amount METRO paid for the period.
	Cost of Penalties	▪ Late Bus: $50 ▪ Cancelled bus: $250	▪ $100 per missed trip ▪ $50 per missed pullout ▪ $50 per deficient bus ▪ $25 per drivers uniform or not possession of driver's license ▪ $100 per inoperable radios ▪ $50 to $150 per day on failure to submit reports on time

International experiences seem to be more likely to include incentives. One extreme case can be the bus service in the United Kingdom or in Buenos Aires (Argentina),

where there the companies completely retain the fare revenue as a direct incentive to increase ridership. In Germany, franchises cover their operating cost through fare-box revenues (they are reimbursed for discounted tickets) and are tendered for lowest subsidy when cost exceeds fare revenues. In Sweden, contract incentives schemes to encourage operators to attract more patrons, including a percentage of collected revenues, are becoming more common (TCRP SR258, 2001). Hordaland in Norway uses a remuneration framework that is related to the level of service and to the passenger numbers (Hensher and Stanley, 2003).

Heavy Rail contracted services seem more likely to include incentives in the form of revenue share schemes both locally and abroad. In the United States, the new MBTA agreement for commuter rail operations includes a 50% share scheme over a target-revenue, once this level is reached. International experience in commuter rail includes the Buenos Aires and former British Rails experience where the revenues are entirely kept by the contractor. A summary of the payment, and incentive and penalty previsions in the MBTA and Buenos Aires commuter rail contracts is presented bellow in Table 3.2.

Table 3.2: Payment, Incentives and Penalties in two selected Commuter Rail cases

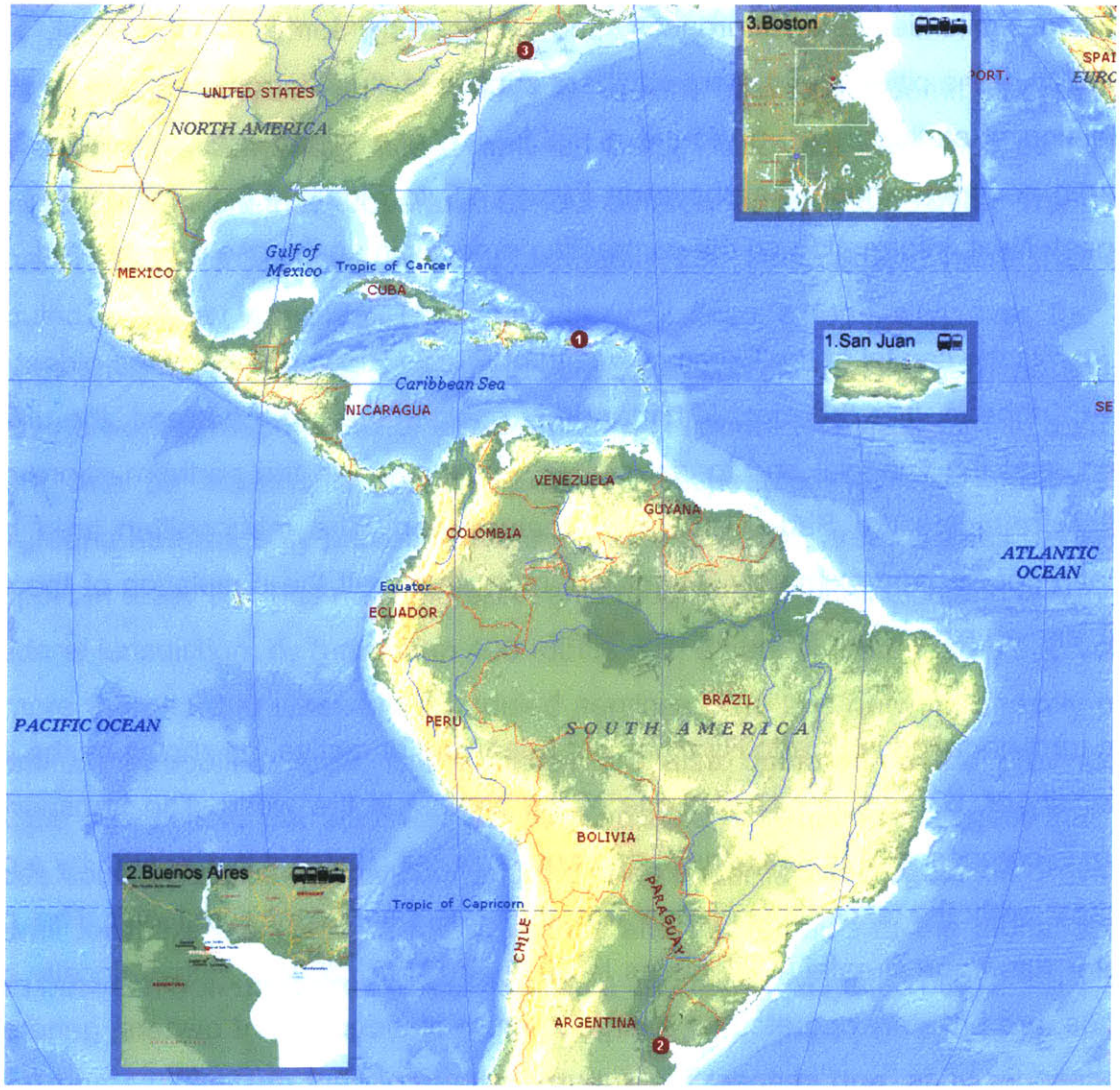
Contract		MBTA Commuter Rail	Buenos Aires Commuter Rail
Payment	Basic	Fixed price	Fixed Price. In addition to the payments from the government, the concessionaire keeps the revenues from all the tickets sold
	Additional Services	The price for additional services is part of the contract	Price for additional services has to be agreed
	Changes in Service	Service changes should be analyzed to see how they affect contractor's costs	There are no special previsions for service changes
	Others	Snow removal and forced account work receive special payment considerations	The concessionaire is responsible for managing a capital improvement plan. The contractor charge management fees on some of these investments.
Incentives & Penalties	Ridership Incentives	Contractor can keep 50% of the revenues over a pre established target level. This level is increased by 3% every year over the previous year's goal or ridership.	The contractor keeps the revenues from all sold tickets. Additionally, fares are allowed to be increased if quality of service (measured by a pre-established index) is grater than certain standards.
	Types of Penalties	▪ Late and cancelled trains ▪ Failure to meet mechanical services ▪ Employee performance ▪ Speed restrictions and track outages ▪ Non compliance with ADA ▪ Inadequate train staffing ▪ Violation to regulation or rules ▪ Defects in mechanical services performed ▪ Failure to follow incident management procedures ▪ Failure to prepare/ submit reports ▪ Failure to complete environmental service works ▪ Failure to adhere station cleaning schedule	▪ Insufficient train/cars in service ▪ Inadequate on-time performance ▪ Not compliance with scheduled services ▪ Cleaning, lighting and staffing in stations ▪ Cleaning and lighting in rail cars ▪ Failure to handle users' complains and suggestions, and inadequate information to public
	Cost of Penalties	Some examples of penalty's cost include ▪ $250 for late off-peak train ▪ $2,000 for canceled peak train ▪ Additional $1,000 for unavailable train due to failure to meet mechanical services ▪ $500 per employee performance ▪ $1,000 per documented instance of non compliance with ADA ▪ $1,000 if contractor does not report violation to regulation or rules ▪ $500 per incident on failure to follow incident management procedures ▪ $500 per station per day for failure to adhere station cleaning schedule	Some examples of penalty's cost include ▪ $100 of each car/train below scheduled ▪ $35 for every not on-time train ▪ up to $200 for cleaning deficiencies ▪ up to $200 for inadequate public relations and information (for US dollars conversion purposes, the ratio Arg$1=US$1 in place at the design and initiation of the contract was adopted)

Chapter four: Case Studies

Presentation

Three case studies provided the basic reference and illustrate the findings of this thesis: Tren Urbano in San Juan, Puerto Rico, Metrovías in Buenos Aires, Argentina, and The Massachusetts Bay Transportation Authority's commuter rail in Boston, USA. The location of the case studies is illustrated in Figure 4.1.

Figure 4.1: Location of the Case Studies



All three cases are rail concessions in an intermediate to large metropolitan area. The Boston commuter rail is the longer in history and has gone through five different contractors and two rebidding processes already, but it was never directly operated by a public company. The Buenos Aires Subway was privately built and operated for many years and later became a public company. It was given under a concession contract to Metrovías for twenty years in the mid nineties. The San Juan metropolitan rail, Tren Urbano, is not yet operative at the time of this thesis. It was built as part of the Federal Transit Authority Turnkey Demonstration Program and will be operated by a private company, ACI, starting in 2005.

This portfolio of cases provides a rich resource for studying the contracting process, identifying similarities and differences, and generalizing some lessons. First, a brief description of the cities and systems that are subject to study introduce the case studies. A selection of statistics can be found in Table 4.1, and alignment, population density and area coverage maps are shown in Figure 4.2 to Figure 4.5 (note that the scale changes). Next, information on the contracting process in each case is presented.

San Juan is the capital of the Commonwealth of Puerto Rico and one of the oldest cities in the Caribbean. It is the most important metropolitan area in the island, the principal seaport, and the financial and tourist center. It is located in the northern shore of the island surrounding the San Juan Bay, a natural port. The metropolitan area has a population of the approximately 2.5 million, more than half the population of the entire island, and an extension of 400 square miles.

Public transportation in Puerto Rico has not been very attractive, as shown by the island car density of .62 cars per capita, one of the highest in the world. The transportation system is composed of buses, jitneys and one ferry line. Buses are operated by a public company, with the exception of one line that has been contracted out. The public operator has approximately 280 buses in 30 lines (AMA, 2004). Jitneys, locally called Públicos, are privately operated by a large number of independent owners, generally in 17 passenger vans, and connect the suburbs with important destinations and transfer

nodes where passengers can access other forms of transit. 3,000 públicos vehicles serve 120 routes, but the públicos system is constantly changing in response to market forces. In 1990, approximately 90% of all trips to work were made by car, 5% by públicos, 3% by bus, and 2% using other modes (USDOT, 1994).

Buenos Aires is the capital of Argentina and the most important urban area in the country. It is composed by the federal district plus a group of 19 neighbor towns, with an extension of 1,500 square miles and a population of over 11 million people, representing approximately one third of the entire population of Argentina. Geographically, the city is located in a plain area, only limited to the east by the Rio de la Plata, an immense estuary.

From a transportation point of view, there city has 300 bus lines, 7 commuter rail lines, 5 heavy rail underground lines and 2 light rail lines. 7% of the daily trips occur in the commuter rail network that is operated by four different private companies. The network is more than 500 miles long with approximately 250 stations and more than 2,000 scheduled weekday services. The commuter rail lines extend well over the entire metropolitan area, but there is a higher concentration in the northern portion. The subway network is responsible for approximately 4% of the total daily trips in a 25 miles network with 69 stations and over 2,500 daily scheduled weekday services. The underground network only partially covers the federal district area, a small piece of the metropolitan area. The bus network represents roughly 50% of all trips and is served, at the federal jurisdiction, by more than 400 routes with a fleet of more than 9,500 vehicles and more than 45,000 weekday scheduled services. The bus network densely covers the entire metropolitan area. Bus services are also operated at the province and municipal jurisdiction, but statistics are not available. Estimations suggest that these services could be similar in magnitude to the ones under federal regulation. Private car accounts for more than 30% of the daily trips and the remains of the modal split are shared between non-motorized (excluding walk) and taxis (Raspall, 1997).

Boston is the capital of the Commonwealth of Massachusetts and the most important city in the New England region. It is located in the eastern part of the state on Boston Harbor, an inlet of Massachusetts Bay. It was one of the earliest major U.S. cities to be settled by Europeans and site of the beginning of the American Revolution. The population of Boston's metropolitan area is over 5.5 million in an area of over 3,100 square miles.

The transit service is the responsibility of the Massachusetts Bay Transportation Authority (MBTA), a public agency that operates the subway, the buses and the commuter ferries, and has contracted the operation of the commuter rail. The MBTA operates a total of 730 miles in 162 bus routes, 37.5 miles with 53 stations in 3 rapid transit lines, 28 miles with 78 stops in 2 light rail lines, and 4 ferry lines with 6 stops. A private consortium operates the commuter rail that consists of 12 routes with 119 stations and 402 service miles (MBTA, 2004). In Boston transit accounts for 8.7% of the commuter trips while automobile adds to 82.7% (FHA, 2003).

Table 4.1: selected indicators for the Case Studies

	Tren Urbano San Juan	**Metrovías** Buenos Aires	**MBTA** Commuter Rail Boston
Population in the entire Metropolitan Area	2.5 million (1999est)	11.5 million (2001)	5.7 million (1999est)
Population density in the metropolitan area (persons per sq. mile)	6,249	7,678	1,825
Mean Household Income (in US dollars)	$14,412 (2000 statewide)	$ 6,384 (2004 estimate based on 1997 data)	$50,587 (2000 statewide)
Citywide transportation options available	Bus Heavy rail (to open)	Bus Light Rail Heavy Rail Commuter Rail	Bus Light Rail Heavy Rail Commuter Rail Ferry
Total concession length (service miles)	12	25 Heavy Rail (HR) 16 Commuter Rail (CR) 9.1 Light Rail (LR)	402
Number of stations in the concession	16	69 HR 23 CR	117 stations 2 terminals
Number of lines in the concession	1 line	5 HR 1 CR 1 LR	12 lines

Figure 4.2: San Juan Metropolitan Area population density and Tren Urbano alignment

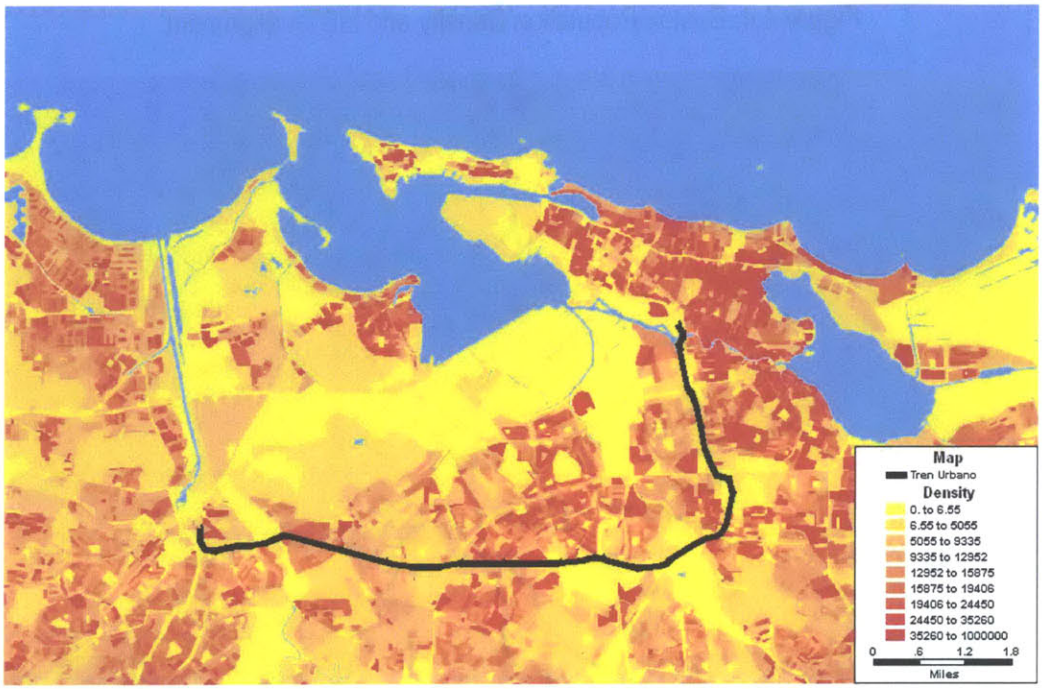


Figure 4.3: Buenos Aires Population Density and Metrovías alignment

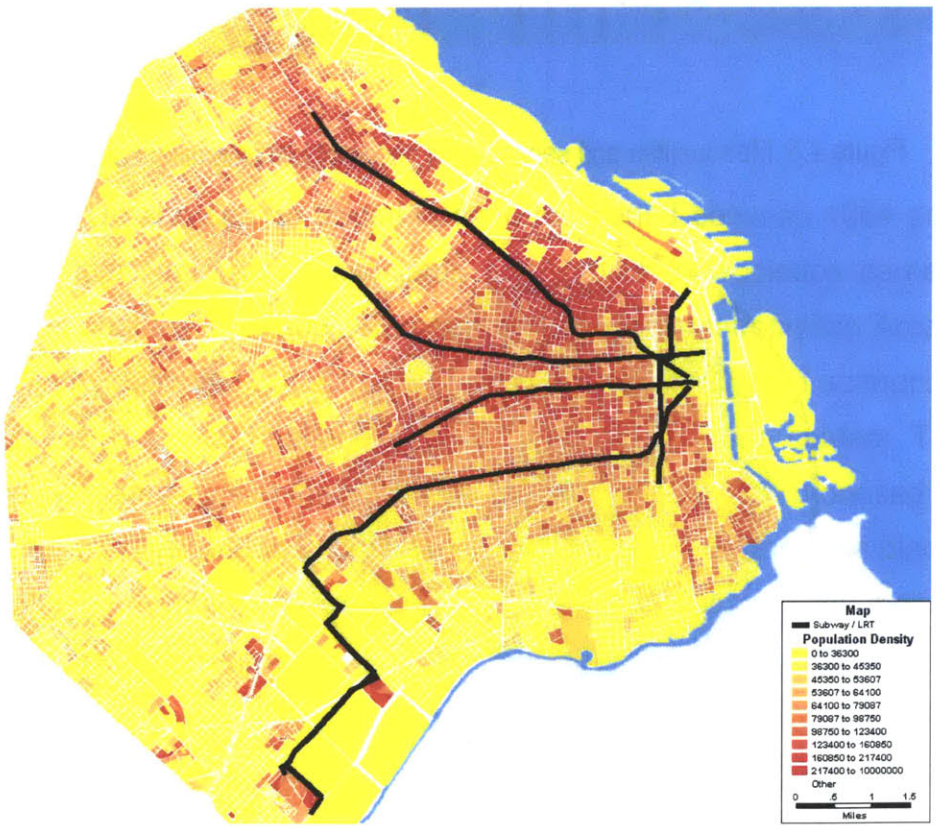


Figure 4.4: Boston Population Density and MBTA alignment

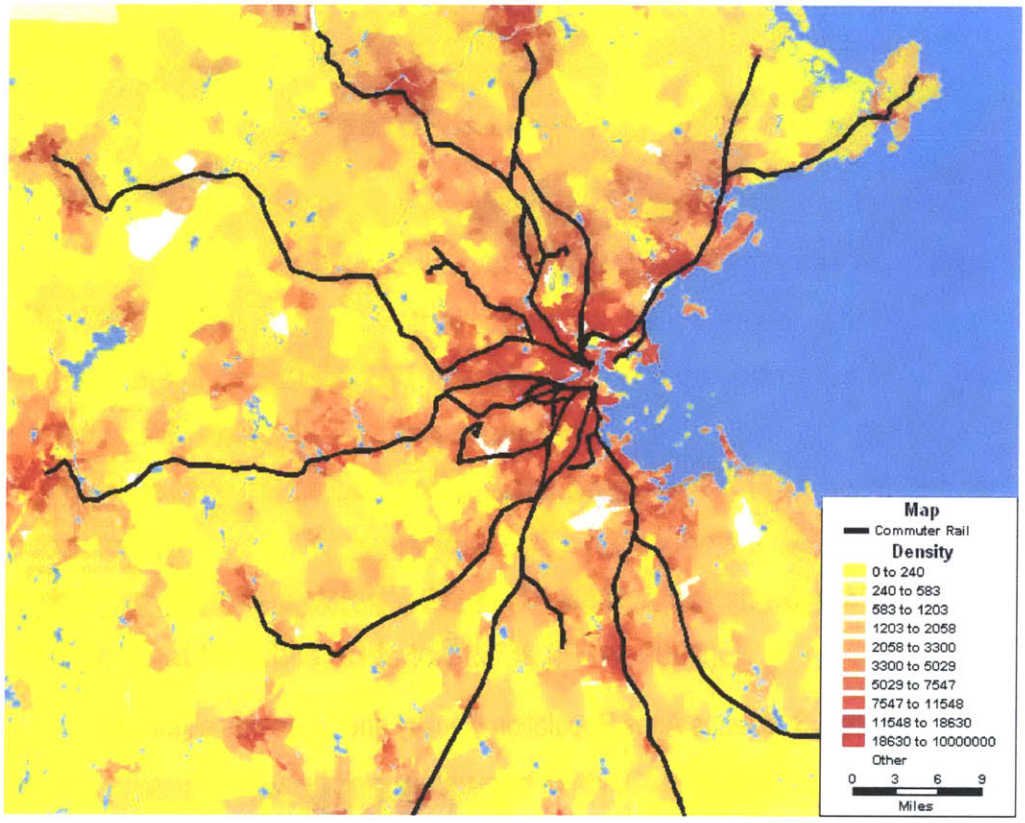
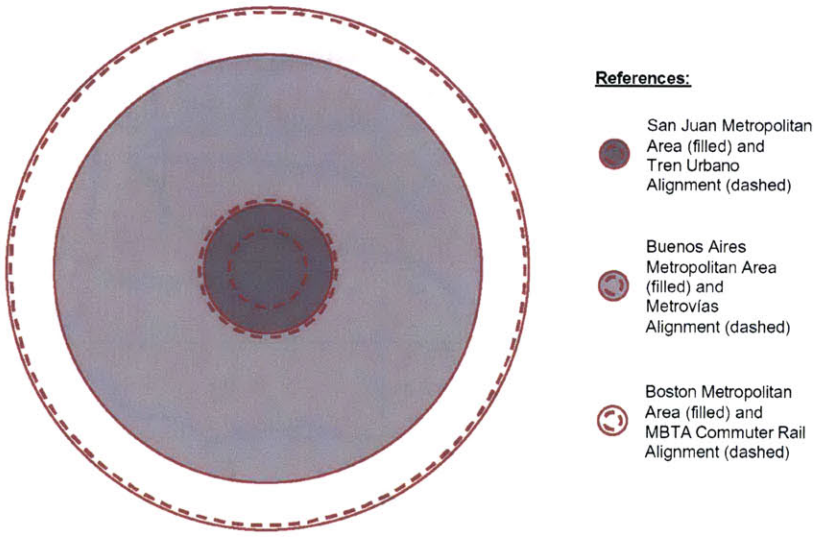


Figure 4.5: Metropolitan and service area geographical extension comparison graph



San Juan Tren Urbano Case Study

Figure 4.6: Tren Urbano alignment in commercial map

Prehistory[2]

The history of Tren Urbano can be traced back to the period between 1964 and 1967, when the firms Wilbur Smith and Associates and Padilla y Asociados carried out a comprehensive regional transportation study of the San Juan Metropolitan Area. In that study, the Planning Board and consultants predicted a multi-centered scenario for the future with a relatively balanced pattern of growth around five urban centers. To satisfy the transportation requirements of this multi-centered region, the plan proposed a grid of highways and expressways and the construction of a mass transit line. The plan argued that a transportation system based only on highways would not be able to accommodate the projected demand, and that consequently heavy rail was needed.

[2] Based on Arturo Ardila, 2002

The plan proposed to build two lines, one running north-south and the other east-west, which would intersect at Hato Rey. In 1971, the Puerto Rico Planning Board adopted this plan as the official plan for the Metropolitan Area of San Juan.

The plan was expected to be fully executed by 1985, including the two subway lines. However, the Highway authority, in charge of implementing most of the plan, did not have political support to build the entire system for the San Juan Area at the same time that it was to build other infrastructure projects in the rest of the island, and the transit part of the project was never undertaken.

Different consultants carried out several other Transportation Studies between 1971 and 1979. All of them supported the idea that a metro line is needed for the Metropolitan Area all San Juan. The alignment of the proposed lines, however, was not the same in all of them. In 1979, a study called "Metro for San Juan: a Study of Transit Alternatives for the Metropolitan Area of San Juan," was carried out by Vorhees and Associates and Consultores Tecnicos Asociados. After analyzing several alternatives, the consultants proposed a light rail solution whose alignment that looked like an inverted C, very similar to the current Tren Urbano one.

The 1979 study and the perception of constantly increasing congestion provided the arguments that led the government of Puerto Rico to submit a request for Federal funding for the construction of the first increment of the transit system in San Juan. The application for Federal funding sought $420 million. The rail project was justified with several arguments.

- The existence of several transportation planning studies that confirmed the need for a metro line in San Juan.
- The assertion that the Government of Puerto Rico was willing to finance a large share of the cost.
- The infeasibility of other options, such as bus priorities, bus ways and highway expansion, to provide sufficient capacity.

In the evaluation done by the Federal government the project submitted by Puerto Rico was the best one among the projects submitted by several cities. The Federal government offered 500 million dollars towards the funding of this rail project. These funds, however, were contingent on Puerto Rico raising 25 percent of the total cost of the project as its share of the cost. The project was never undertaken because the Puerto Rican government never raised these funds.

A couple of reasons motivated the lack of support. First, parallel to this rail project there were many other projects that were competing for local funds. Undertaking this rail project for San Juan would imply postponing or canceling several other projects throughout Puerto Rico. Second, the project was too expensive for Puerto Rico at the time and 25 percent of the total cost was considered to be unaffordable for the island's finances. Third, there was no thought given to raising the local tax base. Fourth, other projects, particularly Acua-Guagua (today Acuaexpreso), were said to offer a possibility for improving mobility conditions in San Juan without incurring in big expenditures and, at the same time, receive the Federal aid. Finally, the transit project did not have political support from neither the mayor of San Juan nor the Governor of Puerto Rico.

- Instead of the transit project, the Government of Puerto Rico undertook the Acuaexpreso project and a plan to improve the Metropolitan bus authority (AMA). These projects received Federal aid and the Puerto Rican contribution was far smaller than it would have been in the transit case. The real motivation of the Acuaexpreso is reported to have been the clearance of large areas of poor neighborhoods originally built by slaves on wetlands, a use of Federal funds for Urban Renewal. According to this view the Acuaexpreso never worked because it never really was a serious public transportation project. Large boats making inadequate trips through badly polluted water were never adequately thought through and never attracted serious ridership.

In 1982, the Planning Board submitted for approval to the governor's office a new plan for the San Juan metropolitan area. The new plan, that was a reduced version of the

1971 plan, deleted several of the proposed highways, and reduced the width of other highways and avenues. Nonetheless, by the end of the eighties congestion in San Juan was reaching the level where the business sector started to get worried about the future economic well-being of the region.

The Committee for the Economic Development of Puerto Rico, a private association of the main businesses in the island, was worried by the impact of congestion on land rents and general economic future of the Metropolitan Area of San Juan. Consequently, they decided to contract its own transportation study for the San Juan Metropolitan Area and hired the French consortium SOFRETU-ESTS to carry out the work.

The study argued that San Juan had too many cars for the average income level of its population and that, while the basic road and highway network was almost complete, the network was lagging behind in the construction of ring roads and arterials. Furthermore, the existing network had several problems that reduced its capacity, such as poor maintenance, no traffic management policy, and changes in capacity along a corridor, which generated bottlenecks. The study also claimed that the SJMA was entering the vicious cycle of building more highways for the ever-growing number of cars, which in turn induce more people to get and use cars. At the same time, the existing parking policy was an incentive for the use of private cars. The vicious cycle was complemented by the lack of public high-quality transit, which forced people to depend and used extensively the private car.

To address these problems the study done by SOFRETU-ESTS presented short term recommendations for improving the public transport system and improving the traffic management system, and a set of long-term recommendations regarding mass transit. The study suggested the construction of a light rail network, not very different from the proposals discussed before in other studies, and that seemed to match in a better way the financial conditions of San Juan at the time.

The Committee for the Economic Development of Puerto Rico managed to assemble a strong coalition of support for the rail project that cut across the political spectrum, and used this study to push for improvements in the transportation and congestion conditions in San Juan by lobbying for the construction of a rail-based solution. With great ability, the Committee for the Economic Development of Puerto Rico gained the support of the local mayors and other political forces, and called a press conference to demand that the Puerto Rican government builds a rail based solution for the Metropolitan Area. The main elements of the Puerto Rican press, also members of the Committee, took the idea, publicized it and gave significant support. By the end of the eighties, the metro project had gained enough political momentum to be seriously considered by the administration and to become part of the political agenda of the island.

The efforts by the Committee for the Economic Development of Puerto Rico to promote mass transit in the Metropolitan Area of San Juan found a receptive environment in the Department of Transportation and Public Works (DOTPW). As a result, the DOTPW hired a new regional master transportation study for the San Juan Metropolitan Area that was carried out by Barton-Aschman Associates, Inc., Parsons De Leuw, Inc and other firms during three years.

The study proposed to expand the network mainly in the suburban areas to provide accessibility but, for the central part of the Metropolitan Area it disapproved significant increases in highway system because of the intolerable community and environmental impacts of such actions. The central part of the region would have to live with the capacity provided by the existing street system with an emphasis upon public Transportation and better traffic management. Therefore, the role for public Transportation in the San Juan Region was going to become increasingly important.

The demand modeling done by the study demonstrated that by 2010 in at least three travel corridors passenger demand could not be accommodated by the use of buses and/or publicos. As a result, the study recommended the construction of a 19.6 mile light rail transit system. The first line was proposed to link Santurce and Bayamon, via

Hato Rey and Rio Piedras. The estimated capital cost was $670 million, excluding right-of-way costs. For a second-phase, the study recommended the construction of a line between Rio Piedras and Carolina at a cost of $566 million dollars. To feed this light rail transit system the study recommended expanding the Metrobus, local bus, and publico service, at an estimated cost of $200 million.

The FTA "sent a message" through its consultant to the project that without a congressional delegation Puerto Rico would never get discretionary Federal funds, notwithstanding the high merit of the project, but that Puerto Rico could built it at much less expense if it participated in the Turnkey Demonstration Project and use Design Build procurement. In 1992, confident with the preliminary findings of the study and just before leaving office to the new elected government, the Secretary of Transportation submitted a Letter of Intent to participate in the Turnkey Demonstration Program of the Federal Transit Administration (FTA). In 1993, the new Secretary of Transportation took over the project and filed the official application to participate in the program. One month later, the FTA published the decision in which Tren Urbano was selected as one of the five turnkey demonstration projects.

Project Development

The new authorities at the DOTPW, before continuing their commitments with the FTA, decided to have an outsider's appraisal of the Barton-Aschman Associates study that was finished in March 1993. Sergio Gonzales, head of the Puerto Rico Highway and transportation Authority (PRHTA), requested the Center for Transportation Studies at the Massachusetts Institute of Technology to audit the study. Simultaneously, a Boston based firm, Multisystems, was contracted to perform a related external evaluation of the study.

The main criticism that the MIT team made to the study regarded the demand modeling exercise, but acknowledged that carrying further studies to improve its quality would delay the eventual implementation of the project. Moreover, the results of the models

were credible and indicated that Tren Urbano was a viable project (Ardila, 2002). Multisystems key conclusions asserted that Tren Urbano was a good concept that should be successful, that the project was cost-effective, and that based on FTA guidelines the project could be eligible for federal funds. Therefore, they recommended making the decision to proceed with the Tren Urbano project (Multisystems, 1993).

Multisystems also recommended upgrading the existing bus and publicos system through the use of a "hub and spoke" system focused on transit centers, route and schedule restructuring, and independent monitoring, in parallel to the construction of Tren Urbano, to revert the trend of decreasing transit ridership (Multisystems, 1993). This recommendation was implemented after further study and major political will, and had a significant positive impact in ridership figures. In 1995 only 60.000 daily riders used the AMA buses in San Juan. By 2000 ridership had boosted to 135.000, a 125% increase (Ardila, 2002).

Although the procurement strategy was beyond Multisystem's appraisal commitments, the team felt that a Design Build (DB) was not going to save money to the Puerto Rican government. Nonetheless, they acknowledged that such a scheme could become a strategic advantage in getting the project into the implementation phase sooner, as the political times required. Furthermore, due to the absolute lack of expertise in train operations within the island, the group was in favor of a Design Build Operate and Maintain (DBOM) contract. A DBOM approach could bring experienced operators from the continent into the island and, through a Technology Transfer Program, develop the local capacity to operate the train in later years.

Two previous experiences influenced the contracting strategy discussion. First, a negative feeling from the DB contract for the construction of the Teodoro Moscoso bridge where the contractor had problems delivering to its commitments. Second, a very positive image from Metrobus, the private operator of a high quality bus line in San Juan, which had proved some of the advantages of contracting out the operation. The

team favored the DBOM strategy, but the decision was idled until a more comprehensive procurement strategy study was developed.

With increased confidence due to the independent appraisals, the government decided to move ahead in the implementation of Tren Urbano. The first step taken was to assemble the planning team. The team included people from the DOTPW, Rafael Jimenez and Associates (a Puerto Rican engineering consultant), MIT, and Multisystems. Following the advice of Frederic Salvucci, member of the MIT faculty and former Secretary of Transportation of the Commonwealth of Massachusetts, a group of lobbyist, attorneys and planning experts that had helped him in many of the big projects that were undertaken in Massachusetts during his administration were also engaged. The planning task was challenging, not only because of the magnitude of the project, but also due to the fact that the project was expected to be fully defined and contracted before the next gubernatorial election took place, in a little more than three years.

Considering these constraints, the government decided to complement the DOTPW with a General Management and Architectural and Engineering Consultant (GMAEC). The consultant was going to take the responsibility for providing the Government with all the necessary planning, engineering and architectural designs required to implement the project on schedule. This approach was intended to guarantee that highly experienced consultants would bring the required expertise to the Government's side, easing its task of assembling, planning, defining and structuring the project and the procurement strategy.

The planning team knew that the process to contract a GMAEC was going to take a long time, 1.5 years in the case of Tren Urbano, and that could delay the plans to have a signed contract before the next election. Therefore, to start working as soon as possible, the planning team suggested the establishment of a temporary GMAEC. The members of this temporary GMAEC were RJA (Rafael Jimenez's firm), Pangaro and Gilchrest (Through their firm MDA) and Parsons DeLeuw (the firm that had been

responsible for furthering the definition of Tren Urbano after the Barton Aschman-Parsons DeLeuw study was finished).

Work at the temporary GMAEC started by refining the planning and engineering studies already done, and completing the studies required for the environmental permitting process. Simultaneously, the government of Puerto Rico issued a request for proposals to contract the definitive consultant firm. Six different groups submitted a proposal. The contract was finally awarded to a consortium known as DMH, composed of two transportation infrastructure development firms from the continental U.S. and two Puerto Rican firms. The former are Daniel, Mann, Johnson and Mendenhall, and Frederick R. Harris, Inc. The latter are Eduardo Molinari and Associates, and Barret and Hale and Associates, consulting engineers. Originally, the contract was for two years and for $ 41.25 million.

GMAEC was in charge of providing all the architectural and engineering services necessary to bring the project to 30 percent design, carrying out all the planning and environmental work required to complete environmental permitting process, and preparing the studies and documents necessary for the PRHTA to bid and award the contracts for final design and construction.

One of the early decisions to be made was the definition of the procurement strategy. GMAEC prepared a strategy paper to analyze the problem. It took into account six primary objectives: control interfaces, maximize technology transfer, owner control, accelerate start of construction, operations-driven design, and enhance project funding from private funding, and compared two different strategies: a single turnkey contract or a mini turnkey (for systems, vehicles, track, yard and shops) plus civil work. The study found that a single turnkey had the strength of holding a single entity responsible from design through construction and on into operations, emphasizing the long term activity and providing the necessary expertise and technology transfer. Nevertheless, a single contractor would take longer and would increase the dependency on the single contractor, reducing the opportunities to involve a broad array of participants. It was

believed that the single contractor might be motivated by short term construction considerations rather than long term operations and maintenance concerns, and that there might be limited bidders in the single contract.

The mini turnkey, on the other hand, kept all systems elements intact and carried them through the operations phase and included multiple civil work packages, allowing a broader participation of local entities. It was expected that the smaller DBOM might be dominated by an equipment manufacturer, but their concern for the reputation of the firm would incentivize higher quality performance. They therefore recommended the mini turnkey approach, since it encouraged better overall competition and had a more reasonable schedule (GMAEC, 1994).

With the super turnkey alternative discarded, further analysis focused on the structure and relationship of the mini turnkey and the multiple contractors. Three alternatives were identified. In the first one the PRHTA would enter into a contract with a systems turnkey contractor and a series of DB civil contracts divided geographically. GMAEC would be responsible for bringing the design to 30%, the review and approval of the final design documents and the coordination of the construction. A second approach transferred the responsibility for the coordination of the civil contracts to the systems turnkey contractor. GMAEC task would be limited to bringing the design to 30% and reviewing and approving of the final design documents. The last option would add to the systems contractor the construction a section of the civil works. The turnkey contractor would be responsible for the coordination of the construction activities under its section and GMAEC, on top of bringing the design to 30% and approving the design documents, would coordinate the remaining civil packages.

These refined options were analyzed considering seven objectives: quality system, contractual commitment within 18 months, owner control, financial feasibility, procurement feasibility, acceptable price, and local participation and technology transfer. The approach finally taken was to merge one section of the civil works to the systems turnkey contractor. The Secretary favored assigning the entire coordination

responsibility to the turnkey contractor, but this option couldn't overcome the negotiation phase, as the system turnkey bidders where already uncomfortable with the complexity of their role and did not want more responsibilities.

The duration of the Operations and Maintenance contract was another issue of the contract strategy that required further analysis. The planning team was in favor for the longest period possible to ensure commitment from the systems and rolling stock manufacturer. Part of the team had had past experience with the Argentine rail concession process and was in favor of ten to twenty years responsibility. Nonetheless, the financial strategy of using tax exempt bonds introduced a cap to the maximum possible contract length of five years based on a federal law. Therefore, the final contract was for 5 years with the possibility of the government extending the contract for 5 additional years. Part of the team supported the idea of signing the extension of the contract soon after awarding the contract to make it clear to the contractor that it was going to be responsible for 10 years of systems operation.

Simultaneously with the definition of the procurement strategy, GMAEC and the planning team at the Tren Urbano Office worked in bringing the design documents to a 30% completion to be able to move into the procurement phase. This task implied revising the alignment and identifying opportunities to enhance the project. Among other improvements, they modified the alignment in the Hato Rey area, moving it from the main avenue to a parallel alley to reduce the potential oppressive urban design impact, and adopted a deep tunnel underground alternative in the Rio Piedras town to preserve one of the oldest communities in San Juan. GMAEC and the Tren Urbano Office performed an outstanding job with their community relations office to handle all concerns and improve local support through the outreach program.

GMAEC also prepared the environmental impact statements (EIS). A draft version of the EIS was ready in 1994 and it granted Tren Urbano the FTA's preliminary approval. The final EIS was completed in 1995. This successful process eased the way for the lobbyist that were able to secure authorization and appropriation of FTA funds during

1994, 1995 and 1996. The Record of Decision, which indicates that the environmental impact statement is complete, was issued early in February, 1996, and by March the Full Funding Grant Agreement was issued by the FTA. In it, the FTA agreed to give $307.5 million in discretionary Federal funds for the construction of Tren Urbano, over a period of five years.

Procurement

The official procurement process began in 1995 when FTA held an industry outreach seminar to attract possible bidders for all the turnkey demonstration cities. Interested bidders offered feedback about the approach and the team soon came to the conclusion that car manufacturers were reluctant to be responsible for super big contracts that included major civil works. This outcome reinforced the systems turnkey plus civil contractors approach. Manufacturers were also reluctant to be responsible for the operate and maintain (OM) part of the contract, because they feel more comfortable with the more common approach where they only produce the rolling stock or system components and have a third party operate them. However, Tren Urbano Officers made it clear that the OM approach was not negotiable and that they were not willing to change the procurement approach. Later in May 1995 GMAEC organized an outreach to explain the procurement process and get feedback for refinements.

The Tren Urbano Office selected a two phases, two envelopes, and best values process for evaluating the proposals. In the first phase, envelope one contained the technical and management proposal. Only those bidders with appropriate qualifications were eligible for the economic contest, based on the second envelope. Envelope two contained a preliminary economic proposal. The process was staffed by the Tren Urbano Office and GMAEC. They made a first decision regarding which proponents could continue to the next stage. The technical group then held discussions with the bidders still in contention to improve the bidders' understanding of the procurement specifications and to refine the project by incorporating the best comments from all the proponents. The qualified bidders were then invited, as part of phase two, to submit a

Best and Final Offer including both a technical envelope and a new economic proposal for the construction of the upgraded project.

The Systems and test track turnkey (STTT) contract was the most critical one. It included the rolling stock and all the systems, their operation and maintenance, the construction of a section of the alignment, and the construction and equipment of the maintenance yards and shops. The request for proposals attracted three bidders, involving seven different train manufacturers. The best written proposal was from a group headed by Breda, an Italian manufacturer, in association with French and Canadian systems suppliers. Unfortunately, the group proved to be very inconsistent during the discussion phase, showing that their consortium was weak. Tren Urbano planners feared that this group was not going to be able to maintain unity and deliver in an appropriate manner. The other two bidders, Bombardier and Siemens, had good proposals. Both of them were simultaneously bidding on the Acela contract for Amtrak, which Bombardier won. Probably because of the Acela contract's results, Bombardier quoted a higher price while Siemens offered a price cut, being awarded the STTT contract based on price.

During the negotiations that followed the selection of the contractor, the issue of supervision and accountability from STTT over the ASC came to the discussions again. Unfortunately, there was not full agreement on this matter within the planning team, making the dialogue even harder. At the beginning of the process both Siemens and Bombardier proposed to take the responsibility of managing the ASC, but later they retreated. Finally, the contract made STTT responsible for the interfaces, but held GMAEC accountable for managing the ASC.

On May 3rd 1996 the Department of Transportation and Public Works awarded the Systems and test track turnkey (STTT) contract to the Siemens Transit Team, a joint venture leaded by Siemens Transportation Systems, Juan Requena Associates, a Puerto Rican engineering firm, and Alternate Concepts Incorporated. The latter firm assumed responsibility for operating and maintaining Tren Urbano while the other two

were in charge of designing and building the rolling stock, systems, stations and support facilities. One small civil section in Bayamon was bid approximately simultaneously with the STTT, in order to be sure that some contract would be signed before the election and reduce the risk of a political pressure to sign a problematic contract with the Siemens consortium.

The entire alignment was divided into seven sections that, with the exception of a 2.6km and two stations section that was included in the STTT contract, were put out to bid for final design and construction. It was required that no prime contractor of STTT could bid on ASC contracts. Nonetheless, one contractor, Redondo, was a subcontractor in the STTT contract and a joint venture partner in the ASC contracts, which ultimately resulted in some accountability problems. Three different contractors were awarded the work, one of them winning four of the six sections. All the ASCs except the Rio Piedras one, where the contractor with most experience in tunneling was selected, were assigned to the lowest bidder. Table 4.2 shows the final assignment of ASCs and STTT contracts to the bidders and the contracted value.

Table 4.2: Contract, contractor and contract value for Tren Urbano

Contract	Stations and facilities to be build	Length of guideway (Km)	Contractor	Contract Value ($ millions)
STTT	Torrimar, Martínez Nadal, Maintenance Facility & Operations control center	2.6	Siemens Transit Team	612.5
Bayamón	Bayamón, Deportivo	2.9	Grupo Metro San Juan	71.5
Río Bayamón	Jardínes	1.7	Redondo-Entrecanales	37.9
Centro Médico	Las Lomas, San Francisco, Centro Médico	2.5	Redondo-Entrecanales	74.1
Villa Nevárez	Cupey	1.9	Redondo-Entrecanales	71.8
Río Piedras	Río Piedras, UPR	1.8	Grupo Kiewitt (KKZ/CMA)	245.3
Hato Rey	Piñero, Domenech, Roosevelt, Hato Rey, Sagrado Corazón	3.6	Redondo-Entrecanales	125.8

Source: Arturo Ardila

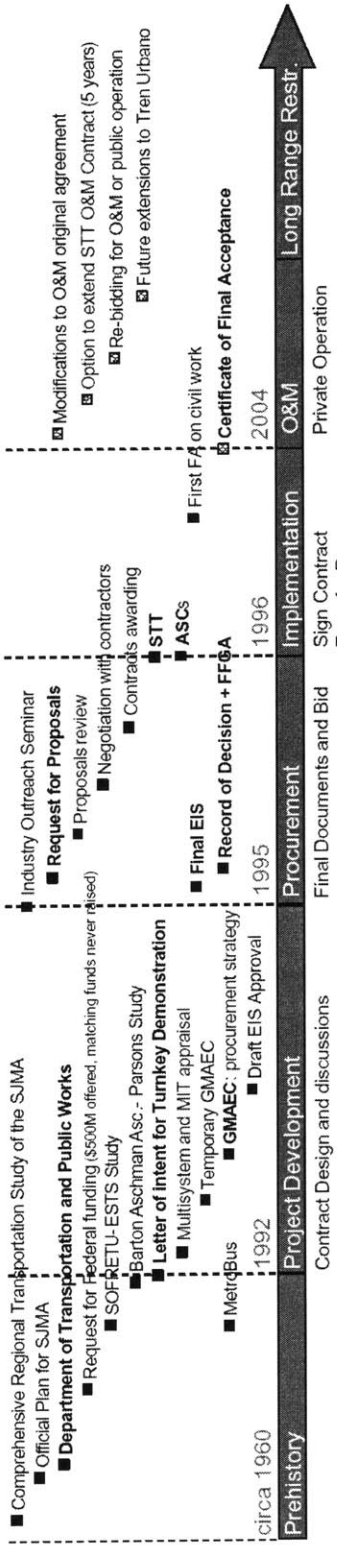
Implementation

The Bayamon alignment section contract was the first civil contract to be awarded. The rest of them followed and work started in the field in 1997. According to the original schedule the train was expected to be operational in November 2001, but the most current expected opening date is December 2004. Some design changes ordered by Tren Urbano hold responsibility for part of this delay, but it is clear that both construction and systems contractors performed below expectations, and the government was unable to keep the contractors to their commitments. Coordination between the ASCs and with STTT and GMAEC and the Tren Urbano office proved to be difficult and might be liable for much of the delay. Politics, changes in administration, inter-contractor and intra-contractors problems, "blame games" and lack of faithfulness generated major obstacles to a smooth flow of the project, especially during the system integration phase. The coordination approach adopted for the STTT and ASC interphase seemed not to have been robust enough to induce an appropriate contractor's behavior and, consequently, insufficient coordination damaged the entire construction project.

Operations and Maintenance

The project has not yet entered its operation phase. Nonetheless, starting in 2003 Alternate Concepts Inc (ACI), the company responsible for the operations, had initiated the hiring and training process for the train operators, station attendants and administrative staff. By the end of 2003 ACI had more than 100 people on the payroll. Delays forced the postponement of the opening day, but the operator seems to be complying with all the steps needed to ensure an effective operation when the train gets ready to start.

Figure 4.7: Tren Urbano contracting process timeline



Buenos Aires Metro Case Study

Figure 4.8: Metrovías alignment commercial map

Prehistory

The beginning of the history of guided transportation in Buenos Aires is not different from the history in many other cities worldwide. Public transportation started during the nineteenth century with the expansion of the city limits using horse-drawn carriages first and steel wheels on rail later. First tramways and then commuter rails and the underground network were constructed and originally operated by private companies. The competition with the buses, fare regulations and periodic crises in the capital markets weakened private corporations that underwent a series of mergers and were finally acquired by the government in the second half of the twentieth century (based on Salvucci, 2003).

The first Underground Railroad project for Buenos Aires was developed in 1886 by the Chamber of Commerce, but was never built. Numerous other projects were considered after that one and even some of them obtained authorization to proceed from the government, but they all failed to start construction. It was not until 1909 when the local government of the City of Buenos Aires, authorized the construction of the underground electric railroad that would eventually became the first metro line, Line A, in 1913. The line was privately financed and constructed by the Compañía de Tranvias Anglo-Argentina Limitada, a British incorporated company that already owned many of the tramway lines in the city.

Another private company, Lacroze Hermanos y Compañía, obtained authorization for the construction of a second line, Line B, in 1912. Once the First World War was over, work started and the line was progressively opened to the public between 1930 and 1931. A Spanish company, Compañía Hispano Argentina de Obras Públicas y Finanzas (CHADOPyF), obtained permission in 1930 to build and operate four additional lines. Only three of these four lines were finally built. Construction started in 1933, 1936 and 1940 for Lines C, D and E, and they were progressively open to the public starting in 1934, 1937 and 1944 respectively.

In 1936 the Corporacion de Transportes de la Ciudad de Buenos Aires was created to coordinate the actions of the subway, tramways and bus companies that were all operated by private firms with sometimes competing interests. The board of directors had representatives from the various private companies, as well as from the national and city government. The corporation failed to perform and soon required increasing subsidies to maintain the operations, especially during the Second World War. Unfortunately, the situation did not improve after the war and the corporation was finally liquidated. The government took over the subway system, expropriating and compensating the private companies. The new public underground company was named Subterráneos de Buenos Aires Sociedad del Estado (SBASE) and its control was transferred from the national to the federal district government.

From the fifties until the early nineties, the public company that operated the underground did not manage to keep the ridership or to continue expanding the network at a comparable pace. During these forty years, while quality of service was constantly deteriorating, ridership declined by half, and only ten new stations were opened.

The background situation for Subterráneos de Buenos Aires at the beginning of the nineties is not as well documented as the situation of Ferrocarriles Argentinos (FA), the national railway company. But although their operation scale was very different, both public companies were facing similar challenges and the government was looking for a common solution. Ferrocarriles Metropolitanos Sociedad Anónima (FEMESA), the state owned company that handled the commuter rail services, operated 900km of tracks and 267 stations caring approximately 290 million passengers per year. SBASE operated 44km of tracks and 76 stations caring 140 million passengers per year. Ferrocarriles Argentinos was a big burden for the national budget requiring 2 million dollars of subsidy per day. This figure for Subterráneos de Buenos Aires is less clear due to their accounting system, but the operating deficit for years 1,990 and 1,991 was estimated to average around 20 million dollars per year. SBASE's subsidy was not paid by the federal government as FEMESA, but was covered by the city finances.

The quantity and quality of the underground service was very poor. The total number of passengers carried declined systematically during public operation, from approximately 275 millions per year in the early seventies to roughly 150 millions in the early nineties. Passengers had been higher before, reaching 375 millions in the late fifties, but employment and lifestyle patterns were very different that long ago, therefore inefficient operation cannot be made fully responsible for that passenger decrease.

Fleet availability was low due to poor maintenance. The number of car kilometers operated during 1993 (before private operation) was below 20 million. Reliability, expressed as minutes of service interruption, rounded 1.2 per thousand car kilometers. The state of repair of the fixed facilities was also deficient. Stations and transfer facilities had not been taken care of for years, and the signaling systems and the tracks were

aging with almost no preventive maintenance. The general aspect of the network was of complete abandonment and the service was poor and unreliable.

FIEL report about Ferrocarriles Argentinos comments: "There was very little survival chance for a company that was mainly a source of public employment and social services, was subject of immense public pressures and an important external influence from suppliers, contractors, etc. It was not difficult to foresee that, if the status quo continued, services were going to be interrupted, especially within the momentum of a company that was unable to adapt to change and was regulated and restricted because of its public property nature". The situation of SBASE was better than that of FA, but not radically different.

Project Development

Faced with this critical situation, and immersed in a wider economic reform strategy, the Argentinean government decided to concession the railroads, commuter rail and the underground. The main framework of the economic reform was law number 23,696 of State Reform of 1989. This rule established many public companies to be subject to privatization, among them Subterráneos de Buenos Aires. In the early nineties the government called for international bids for the concession of the commuter rail and subway service of the Buenos Aires Metropolitan Area. The Argentinean media and public opinion did not make any special effort to distinguish the concepts of concession and privatization so railway concession process, although it did not involve the sale of any government asset, is better known locally as railway privatization.

Previous concession attempts in the rail sector dated back to 1987, initiated to try to solve the endemic problem of Ferrocarriles Argentinos, the national railroad company that required about 2 million dollars per day of subsidy to maintain a poor and constantly deteriorating quality of service. This first proposal only included the freight market, transferring the management of the rolling stock and commercial responsibilities to private hands, with government remaining in control of the infrastructure. While this idea

was being analyzed, a new economic crisis and hyperinflation halted the endeavor and it was abandoned.

Soon after this attempt, some local private companies formed a group and presented a private initiative to operate the most important freight rail corridor in Argentina: the line between Rosario and Bahía Blanca. This effort didn't work either, because of a change in government while the proposal was being analyzed. Nonetheless, many of the companies that formed this original group ended up with the freight concession a couple of years later. Further analysis of this privatization attempt is out of the scope of this work, but it constitutes an excellent example of how private manufacturing companies interested in having a competitive transportation alternative can use their stake to motivate a change in the unsatisfactory public operation.

In 1989 with a new government in office the freight railroad concession took new impetus. A new group leaded by the minister of public works was formed to study the concession alternatives. The strategy adopted was to franchise the fright railroad by geographical areas, to include a minimum mandatory investment plan and to keep the concession vertically integrated. The network was geographically divided into six main corridors and put out to bid. The first one, Rosario to Bahía Blanca, was successfully concessioned in 1991. The other four were awarded in the next two years and one received no offers and continued to be operated by the government.

This success increased the confidence in private concessions and in the vertically integrated strategy, but government changed the minister of economic affair and part of the team was replaced. The new head of the rail concession office, took the responsibility of the concession of the commuter rail services within the metropolitan area of Buenos Aires.

In July 1991 Jorge Kogan was put in charge of the concession process and headed the Unidad de Coordinación del Programa de Reestructuración Ferroviaria (UCPRF), [Coordination Unit for Railroads Restructuring]. With the financial aid of the World Bank,

he set up a team that started with about 35 people and ended with more than 130. The top positions were directly contracted by the office and most of the technical staff was brought from Ferrocarriles Argentinos under commissioning. The office was informally arranged in 7 areas: Operations, Juridical, Administrative, Investment plans, finance and operations safety. Engineers and technicians in Track and right of way, signaling and communications, electric power, maintenance and mechanical works, and traffic and operations control were soon added to the team, first to design and later to monitor the investment plans. The World Bank also agreed to finance the early buyout of excess workers.

During 1991 and 1992 Jorge Kogan and his team did many trips abroad, to Europe, Japan and the US, to see and learn from modern and efficient metros and commuter rail systems. Information gathered through interviews with the management and on site visits to the stations, trains and maintenance facilities helped to improve the design of the investment plans with realistic efficiency goals and state of the art technologies and materials. These trips were also very important to promote the privatization process abroad and attract investors to prepare offers or join local groups. These journeys proved to have played a vital role in the success of the privatization process when eight different firms presented their proposals.

The team prepared the entire bidding documents and the investment programs, conducted the bidding process, evaluated the proposals and finally awarded the concessions. The UCPRF also took the responsibility of supervising and controlling the contracts until late 1996. The commuter rail service was divided into 7 separate vertically integrated contracts and franchised for 10 years, with the concessionaire responsible for the operations and maintenance of the entire line. All the assets remained property of the government, but were given to the concessionaires for their use and maintenance. Concessionaires were also responsible for an investment plan to improve service quality and reliability that was designed by the UCPRF. The first concession was transferred in January 1994 and the last one in May 1995.

Subterráneos de Buenos Aires was also selected to be privatized and the underground network was joined to one commuter rail line, Ferrocarril Urquiza, and put out to bid. Unlike the commuter rail contracts that were 10 years long, because of a more extensive investment plan, the underground concession was decided to be 20 years long. The basic concession documents were the same as in the commuter rail case, but incentives, penalties and the investment plan were redesigned by staff of Subterráneos de Buenos Aires, in conjunction with the UCPRF. SBASE had a limited participation in the evaluation of the proposal, but took an active role in the negotiation phase.

The design of the bidding documents was a challenging task because there were no close precedents. Most of the railroads in the world were operated by public companies and no metro system worldwide was under private operation. To increase its staff capacity, Kogan signed a cooperation contract with the Center for Transportation Studies at the Massachusetts Institute of Technology, a research center with extensive academic and practical experience in transit operations and policy. An important member of the faculty, Frederic Salvucci, former Secretary of Transportation of the State of Massachusetts, had been responsible for acquiring the bankrupt commuter rail lines and making them part of the public transit system, while contracting the operation and maintenance to private companies using a concession contract. Mercer Management, a Massachusetts consulting group, was also involved and included key team members who had played roles on the private sector side of the Boston concessions.

The UCPRF staff worked in different groups. One was given the responsibility of designing the investment plan. The secretary of economic affaires allocated approximately $ 2,000 millions over the entire program for the investment plan and service subsidy and the staff had to select, within this budget constraint, the set of works that would maximize service quality and reliability for the entire commuter rail and subway network. After such a long period without serious investments, the lag was enormous and deciding the appropriate projects was a real challenge. Furthermore, the projects had to be brought to such a design detail that could enable bidders to quote

them, in a very time constrained environment. The investment plan concentrated on vital maintenance and rebuilding work to ensure safety and reliability, rather than on expansion or acquisition of new rolling stock.

Another part of the team worked on the design of the contract and bidding documents. While legal specialists were in charge of wording the entire contract to comply with national and local regulations, financial experts checked the viability of the entire enterprise and estimated the subsidy that was going to be needed. A fundamental input, the services to be provided in terms of operating routes, minimum frequencies, and working hours were designed by UCPRF planners. Other important issues such as different penalties and their costs, incentives for improved service, fares and fare collection methods were carefully analyzed by the team.

In the final version of the request for proposals, the government established fares, minimum service standards, a minimum investment plan that was mandatory, and a clear system of incentives and penalties. Government remained the owner of the assets but gave them to the concessionaire for their use. The bidder, based on their own demand forecast, had to prepare a service and maintenance plan and present their subsidy requirement. The winner would be the one to offer the minimum net present value of subsidy for the concession calculated with a 12% discount rate (based on FIEL, 1990).

The bidding system consisted of two stages with three envelopes. Envelope 1 contained the business credentials and records, envelope 2A contained the business plan and envelope 2B the financial proposal. In the first stage, the government reviewed the technical qualifications of the prospective concessionaires and selected those who qualified to bid. In the second stage, the qualified bidders submitted their final business proposals and the government selected the winner.

The government also included provisions for the implementation of an integrated fare system and creating a special fund by retaining a part of the fare to establish a better

database to the authority and pay service subsidies. Ultimately the contract provided the fare revenues exclusively to the concessionaire leaving these goals behind. The creation of a transportation authority that would include the local, provincial and national government was also contemplated in the contract. It was going to be in charge, among other issues, of coordinating different concessionaires' schedules, implementing a unified payment media and developing intermodal transfer faculties. Unfortunately, these provisions never materialized.

Procurement

Between late 1991 and early 1992 all the procurement documents were ready and made public during the call for proposals. In late January 1992 the bidders presented their business credentials and records. Eight groups were qualified to submit offers. In June the bidding process closed with the submittal of envelopes 2A and 2B where bidders showed their business plan and made their financial offer. The UCPRF received three offers for the Subte and Urquiza concession. The business plan (envelope 2A) was opened and analyzed starting in July 1992 and the financial offer (envelope 2B) was opened in November of that same year. A group formed by Benito Roggio E Hijos S.A, Cometrans S.A, Burlington Northern Railroad Co, Morrison Knuden Corportation Inc and SKS Saccifa & M. Cac was selected as the best offer for the Subte and Urquiza concession. The other two competitors were an Italian group and a consortium lead by the Metro de Chile.

UCPRF selected the best offer in late January 1993 and conducted, with the cooperation of SBASE, a detailed negotiation to fine tune the terms of the agreement. The most cumbersome part of the negotiations were triggered by the fact that the SBASE had signed, previous to the bidding process, contracts for the heavy maintenance of more than 50 cars, approximately half of line B's fleet, and the acquisition of some new units for line D. Nonetheless, by the time the contractor was selected, the delivery of the new units was far behind schedule, and the heavy maintenance had not even started. The concessionaire feared that the government was

not going to be able to deliver the rolling stock, generating serious consequences in service quality that the contractor didn't want to be made liable for. Furthermore, during the privatization process that started in 1991 maintenance of the rolling stock and fixed facilities was almost null, leading to an increased deterioration of the assets and leaving them in worse condition than those prevailing at the time the prospective contractors submitted their proposals. As a result of this negotiation process, the contract was modified to introduce more explicit legal provisions for the government's pre-concession responsibilities and, more important from the operations perspective, the penalties for improper operations performance were softened and waived for the first six months.

Once this negotiation process was concluded, in November 1993, Metrovías was formally awarded the concession, the contract was signed and, in late December, the government formally approved the contract. On January 1st, 2004 Metrovías took over Subterráneos de Buenos Aires and private operation began. Buenos Aires became the first city in the world to have a private operator of its underground rail network.

Implementation

The group selected as the best offer started working hard seven months before the effective transfer date. They hired a management team that was composed mainly from former SBASE managers and gave them temporary office space at the corporation's headquarters. Approximately seventy people, including the management team, worked to prepare for the take-over process. They had an important role during the negotiation phase that took place during the second half of 1993.

The team was in charge of assessing the real capabilities of the metro and, congruent with this assessment, converting the proposed business plan into a reality. Among other issues, they had to decide the staff they were planning to retain from SBASE and the new employees they would have to hire, update the rolling stock and fixed facilities maintenance plan, organize the financial and accounting system, and equip the offices with appropriate hardware and information technology.

With the contract signed and according to the agreement, on January 1st, 1994, most assets were made available to the concessionaire to begin operations. That same day, the new Metrovías token was implemented to ensure that all trips made had been paid for to the concessionaire.

Operations and Maintenance

From the same moment that the private concessionaire took over the public company service quality started to improve. First actions concentrated on radically improving the state of repair of the rolling stock and the fixed facilities. That alone permitted an important increase in service reliability. As more cars were made available thanks to the improved maintenance tasks, frequency was also improved. The users were also attracted by a cleaner environment and a more customer friendly policy from the company. Only during the first year of concession, and with all the problems associated with the transition phase, passengers flow increased by 18% and service provided by 15%.

The success of the first year increased concessionaire's confidence and, with the experience gained, service quantity and quality continued to improve. Proving able to deliver a reliable and faster service, users soon started switching from buses to the metro, as Metrovías kept improving the state of repair and quality of service. With the execution of the investment plan, more passenger cars were added and the track replaced in most of the lines. Stations were improved too, eliminating leaks, repainting and changing the signage, contributing to the public's appealing towards the underground. After five years of concession, in 1999, Metrovías was offering 75% more car kilometers and transporting 80% more passengers.

During the initial years of the concession, the UCPF was in charge of the oversight and control of the contract. The UCPF was very well staffed for that matter, since it carried all the experts that had been involved in the design of the contracts and bidding

documents. At the beginning, with the service penalties waived or relaxed, controlling the investment plan was one of the most time consuming tasks within the control agency. As in other procurement contracts, the authority had to approve any changes to the original project, observe and control the work performed, approve it, calculate the progress achieved, index the quoted prices, prepare the payment orders and pay the contractor. This involved a lot of both technical and bureaucratic activities and, considering that there were six concessionaires and many investments under work, a lot of time and effort.

The UCPF was also responsible for controlling the operations and, based on the performance achieved, calculate the global quality index, a number that weighted different service quality quantifiable aspects such as service frequency, on time performance, available fleet during the day and during peak hour. This index was relevant because it was the base for the calculation of both penalties and incentives. As an incentive, the contract established that the contractor was allowed to increase fares according to a predefined schedule if it achieved certain thresholds in the global quality index. This schedule, however, was based on percentage increases that made the resulting fares difficult to implement because of the need to round to five cents. The government had to keep track of the difference between the concessionaire's fare and the user's fare and reconcile the difference at the end of each fiscal year. Other UCPF tasks included the control of the financial and economical health of the concessionaires, keeping statistical records and handling users' complaints.

In 1996 the UCPF was absorbed by a larger control agency, the Comisión Nacional de Regulación del Transporte (CNRT) [National Commission for Transportation Regulation], an office that embraced all ground surface transportation modes. Being a wider and more powerful agency, it was also much more politicized. Unfortunately, this made part of the UCPF original staff uncomfortable and, in the next years, many of the people that had been involved in the concession process since 1991 resigned. A significant part of them, after leaving the government, were offered good positions at the contractors' offices. The CNRT had proved to be a much more politics-oriented organization than its

predecessor the UCPF, a much more technical agency. Therefore, the quality of the control tasks decreased after its creation and the philosophy guiding the decision making process radically shifted.

The unexpected increase in demand during the first five years of concession made the concessionaire and the government doubt the adequacy of the original investment plan. Parties feared that, if demand continued to increase, the rolling stock and fixed facilities would not be able to accommodate future flows. In 1997, the government and Metrovías started discussing modifications to the original contract. The main objective was to design a more ambitious investment plan to increase network capacity, and to create the appropriate mechanisms to finance it.

The new contract proposed a set of fare increases that were subject to the company performing certain works from an upgraded investment plan. The fare perceived by Metrovías would not change, but the difference between the new user's fare and the concessionaire's fare was to be accumulated in a special account for financing the additional investments. This finance mechanism had two advantages. First, it would not increase the government tax needs because it was going to be afforded only by the users. Second, the money available would increase as demand increases, creating a dedicated flow of funds that could be used for a sustainable expansion and maintenance of the state of good repair in the network. Additionally, the concession fee that Metrovías was obliged to pay the government was proposed to be redirected to help financing the new investment plan.

Negotiations took place during the second half of 1997 and 1998. In early 1999, according to the procedure, a public hearing was held. On April 1999 the amended contract was approved by the government, Metrovías was allowed to increase the fare, and the first works financed with the new fund stream were started. A summary of the upgraded investment plan and its funding source is presented in Table 4.3.

Table 4.3: Investment program and source of funding after renegotiation

Investment Program	Original Investment Plan	Concession Fee	Fare Increase Fund	Total
Rolling stock	235.2	126.1	346.3	707.6
Fixed Facilities	161.1	45.9	114.7	321.7
Accessibility and Transfer Facilities	20.6	39.6	97.4	157.6
Maintenance Facilities	63.2	1.5	30.0	94.7
Safety and Security	14.9		0.8	15.7
Network extension			150.3	150.3
Others (unassigned)			247.6	247.6
Total	**495.0**	**213.0**	**987.1**	**1,695.1**

Current Situation

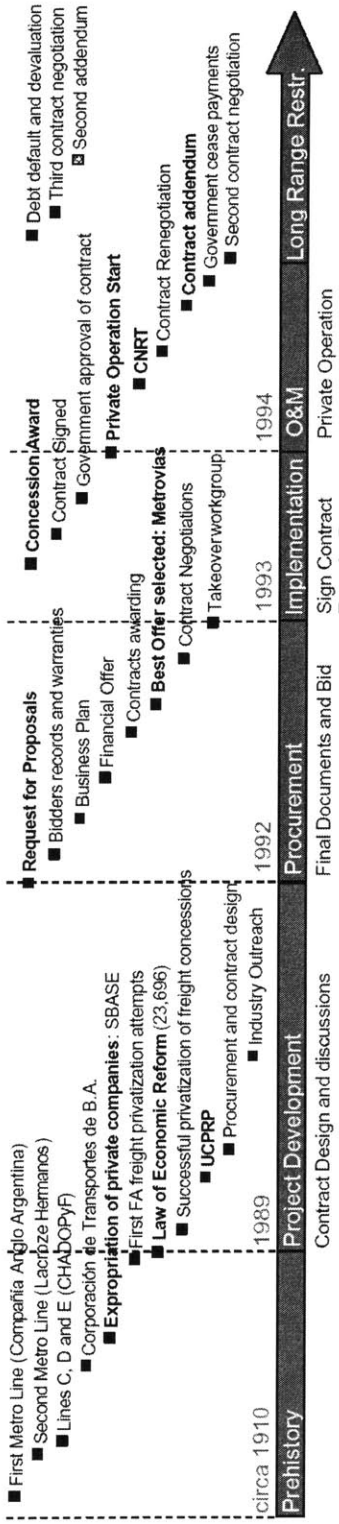
The government paid the subsidy and reimbursed the investment plan according to schedule from 1994 to 1999. Unfortunately, from 1999 it started delaying payments and in early 2001 it suspended all payments, and, because government never asked Metrovías to slow down or suspend work, the debt kept increasing. During 2001 the government paid Metrovías part of the debt with government-issued bonds that were defaulted in January 2002. Therefore, the financial burden on the company was not improved.

In December 1991, rumors of default and devaluation provoked a run on the banks and required government to freeze deposits. The outraged public rioted and forced the president to resign. In 2002, the new president elected by the congress defaulted on Argentina's debt and devaluated the peso (Gomez-Ibáñez, 2003). The concessionaire situation was then drastically deteriorated because the recession reduced ridership and the new exchange rate, and price inflation increased operating costs considerably. Furthermore, some contract provisions were tied to the US dollar, whose value triplicated in less than 6 months. Government started paying an emergency subsidy as a temporary measure, while the company reduced service frequency and delayed maintenance to reduce costs. Nevertheless, the company's balance sheets showed losses in the last two years.

In May 2003 the legislative branch of the local government declared working conditions in the underground for train operators and conductors to be unhealthy. The measure implied a reduction from eight to six hours shifts. Consequently, approximately 400 new employees were required to provide the scheduled service. This policy, with direct political benefits, did not affect the local accounts because the subsidy to the metro is paid by the federal government. The operator, however, had to support the unions pressure to extend these conditions to all workers and the financial burden of the increased operating cost. Although the extra cost will be ultimately transferred to the government, there is a bureaucratic procedure for the subsidy increase to be approved.

Metrovías is still negotiating with the government the terms of a modified contract that should contemplate the influence in the concessionaire's finances of inflation, the new peso-to-dollar exchange rate, deteriorated demand patterns, the new workers' conditions, and an updated investment plan.

Figure 4.9: Metrovías contracting process timeline



Boston Commuter Rail Case Study

Figure 4.10: MBTA Commuter Rail alignment commercial map

Prehistory[3]

Railroad history in the Commonwealth of Massachusetts dates back to 1827 when the legislature called for surveys and preliminary plans for a railroad from Boston to Providence and to the Hudson River. In 1830 the legislature granted charters to private companies for railroad lines to Boston from Providence, Albany, Brattleboro and Lowell.

[3] based on Humphrey and Clark, 1985

Construction on all three started 1832 and in 1834 the B&W opened the New England's first scheduled passenger service between Boston and Newton.

Starting 1885 a process of merging and consolidation reduced the number of operating companies from eight to three by the beginning of the twentieth century. Commuter rail traffic peaked in 1893 and start falling after that with streetcar competition. First World War efforts forced passenger service reductions to conserve energy, employees, coal and other supplies. Despite the end of the war, commuter service on most on most of the lines stayed at wartime levels. Railroads claim war driven inflation prevented them from reinstating most of the trains. With the motivation of the war effort gone, tolerance of poor train service fell, and private automobiles started becoming increasingly attractive.

From the 1920s railroads attempted to save lightly patronized branches through the use of self propelled cars. In 1924 bus subsidiaries were formed to take care of routes that could not be saved even with gas railcars. During the Depression, revenues fell sharply, driving the New Heaven into bankruptcy in 1935 and the B&P in 1938. Bankruptcies produced the largest passenger service cuts since WWI. World War Two, in contrast, produced a sudden upsurge in rail travel due to gasoline and tire rationing, and boosted railroads finances. But after WWII, with rationing over, volumes on the railroads returned to prewar levels and service was further reduced on many lines. The postwar suburban housing boom didn't help the railroads much because most building sites in near suburbs weren't convenient to rail lines. Shopping malls and industrial parks increasingly gave suburban dwellers alternatives to going to Downtown Boston at all.

By the end of 1956 the New Heaven was threatening to shut down Old Colony passenger service unless financial aid was provided. After court injunctions and a two days service interruption, legislation passed in 1958 provided a one year $900,000 subsidy to be paid by the cities and towns served. The subsidy was not renewed and the Old Colony passenger service was ended on June 1959. With ridership at a 90-year low it became clear that the public must support the service or lose it. That same year

the Mass Transportation Commission (MTC) of the Commonwealth of Massachusetts was established to coordinate planning of public and private transportation and land use. The MTC conducted a demonstration project with the B&M in the early sixties while the New Heaven faced bankruptcy again and the New York Central dropped most of its remaining Boston commuter rail services. The MTC study recommended that subsidies should be provided by an expanded Metropolitan Transit Authority. As a result, in 1964, the Massachusetts Bay Transportation Authority (MBTA) was created, empowered to operate, directly or by contract, public transportation in a 78 cities and towns district.

In 1965 the MBTA and the B&M reached an agreement and the latter was allowed to drop most interstate trains in exchange for a subsidy for more frequent commuter rail services. Nonetheless, in the following years service cuts continued on all railroad companies. In 1970, the Penn Central, born with the merger of the New York Central and the Pennsylvania, declared bankruptcy. Congress created the National Railroad Passenger Corporation (Amtrak) and relieved the railroad companies of passenger service requirements.

Assets Acquisition

To guard against the loss of rights of way in a possible Penn Central liquidation, the State agreed in 1971, to purchase 145 miles of active and abandoned Penn Central lines for the MBTA, including most of the tracks then carrying commuter trains to South Station and west of Boston. A Federal loan that later became a grant was used to partially cover this cost.

Commuter rail subsidies were provided only to cover train operating expenses. Consequently, track conditions were deteriorating rapidly, travel was getting progressively slower and rolling stock was wearing out. In 1970 Governor Sargent declared a moratorium on highway construction within route 128 and, after examining Boston's highway and transit plans, recommended a shift to public transportation including $70 million for the first phase of a Commuter Rail Improvement Plan (CRIP).

Later, during the following administration and as part of the CRIP, the MBTA purchased 250 miles of rights of way, the Boston terminal and all passenger equipment from the B&M.

Negotiations were not easy because there was only one possible buyer and seller involved. The B&M, a money loosing business, knew its company had no commercial value. Furthermore, they were looking for a way to get out of the bankruptcy court and a cash payment from the MBTA could indeed help. Nonetheless they asked the Commonwealth a very high price obscuring the negotiations. The MBTA on the other hand, was in front of a unique opportunity to acquire the right of way and solve part of the commuter rail managing issues for good. Cleverly, the director of commuter rail at that time went to the New York Stock exchange and estimated the cost of buying enough shares to control the entire company. Although the Commonwealth was incapable of performing such a transaction, it brought the negotiation back to a reasonable ground. With negotiations leading nowhere the MBTA gave the B&M an ultimatum and refused to pay further subsidies starting July 1st 1975. On June 30th the B&M stopped running the commuter rail service. The MBTA was prepared and immediately provided bus service on parallel routes. Two days later the B&M came back to the negotiation table and restarted providing commuter rail services. Later that year the parties reached an agreement and the price was settled at $39.5 million. In late 1976, after bankruptcy court and ICC approval, the B&M transferred the assets to the MBTA but was kept as a private operator for the North Station based commuter rail services.

Even though the MBTA bought the assets from the private rail companies, the government decided not to operate the service directly. The MBTA had never handled commuter rail operations and there was not much expertise within the agency. Furthermore, officials believed that a private company could do a better job at keeping the operating costs down than the public monopoly. In the first half of the seventies there was no heavy rail transit contracting experience anywhere in the world, so the government continued with the incumbent companies as private operators and,

because these companies were already receiving a subsidy, the MBTA found it easy to agree on the price.

Before the purchase the MBTA was operating on year to year contracts and was unable to make any investments to upgrade the system because it could neither do a multi year contract nor improvements that would take more than a year due to state regulations. After the purchase the MBTA signed five years contracts with the companies and then renewed them annually or biannually when the original term expired. The MBTA supplemented the operating contracts with Force Account Improvements, negotiating sole source with the operator on a cost plus basis for track improvements. The agency paid time and materials, and could borrow the money or get Federal funds because the assets were in the public domain. Contracting third parties to fix the track could have caused important schedule interference with the operations of both commuter rail and freight services. Furthermore, this extra income was helping the railroads come out of bankruptcy and becoming a financially healthier company that would provide better commuter rail and freight services.

Changing the Operator

When it became clear that Penn Central could not be reorganized, Congress created the Consolidated Rail Corporation (ConRail) in 1976. Under the Regional Rail Reorganization Act, ConRail was banned from operating unsubsidized commuter rail services. The MBTA used temporary federal funds to contract with ConRail at the same price to the agency as it did with Penn Central, but a year later, and with reduced federal funding availability, ConRail doubled the service price to the MBTA. ConRail was probably speculating on its monopoly power, but seemed to have forgotten that the MBTA owned the right of way already. Under time pressure and with no willingness to cooperate from ConRail, the manager of commuter rail operations quickly entered negotiations with B&M to operate the service from South Station, who accepted to provide it at the same price as the old Penn Central. Without any service interruption, in 1977, the MBTA changed to B&M to operate commuter rail services from South Station

and ended its relationship with ConRail. The agency succeeded in getting service at a reasonable price and showed its superior leverage, but was left with only one operator for the entire network. It was going to be impossible to repeat the strategy, so the now monopolist contractor leverage increased.

Improvements in the commuter rail service continued on the second half of the seventies with the acquisition of 60 new Budd cars and the restoration of abandoned service. In 1983 Guilford Transportation acquired the Boston and Maine Corporation as part of a business strategy to create a large freight network in the northeast when the Conrail network would become private. While the Federal government was debating the future of Conrail, Guilford maintained a competent performance, although some managerial changes did not appeal to the agency's officials. The MBTA was a very good customer and paid punctually, providing the company a good and reliable cash flow.

When the Federal government finally decided that Conrail was not going to be sold and, instead the managers and workers would reorganize themselves as a private company, Gilford's vision was no longer achievable. Under these new circumstances Guilford radically changed strategy and decided that their way to survive was to form a very low cost cargo carrier. To achieve this new goal they opened a new shadow corporation in western Massachusetts essentially non-unionized and with very efficient work practices because they did not comply with the union's work rules. This arrangement, however, contrasted with the way they had been operating the MBTA commuter rail services, under the traditional union structure. Immediately the union workers started to disrupt the service, and in retaliation Guilford was also disrupting the service, causing important delays to the passengers that were ambiguous as to whose fault it was.

The MBTA found itself in a situation where the major investments that it had incur to improve the service were misused, as the operator was providing very bad quality of service to the passengers. After realizing that the unions and the managers were not willing to reach an agreement, the government decided to excise its right to rebid the

contract. There were only three bidders for the commuter rail service. Guilford presented an offer, but there was no interest for it in the agency because it was Guilford's intransigence which caused the MBTA to decide to rebid the contract. The second bidder was the quasi-public National Railroad Passenger Corporation (Amtrak). No one seriously considered the third bidder, a group of small companies, incapable of operating the service. Amtrak was, therefore, awarded the concession.

Maintenance only Contract

Amtrak operated the MBTA's commuter rail services from 1987 with an initial 3 years contract and with one year renewals after 1990. By the late 90s the MBTA was not satisfied with Amtrak's performance and tried to introduce some alternatives. Initially the agency considered rebidding the entire concession. Nonetheless, they were afraid of not having enough number of bidders, so the MBTA decided it wanted at least to contract fleet maintenance from a contractor other than Amtrak. One of the most evident signals of serious underperformance was that all the new vehicles that the government had bought and the new maintenance facilities were equipped with computerized diagnostics systems that were systematically vandalized to block management control. Even though it is always difficult to separate vehicle maintenance from operations because of liability issues, the MBTA decided to proceed this way.

In 1999 the MBTA ran a bid for the maintenance of MBTA's commuter rail fleet which resulted in four bids. In order from most expensive to cheapest, the first one was by Amtrak itself, followed by Alternate Concepts Incorporated and Alstom, then Bombardier, and finally a Boise-Herzog joint venture. The lowest bid was approximately two percent cheaper than the Bombardier one, 22% cheaper than the ACI bid, and 36% lower than the Amtrak offer. The MBTA proceeded and started negotiations with the cheapest bidder. When it came evident that Amtrak was not going to get the contract the controversy hit the media. The unions started accusing the administration of layoff of public employees and non compliance with federal labor laws that, according to the unions, implied that the MBTA would continue to be responsible for wages and benefits

of laid-off Amtrak worker. The conflict soon entered the political arena gaining supporters for the unions' case and even reached Washington forcing a sudden change of the FTA's original support.

The unions succeeded in slowing down the procurement process especially because Herzog had not made serious union arrangements before submitting their bid. Amtrak, of course, planed to continue with the traditional unions. ACI proposed to keep the workers unionized, but under the Teamsters union with whom ACI had a long standing relationship due to its bus shuttle contracts. This union had the reputation of being more flexible because it represents the truck drivers who were working in a much more competitive environment. With any of the other bidders it would have been much more difficult for Amtrak and the unions to make the case that the government was awarding to a non union contractor. The MBTA was not expecting this controversy, but even when it found itself in the situation it felt that it had to go with the low bidder because the procurement design left the agency with no other option. Herzog later declared to the media that it would work with the incumbent unions, but it was already too late.

The rail unions finally succeeded in getting the workers to agree that they would not work for the new group. This resulted in a situation where if the MBTA awarded the contract it would find itself with no staff to maintain the vehicles. The agency then backed down, cancelled the process, and made the decision that it would concession the entire system instead. Had the MBTA had in place a procurement design that would have allowed some discretion to discard the Herzog proposal, results could have been much better.

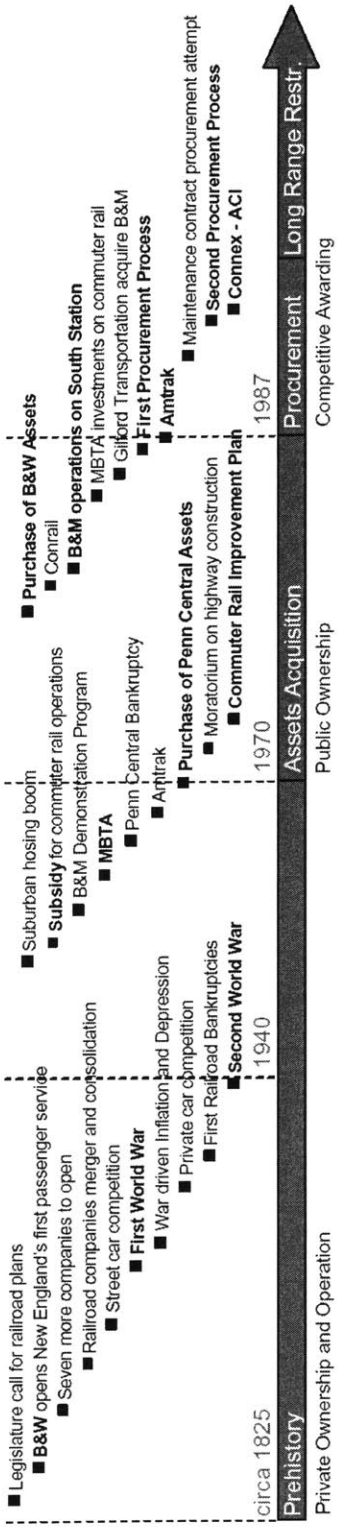
Bidding of the Entire Network

After this disastrous experience, in 2002 the MBTA decided to run a new bid for the operation of the entire commuter rail network. The agency prepared a five year concession contract with the option to the government for an additional five years.

Amtrak made the strategic decision of not submitting a bid, arguing that the insurance provisions were insufficient, but really hoping that their behavior would cause a reversal of the MBTA's decision to rebid the commuter rail operations. It did not. Without an Amtrak's offer, The MBTA ended up with two bids: one by Connex, Bombardier and Alternate Concepts Inc, and a second one by Guilford Rail. A third group submitted an incomplete bid and was disqualified. Based on its previous experience the agency had serious concerns about Guilford's capabilities to operate the commuter rail and awarded the concession to the group by leaded ACI, which was half the price Guilford's bid. The Connex, Bombardier and ACI consortium "emerged as the front-runner because of its rail operation experience, deep pockets, and worldwide clout" (Mac Daniel, 2002).

The MBTA was forced to decide from only two offers, with a 100% price difference between them and with no real option to back up and keep the relationship with Amtrak, as it had self excluded from the process. The ACI consortium entered the transition phase in early 2003 and took over Amtrak on July 1st 2003. Until the date of this thesis there have been no major complaints on the consortium's performance.

Figure 4.11: Boston Commuter Rail concession process timeline



Chapter Five: Qualitative Approach

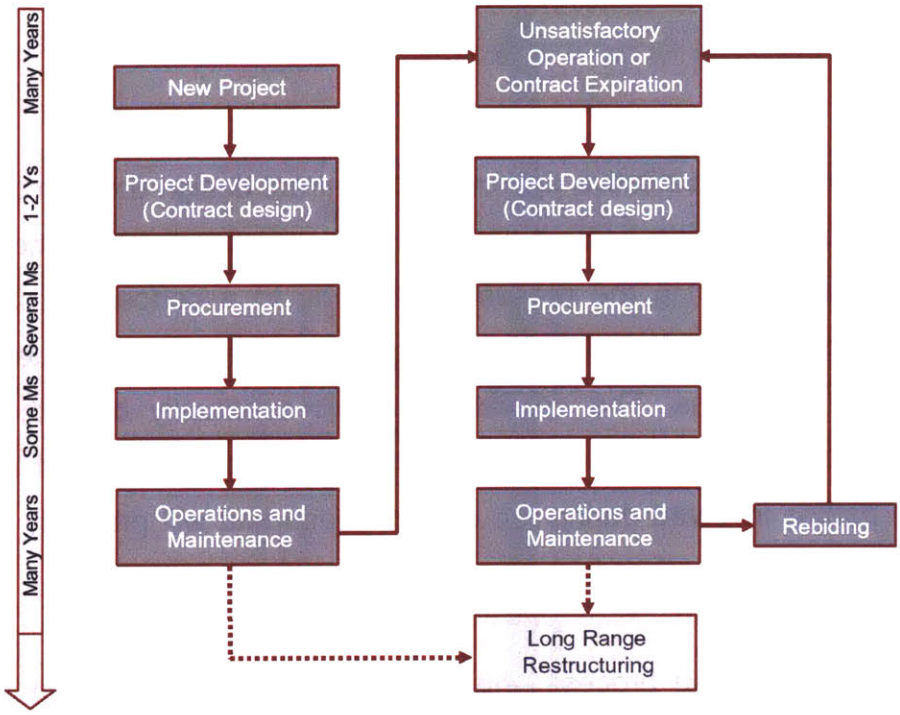
Introduction

This section presents a qualitative approach to contract design through the analysis of the contracting process. The basic premise is that contract design is not a static and isolated act. Instead, during the process that leads to a concession the interaction between different stakeholders shifts the leverage among them frequently, and that affects contract definitions. The contract that will eventually bind the relationship between the public agency and the concessionaire will be a result of an agreement between the parties involved during the design phase and will probably trade off best practices with viable alternatives in the political environment.

To analyze the contracting process, this research builds upon the six stage project evolution framework developed by Fred Salvucci, Sheldon Lyn and Arturo Ardila for large scale infrastructure projects (Lyn, 2001 and Ardila, 2002). According to the authors, a project life cycle can be divided into six stages: prehistory, project development, procurement, implementation, operations and maintenance, and long range use and socio economic restructuring. This research focuses on phases two to five, project development to operations and maintenance, emphasizing the way the contract design is affected by the different actors, as well as the strategy adopted for the control tasks. The original model was developed to explain large infrastructure project and was here adapted to enlighten the contracting process.

The description of the stages is based on the work by Lyn. Further reference can be found in his MIT thesis of 2001. Figure 5.1 illustrates the six stages proposed by the model and its approximate duration.

Figure 5.1: Stages and time frame in the contracting process



Prehistory

This represents the gestation period during which the idea originates and public consciousness of the need for the project emerges. This gestation period could cover many years while the project is packaged and promoted in different ways to try to satisfy the technical and economic criteria, and most importantly, the political criteria. This stage usually corresponds to a period where incumbent operator, public or private, is continuously misperforming, providing inappropriate quality and quantity of service and generating discomfort to the users. Alternatively, it might be related to a new project which seeks to avoid some of the disadvantages of public operations perceived in other transportation systems or other areas of the public administration. This latent demand for a solution will eventually evolve into a public claim and gain agenda attention.

During this time project champions or advocates keep the idea alive, waiting for windows of opportunity. A window of opportunity could appear as a result of triggering events that push the need for a solution to a given problem to the forefront of public

consciousness. A commuter rail accident that evidences inadequate system maintenance or a wider economic crisis that imposes big fiscal constraints on the public agency can boost public attention for those supporting a concession as the solution. Politicians may become involved to greater or lesser extent at this stage depending on how they perceive the risk/return ratio of putting their name behind such a project. The media also plays a role in this stage and its role can be critical in determining whether or not the project emerges from this stage, given their important position in influencing the public's perception and politician's views.

Before a project can emerge from the prehistory stage it must be taken on by a government organization that has both the interest and the capacity to oversee its implementation. Concession processes are of a very different nature than the projects usually dealt under existing organizations and the required capacity might be non-existent within current agencies. This can become a major threat and project champions should be able to create ad-hoc institutions if needed, for the project to succeed. Otherwise, even if the concession is undertaken, it might result in a complete failure due to government incompetence when designing, negotiating or enforcing the contract.

The detailed study of project's prehistory's facts and stakeholders is out of the scope of this research because this stage is almost unique for every case with great influence of project-specific actors and variables. Generalizations are almost impossible but the case studies in chapter three present the specific actions and stakeholders involved in each of them. It is relevant to acknowledge that the actors that are involved in the projects from the prehistory phase and those who push it to the next phase will have a more important stake in the continuing steps of the process.

Project Development (Contract Design)

If the events bring the project need to the forefront of the public and political agenda, steps should then be taken to further conceptualize and plan the concession, prepare

studies, identify sources of funding, and form support coalitions among citizens, business groups and politicians.

One or more project champions usually working with the resources of a government agency organize the efforts in this stage. He or she must assemble the required personnel to bring the project to implementation. This includes defining the scope of the concession, identifying the state of the assets to be transferred, defining payment, incentives and penalties, preparing the bidding documents, ensuring financial stability and publicizing the privatization process to attract bidders. This stage requires tremendous expertise and coordination between and among multiple entities.

This is probably the most important and critical phase in the concession process for two reasons. First, the contract design will bind the authority and the contractor for many years after the procurement. Therefore, errors or omissions at this stage might make the contract obsolete or incomplete, resulting in all the implications outlined in section two. Second, because at this point the political decision to proceed with the privatization has already been made and the incumbent operator, either public or private, knows that it is going to be terminated. Consequently, while the project leader is designing and preparing the concession process, officials and employees at the operating company or agency have little motivation to perform efficiently. It is extremely important to acknowledge this simultaneity of activities because otherwise the transition from one operator to the other can be very difficult or even impossible.

Timing is a vital element of this phase. Although it is important that the contract design is done with extreme caution to avoid the incompleteness and asymmetry threats, it is at the same time essential that this stage is completed as soon as possible. The fact that the transportation services are essential to the citizenship brings them to constant public and media attention, challenging the project every day. Quality of service during this phase will almost surely deteriorate further because of employees' awareness of the concession process, increasing the pressure on the government. Eventually, coalitions

supporting private participation can fade before the process arrives to the procurement phase.

Contract design implies compromises and internal negotiations. At least the concession office and the current operator, if separate entities, have to agree on the basics of the contracting approach. Nonetheless, there are other actors that have an important stake during this process. If the contract has to be approved by a legislative, an executive, or both branches of government, contract design will have to try to satisfy their concerns. The unions have an important negotiating power with the threat of strike or not to work for a private contractor to impose their ideas. Opinion makers in the media and the opposing political parties can also influence contract design. All the internal and external stake holders that were analyzed in section two as being responsible for conflicting interest within the government to decide on a public transportation policy have a stake during contract design. In fact, the contract is a written commitment of transit policy.

Actually, the fact that the contract becomes an explicit piece of public policy is one important reason why many times governments avoid any form of concession. Public sector operations can help hide and accommodate, within their internal bureaucracy and their huge dimensions, multi-objective and fuzzier policies. It also allows the government to concede to certain demands without great exposition to other stakeholders. Privatization, on the other hand, makes every policy decision explicit and subject to confrontation from the other parties involved. It also locks in the terms for at least the life of the contract so the stakes rise, as the process introduces an urgency to "speak now or hold your peace"

As it will be noted later, transition from one operator to the next one is a key problem in privatization attempts. A fast pace at this stage can help minimizing problems associated with transitions. The only possible way to approach the contracting process in a proficient and time efficient manner is assuring the privatization office sufficient resources and independence to attract competent and experienced professionals to work in the process. They can, after the privatization is complete, continue their tasks as

part of the control agency, ensuring contractor's commitment to the contract. The speed and competency required at this stage highlights the importance of the professional quality and adequate quantity of the agency's staff. Furthermore, credibility of the government agency is a key element to the attractiveness of business opportunity.

Competency of staff, transparency and freedom of action in the government will guide the private bidders' approach to the contract and self selecting criteria. If the government shows itself serious, committed and professional, speculative bidders will probably self exclude. On the contrary, if the government shows a non professional attitude, speculative bidders will be actively lobbying the government and serious and competent bidders might self exclude from the process. Important issues that bidders will seriously evaluate include government reputation and credibility on timely payments, and its ability to solve disputes. If the government is perceived by the bidders as a "bad payer", this risk of not being paid will be reflected in the economic offer. Also, a general impression on the flexibility and experience of the agency to handle contract disputes can affect bidders' approach to the concession. If the government has a bad reputation as a payer the agency can try to find a legal mechanism to secure the flow stream by, for example, creating a dedicated tax. In the same manner, a negative history in conflict resolution can be mitigated by the use of arbitration mechanisms.

Principal Stakeholders in Contract Design

Government: Within government there will be rival forces trying to keep control of the concession process. Transit systems usually have three elements that make them perceived as leverage tools in the political arena and therefore attractive to political interests. First, they handle a high daily cash flow through fares and subsidies. Second, they are labor intensive and involve many potential voters. And third, they are very visible to the politicians' constituency. Transit policy also increases the politicians' constituency because improving mobility and accessibilty to the business center is appealing to both the residential communities and the downtown office owners.

Government is used as generalization, but it usually comprises different branches and different jurisdictions overlapping their powers in large scale projects, requiring an internal agreement. This compromise is not always easy to achieve as internal negotiations can be difficult and time consuming. There should be no clear incentive for any particular contract scheme at different government levels. Nonetheless, individual branches or jurisdictions might have different viewpoints or subtleties that can benefit their constituency. For example, communities located in the outer belt might fight for a uniform fare where short trips cross subsidize longer trips. Also, some of the political actors can be supported and acting in favor of lobbying groups, like labor or potential operator consortiums, and their interests.

Because of this complex map of government branches and jurisdictions that surrounds large projects, decisions are sometimes taken by decision makers that might not have the adequate experience in dealing with transit operations. There is a tendency within government to look at short range construction benefits and forget about operational needs and complexities. Usually the misunderstanding of transit operations tends to underestimate the requirements of the operations phase, constraining project success due to failure to analyze and plan this phase.

Unions: using their threat of strike or denying working for a private contractor worker's unions can seriously influence the concession process. Of course they will try to get as much benefits as possible in the concession contract, but they will not necessarily get involved in the contract's details provisions. They influence the political stakeholders as they represent an important constituency for them and many times concessions are associated with workforce cutbacks and workers benefits reductions. When layoffs are part of the concession process, the risk of workforce resistance is higher.

Because of the dynamics of the traditional government-union relationships in public sector companies, workforce issues should be attended early. Government should generally take care of union relations, lead the negotiations and level the ground for all bidders. If it transfers that responsibility to the contractors, it incurs the risk of having

different offers, from different bidders, with different union arrangements. This is extremely risky as the bidder with the less attractive union deal, or maybe no union plans at all, can be awarded the concession based on price. Under unattractive working arrangements the unions can later decide not to work, forcing the government into either renegotiating with the awarded bidder and the unions in a much more stressed environment, re-awarding the contract to the second best bidder with potential risk of lawsuit from the best price bidder, or canceling the concession process. Even if the government is able to reach an agreement either with the first of second best price bidders and to avoid bidders' litigation, such a process will usually harm the concession process by reducing credibility, extending its timeframe and increasing the risk of losing constituency support.

The approach to labor negotiations will depend on the local culture. At the time of a concession process the government can feel that it has a stronger leverage to achieve labor advantages but should never misjudge unions' pull. Experience has shown more than one unsuccessful concession due to union opposition. The earliest and more transparently the government work out unions' potential conflicts, the more confident the bidders will feel with the entire process and the better the financial offers that the government will receive. Furthermore, if the government is not explicit, bidders might discount the future risk excessively and transfer the risk back to the government in the form of a higher price. The government could retain control of union negotiations for a six to twelve months period to avoid unions becoming active in the middle of the contracting process or first months of operation, but should move out of the negotiations after the contract is in place and allow the concessionaire to deal with the unions.

External Financers: This group includes two different types of financers: Government or government affiliated institutions and private financers. Examples of the first group are the Federal Transit Authority (FTA), the World Bank (WB) or the Inter American Development Bank (IADB). In general both groups tend to have a more system-efficiency oriented perspective because they need the system to perform in order to be

able to recuperate the money they loan or make sure the funds they provide are well spent.

Institutions in the first group usually take into consideration the complete map of winners and losers and perform cost benefit and other comprehensive analysis before funding a project. These institutions generally have a staff of qualified and experienced professionals to evaluate the projects and will outsource further studies if needed to inform their decisions. They are also accountable as brand name institutions for the success of the project they fund so they are usually cautious regarding the projects they select to avoid public embarrassment. Usually they study the operating capacity of the agencies involved, both economically and in terms of staffing. They will tend to push incentives and penalties' schemes that warrantee a decent system performance. Nonetheless, these financing groups might sometimes misjudge the operating requirements of complex systems. They are, after all, borrowing organizations and their primary objective is to fund infrastructure projects.

Private financers are less concerned about the system efficiency and will not care enough about the users as long as they find financial sources as to warrantee that they will be able to recover their investment. They usually have a narrower and short range point of view, and do not include experts in the transit field, although they can contract out specific studies. They will push to have a secured cash stream to reduce their risk or have the government guarantee the repayment of debt rather than taking a risk themselves.

Contractors: Operators will have a different stake depending on the kind of project. In new starts, where the service is inexistent and operator is defined before the construction starts such as Tren Urbano, the relative leverage is lower. In projects where incumbent operators exist, such as Transmilenio in Colombia, their leverage during this phase is very important. An intermediate case would be one where the service is existent and operated by the government. In this case, there is information on

how well the system is performing and what gains can be obtained. Metrovías is an example of such a case.

Operators' interest is to make a profit and they will look for lowering their risk by defending the elimination of uncertain or difficult to estimate provisions and imposing a maximum on penalties fees. This, to some extent is useful for the agency too, since clauses where economic impacts could be very difficult to estimate will push bidders towards the safer side probably demanding a higher price. Furthermore, responsible contractors will restrain from bidding in contracts with unfeasible or highly risky clauses, leaving the government with opportunist contractors rather than responsible ones. Contractors' input can be important to understand how certain clauses are perceived by the potential bidders. Of course potential concessionaires want a low risk high profit contract and their observations on the contract should might this point of view, but this should not become a barrier for considering contractors' concerns.

At this stage, bidders can be more influential by working through lobbying other political actors that by acting themselves. Government might want to keep the process and decisions as secret as possible, but it is usually impossible to avoid information leakages that will, in turn, generate potential bidders' reactions to modify previsions if they seem to worsen contract terms from their perspective. A transparent and open bidders' conference to explicitly consider bidder's concerns and incorporate them to the contract design can improve this process.

Media: As in any other public affaire, media is important stakeholder because they can build or damage public support. It is encouraged in this type of processes to be open to the media and, to the extent possible, provide them with all the relevant information. This can avoid press speculations that are usually more harmful than helpful.

Procurement

Once the contract design activities are successfully completed and documents are ready to go public, the concession project enters the procurement phase. This stage formally starts when the request for proposals (RFP) is made available to interested bidders. Alternatively, an industry outreach seminar or "road show" that brings interested bidders to the site can be considered the beginning of this phase. Because transportation services are of public interest, most of the times the procurement process must compile strict regulations regarding openness, transparency and maximum price.

This is the most active stage of the concession process. Bidders buy the request for proposals, analyze the terms and prepare their business and financial plan. They might submit questions or doubts to the concession office that, in turn, provides them with clarifications. Usually a Data Room, where additional information not provided with the RFP is available, is hosted by the concession office. Government staff is responsible for conducting visits to site facilities and granting access to bidders to view and evaluate the assets to be transferred. For similar reasons as the project development stage, this phase should be as short as possible, but long enough in this case to permit the bidders to study the project and come up with reasonable proposals.

Depending on the bidding strategy adopted, a first step might include the analysis of potential bidder's credentials. This is usually called phase one or envelope one. The prospective bidders are requested to submit proofs of their management and financial capabilities and experience, and some form of financial warranty of commitment. Only qualified bidders will be allowed to continue in the bidding process. A second envelope can contain a detailed business and maintenance plan proposal. This second filter is generally used to eliminate unfeasible or inconsistent proposals. Although these proposals are usually quite general in scope, they enable the concession office to make a consistency check between the resources estimations, costs and incomes in the business plan and verify commitments to minimal requirements in the maintenance plan.

Finally a third envelope includes the financial offer. Sometimes envelopes two and three are called 2A & 2B and, in some cases, they are analyzed simultaneously by the concession office. The problem with such an approach is that once the cheapest proposal comes evident, it is much harder to disqualify it even if it is inconsistent from a business planning point of view. With the recommended approach, if the bidder's business plan is not approved beforehand, the associated financial offer is never considered. Each step must assume the worst in terms of tactics of bidders, and be structured to minimize exposure to abuse.

In some cases, there is an iterative process where the bidders' first proposal is used only as a reference input to a round of discussions and negotiations to improve the service standards or contract design. All qualified bidders participate in this round and the information may, or may not, be shared among them. Sharing levels the playfield but creates a disincentive to creativity. Once the upgraded service contract is ready, the bidders submit their final financial offer, called Best and Final Offer (BAFO). This approach enables the input from contractor's industry experience improve the concession office's proposal. The main disadvantage of this method is that it demands more time to select the winning offer, increasing the risks of transition problems or constituency loss. On the other hand, it may reduce ambiguity and actually expedite a smooth transition.

An alternative approach could be for the government to set a fixed price after the bidder's first financial offers. The authority could either discretionarily define the final price based on the prices of the offers received or take the price of the second best offer. The second price setting alternative can help increasing process transparency and reduce possible complaints on agency's discretion. Second price auctions, also known as Vickrey auctions, have in theory, the advantage of eliminating price setting strategies because the bidders can bid their real value, and are warranted that they will pay that price or less. Under this methodology the bidder offering the best price will win, but will pay the price of the second best bid. Neither first nor second price auctions can

eliminate speculative bidding strategies or warranty better results, but second price auctions have the advantage of eliminating the bid shading effect (Sheffi, 2004).

With the price fixed, the qualified bidders are then invited to propose the quantity and quality of service they are willing to provide at that price. The contract would be awarded to the bidder offering the best service. This approach can reduce speculation around price offers discouraging the participation of opportunistic bidders, and can give government a little more discretion in the selection process. The rationale behind this method is that under this system the government knows it is paying a reasonable price and has, therefore, more leverage to demand a reasonable service. Furthermore, because the bidders quoted the quality of service they were going to provide, they should feel more committed to it. To some extent there is an inversion of the burden of proof, since the service was not demanded by the government, as in the standard approach, but offered by the contractor. Opportunistic bidders, nonetheless, could still quote an unrealistic quality of service and end up with the contract, but at least the authority has a stronger argument to demand a reasonable service for the price paid.

This stage evidences the number of bidders, the number of private firms that found the terms attractive. A high number of bidders is an important factor in the privatization process for many reasons: First, only a large number of bidders can ensure that the government will end up paying close to marginal cost prices for the service. Second, a reduced number of bidders can indicate that contractual terms are unattractive to private companies and raise the doubt of the real level of service that the few contractors that accepted these terms would be able to deliver. Third, with few alternatives to choose from and with the concession process already deployed, the government leverage relative to the contractors is smaller. In the extreme case, with only one offer, the government has to decide whether to accept conditions that the contractor might have or dismiss the concession process, both options are costly and risky from a political and economical point of view. Finally, with fewer alternatives, the government is in a weaker position to enforce the contract because the termination

threaten is less effective when the parties know it might be difficult to find another contractor.

For this reason, designing the privatization process and the contract documents in such a way that they attract a high number of bidders is of extreme importance. The larger the number of bidders, the higher the leverage that the government will have after selecting the winning offer and the smaller the "hold up" risk for the public sector. Many strategies can be used to encourage private participation. Nonetheless, a good contract design that leaves margin for a profitable enterprise performing according to reasonable expectations combined with a reliable, prompt and fair payment by government is probably the best one. The contract should be designed in such a way that it is clear to the bidders that there is no space for arbitrary decisions or corruption by the government. At the same time, the payment scheme and penalties should ensure the government that the contractor will not missperform. If the bidders anticipate contract disagreements and the local justice efficiency and capabilities for handling this type of conflicts are doubtful, an arbitration process can help keeping the terms attractive to private contractors.

After the selection process, one of the bidders is chosen as the best offer. That usually leads to a final negotiation phase between the chosen contractor and the government. There should be, in theory, no need for a negotiation at this moment. Nonetheless, it is sometimes needed because in the time elapsed from the moment the contract was designed to the selection of the winning offer conditions have notoriously changed in the state of repair or other relevant issues while the "lame duck" operator continued to provide service. Again, it is important that this negotiation process takes the least amount of time possible because at this time service is being provided by a totally unmotivated, if not sabotaging, staff.

The negotiating process can be reduced in two phase procurement processes if bidders, after the clarifications phase, are be asked to submit their acceptance of the contract terms with their first offer. If bidders find a provision in the contract to be unacceptable,

they should make it clear in writing to the government in their offer. The government can then agree to modify the contract or not based on the feedback received from all bidders on each controversial issue. Once the reviewed contract is released, the submission of a BAFO implies the acceptance of all contract terms by the bidders.

If the parties succeed at the negotiation phase, they will come to an agreement and the selected contractor will officially be awarded the contract. This is usually done by a formal resolution of the agency in charge, and followed by the signing of the revised contract. Shortly after that, the awarded concessionaire will have to take over the operations.

Principal Stakeholders in Procurement

The most relevant stakeholders in this phase are the government and the bidders. Before the winning offer is announced, the government holds the bigger leverage but once the government has announced the selected contractor, all other contractors are dismissed from the scene and concentrate their resources in other activities. This generates a leverage shift in the relationship between the parties. Before, the selected contractor was one among many without any particular leverage, and the power was mainly held by the concession agency. After the selection process and the public announcement of the winner, involved actors reduce to only the government and the selected contractor, radically increasing contractor's leverage. Negotiations can lead nowhere if an agreement proves unfeasible and the concession office might have to go back to the second best offer, but both parties know that there is a high cost associated with such a decision. The media may show the government as incompetent for the concession process and service continues to deteriorate under the "lame duck" operator. Furthermore, increasing the process timeframe and bad reputation in the media can break the political constituency and harm or even stop the process. Government experiences at this stage the presence of "hold-up" risks. This risk can be reduced if the number of competent bidders is higher because that gives the concession office more leverage in the form of alternative contractors and creates a risk on the selected

contractor too. An economic commitment from the bidder, such as a moderate bond that is at risk can be used to reduce the imbalance in leverage too.

The peak in contract arrangement discussions might occur during the negotiations after the best offer has been selected. Government and the selected bidder have to finish customizing the contract and they will, of course, defend their own interests. The parties' leverage depends on the state of the system and their relative power. But minor changes are always possible in this not always very transparent phase. Caution should be executed since minor changes in the contract can have great impact on contractor's finances and performance.

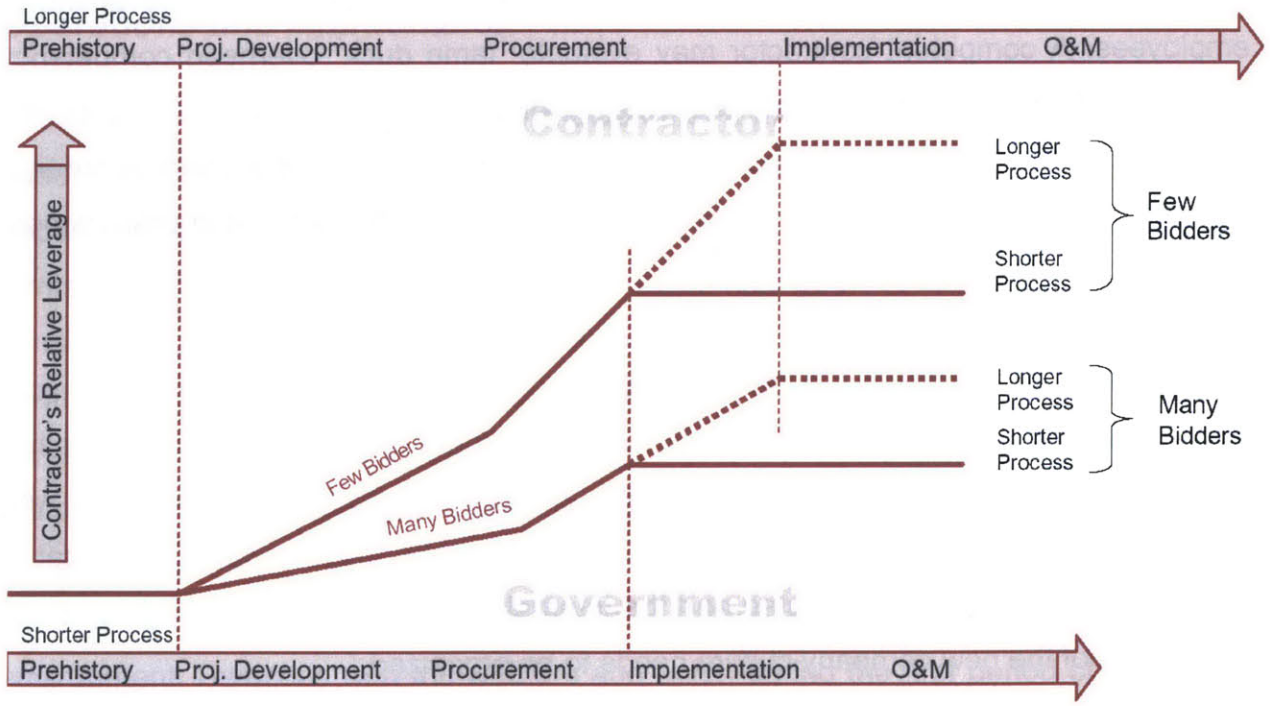
When the status of the assets or other contractual issues have deteriorated as a consequence of improper management during the concession process, the situation gets even more complex for the government. The "hold up" risk increases as the selected operator knows that the concession office will have to enter similar negotiations with an alternative contractor. In this case, the contractor's leverage is bigger and the government is in a weaker position to keep original contractual terms. This undesired situation highlights the importance of a reduced timeframe and the need for competent staff during the contract development and procurement process to minimize the adverse effects of "lame duck" operations. Furthermore, if such deterioration can be anticipated, fixed rules within the contract could set the framework and adjustment criteria for this negotiation, reducing the opportunism risks.

The questions and answers during the clarification part of the procurement phase should help to improve transparency and reduce parties' risks of encountering unexpected contract specifications. Independence and competency of the concession office can prove important to keep government objectives under control during this phase. As in any other negotiation, if the contractor finds a solid counterpart, their leverage is drastically reduced. An approach that can help maintaining government's competency and knowledge is keeping part of the operations in house by, for example, offering to concession all but one line that is kept under public operation. This is

sometimes difficult to achieve politically and can reduce the economies of scale of private operation. Furthermore, it doesn't eliminate the problems associated with government's companies bureaucracies described in chapter two. On the other hand, it provides the agency with first hand knowledge on the business, which puts it in a much better position when negotiating with the bidders. This approach can work better in agencies operating systems that have physical separations between lines or facilities, where economies of scale are more difficult to achieve.

Figure 5.2 illustrates the relative leverage shift during the concession process as a function of the number of bidders and the length of the process. Once the process is initiated the bidders' leverage grows as they become part of the active players. A longer process and fewer bidders increase contractor's relative leverage.

Figure 5.2: Leverage Shift during the concession process as a function of the number of bidders and the length of the process



The media plays an important role as it is always active in informing the constituency that supports the concession process.

Implementation

This is the phase where the awarded contractor takes over the service operations. Usually the contractor prepares for this stage from the moment they are selected as best offer while they fine tune and negotiate the final agreement. Although there is a concrete deadline when responsibilities are transferred to the new concessionaire, it is common to include a transition period where the "lame duck" operator and the new contractor coexist. This is nonetheless a risky approach, since usually the operator that is leaving responsibilities, has little or no incentive to assist the new contractor. It can be, however, mitigated if the new contractor decides to keep part of the old operator's key personnel in their staff. Unfortunately, the most relevant executives in handling transition smoothness are also critical for management accountability and control, so they are usually considered key positions that would not easily be left to unknown employees. A competent contractor may evaluate "lame duck" overhead competency and trade off the advantages and disadvantages of keeping part of them. Moreover, the concession office may need to employ some of the key lame duck managers in order to secure contractor's oversight and retain loyalty of the operator during the procurement process.

Getting ready for takeover is a complex task and involves an exhaustive preparation. The contractor has to convert the business plan into reality. Among other responsibilities, it has to materialize staffing, financial sources and agreements with suppliers, and define training programs. Where applicable, the incumbent staff that is going to be kept has to be selected and the internal communications strategy to inform employees of the new company culture needs to be organized.

This is a challenging and probably the most fragile phase. At this point government has incurred in most of the financial and political costs of privatization and, if takeover fails,

there will be no benefits to materialize. Where the unions are too strong, the risk is bigger as non-supportive employees performing inadequately can seriously harm transition and its public perception. Nonetheless, if transition occurs without major inconvenience, the government will transfer the assets and contractor will take management and other responsibilities for operations, bringing the concession process into its final phase, operations and maintenance.

There is a risk that the government might deceive the contractor by not making all the assets available, resulting in delays or transferring assets in worst shape than expected. These situations will act as a tacit penalty to the contractor and might trigger a claim for compensation. If the claim is attended, it will open a window for negotiating new terms such as temporary waivers. Government should avoid such situations by performing its obligations because negotiations are usually managed in a non-transparent environment that can harm public perception.

Operations and Maintenance

At this stage the concession process should enter a more stable phase, with operations under the responsibility of the private contractor. The duration of this stage varies depending on the contract, but evidence suggest from 5 to 20 years are the most usual terms. Typically the first few months or even first year of the new operator are considered part of a transition phase and special provisions are in effect to help the contractor learn the particularities of the system. It is usual to waive or relax contract penalties that relates to quantity and quality of service. Many times the operator finds the system in a worst state compared to its expectations and bringing the state of repair to adequate levels can consume more time than anticipated. Furthermore, the management has to build the new company's culture and create an adequate working environment. Relations with the workers and union during the first period of operations and maintenance are crucial.

A particularly problematic change is likely to be the sudden shift in union relationship from the public sector, where a combination of normal bargaining and political pressure is part of the union culture, to a private sector relationship based on contracts and productivity. If the government is unsuccessful at getting "out of the way" on time, the entire relationship with the private concessionaire can be undermined. Negotiations with the union should be handled by the government beforehand and not left to contractor's discretion because it might not have the strength that is needed to deal by itself with very strong unions, especially if the government does not have a clear policy supporting the private employer. The government must clearly establish with the unions that they will need to deal with the new concessionaire. Any ambiguity runs the risk of labor disruption during the sensitive transition stage.

Once the transition phase is over private operations and government oversight should become usual. If the contract was correctly design and both parties behave in a reasonable way, this stage, although the longest in time, should occur smoothly. However, if the parties behave in a dishonest or incompetent way the contractual relationship could be harmed and users affected by an inappropriate quality or quantity of service. Probably the most important element to ensure success during this phase is the competency of both the control agency and the operator. To an important degree the outcome of the concession will depend on the ability of the control agency to enforce the contract terms and the willingness of the operator to observe its commitments.

During the operations phase there is, at least in theory, little space for contract modifications. Nonetheless, it is at this stage when the contract is really tested and the parties have to live with the reality of daily operations. Problems in the contract can show up immediately or might depend on some triggering event. In any case, adjustments can take place to deal with minor flaws to keep the contract fully operational. Agency's flexibility is crucial here and the staff quality will play a vital role in being able to adapt the instrument to real operations needs.

Furthermore, through the enforcement of the contract that the control agency executes the culture of control is created. In the long run, this culture becomes "the rules" of how control is performed, what is considered important and what is irrelevant. They shape new incentives and penalties, that are not written anywhere in the contract, but can be as important as the written ones. If the agency systematically waives certain penalties or never enforces some performance indicators, it will become the contractor's practice to ignore these requirements.

Government has an important responsibility in providing regular payments. Contractors are usually quite fragile financially because transit services are very expensive to operate. Late payments can seriously harm the concessionaire if they involve more than a couple of months. Delays in assets transfer or takeover day can also affect contractor's finances, especially once they are staffed for operations. The government must pay on time to avoid hurting the relationship with the contractor. As it was explained earlier, the contractor-government relationship is a valuable asset for good transit services under private operation.

Arbitration can play an important role in this stage of the project. As described earlier, a prestigious, independent and knowledgeable institution could resolve contract disputes much faster and cheaper. When the appropriate arbitrator is selected this approach can have numerous advantages. It reduces the time needed for simple conflicts resolution, it increases the bidders' confidence in the entire process, and it reduces the pressure on the traditional legal system that is usually overwhelmed. Because of these reasons, it should result in lower price bids and a better concession to the government.

If an arbitration stage is implemented, selected contractual discrepancies during the operations and maintenance phase would be submitted to the arbitrator first for analysis. The parties should present the case and the evidence, and within a predefined time period, the arbitrator would come to a conclusion. Conflicts arising from the daily operations and the application of incentives and penalties should always be subject to arbitration in first instance. Depending on the economic prejudice, the arbitration could

then be appealed through standard legal procedures. The arbitration mechanism should ease every day operations and help in keeping a constructive relationship between the government and the contractor by avoiding long lasting conflicts. A competent arbitrator can also provide advice to the parties on changes to safety procedures and mediate when safety regulations are being disputed.

Technology is increasingly playing a more relevant role in reducing the number of potential conflicts. Today, devices like Global Positioning Systems (GPS), Automated Fare Collectors (AFC) and Automated Passenger Counters (APC), along with Automated Train Operation (ATO) control systems provides more accurate and objective information on the number and location of the vehicles at any certain time, and the number of passengers on board and waiting on the platforms than traditional manual inspections. Furthermore, this information can be accessed in real time by the contractor and the agency simultaneously, but should also be stored for liability and legal matters. All this information is relevant at the moment of charging penalties for delayed services, insufficient number of vehicles, fare collection errors, or paying non contractual services, among others uses. It can also be very useful when assessing compensations in operational conflicts.

If unexpected and important changes occur during the operations and maintenance phase, parties might have to enter a renegotiation process. This is triggered by situations that make the contract obsolete. Renegotiation should be avoided as much as possible, but the parties should not live with a contract that they cannot comply with. It is very risky as it might become the culture of the contractor-agency relationship not to honor the contract, shifting the regulatory regime from a contract to discretionary regulation. Contract renegotiations are highly risky because the incumbent operator has a big leverage and also better information. Most of the contracting risks that were analyzed in section two arise during a renegotiation process, but some of them can be mitigated if a renegotiation event is anticipated in the original contract. Availability of arbitration might reduce the risk for both parties if renegotiation becomes necessary,

because the arbitrator has an important knowledge of the concession's objectives, the contracting process and the contractor and agency's performance.

Stakeholders in Operations and Maintenance

In the operations and maintenance phase the government role shifts radically. The active and creative responsibilities that characterized the contract design phase change to a more monotonous task. The most important activities within the government in relation with the concession program are monitoring the contractor's performance and ensuring prompt payments. Government should still hold broader transportation planning responsibilities because those should not be delegated to the concessionaire. Its private company nature interferes with the long term society welfare approach that transportation planning requires. Nonetheless, at the concession level, activity in the authority's side is considerably reduced both in quantity and variety. Control tasks are usually less attracting than operative tasks from a professional perspective. Therefore, government agencies might sometimes experience problems keeping or attracting competent personnel. Furthermore, concessionaires staffing themselves for operations can find public officials that have been involved in the process valuable resources and attract them to the contractor's side with a better payment. This process is harmful for the government but is usually very difficult to avoid given the agency's scope reduction and financial constraints.

During the entire concession process, but particularly during the operations stage, the behavior of both the government officials and the contractor's management are important to create a productive relationship. At least two different variables can affect the parties' attitude towards contractual commitment: the optimizing horizon and the relationship between penalties' costs and its enforceability.

The first one deals with the optimizing term chosen when taking decision. If any of the parties takes a short term optimizing horizon, they will be more inclined to try to take advantage of the other party by either engaging in extreme demands on the part of the

control agency, or providing less than optimal service quality and quantity on the part of the contractor. The operator - control agency relationship in public transportation needs a lot of flexibility. Unexpected events are frequent in transit operations and might force the operator to offer special emergency services. If the agency lacks the flexibility to approve them or waive penalties on such occasions and insists on applying contract specifications in extreme situations, the contractor can be seriously harmed economically. Also, the agency can delay payments, deny incentives or charge questionable penalties to affect the concessionaire. Similarly, the operator can be uncooperative to agency needs that might be out of contract specifications such as special events or disagree to changes on safety procedures and policies. All these "hold up" risks are magnified in the presence of short term optimization with the use of blame games and other distractive strategies.

If, instead, both parties take a long term optimizing horizon as their policy, they can capitalize the benefits of a productive relationship. This implies a flexible approach to other parties' demands and mutual cooperation during unexpected events. Unpredictable circumstances are a form of contract incompleteness and, as explained in chapter three, they expose the parties to potential "hold up" risks. Nonetheless, if parties behave in a cooperative way, they can not only overcome the problem, but also set a precedent on how to approach similar issues in the future. Unfortunately, narrow minded managers and officials on both sides can try to maximize their immediate benefits, deteriorating the contractor - agency relationship. Furthermore, only one of the parties behaving this way suffices to harm the relationship, and it takes much longer to heal relationships from such a behavior than it takes to hurt them.

The conflict between individual and collective well-being, within and between organizations, has long been studied by social sciences and is known as The Social Dilemma. The Prisoner's Dilemma, a simplified version of the social dilemma, shows that when each person pursues the course of action that is more "rational" from his or her point of view, the result can be mutual disaster and enlightens how each individual could do better by cooperating with the others. Nonetheless, it is not easy to know how

to implement this behavior (Thompson, 2000). Only experienced and honest management and public officials can understand this paradox and help aligning the objectives and reward cooperation as to achieve mutual benefits.

Two factors can help inducing long term optimization. The first and more important one is competency of the management and government officials. Knowledgeable and experienced staff on both sides is needed to understand the complexities of transit operations and to have the confidence to handle unexpected events in the way that better serves the passengers, who are indeed the final beneficiaries of the transit systems and the direct victims of any agency - contractor relationship mismanagement. The second one is a long term commitment requirement as part of the contract. Such a provision can induce the parties to behave in a more responsible and long term maximizing way because they know they are going to be managing operations for many years.

The second variable affecting the ability of the control agency to enforce the contract terms and the willingness of the operator to observe its commitments is the relationship between penalties' costs and its enforceability. Many contracts are designed with high penalty costs in an attempt to punish improper behavior on the contractor's part, or believing that high penalties can ease firing a misperforming contractor. Nonetheless, high costs penalties reduce the likelihood of enforcement because the agency knows they can seriously affect contractor's finances or that the contractor will simply be unable to pay the penalties. High costs also increase the chances of dishonest behavior on the parties by either waiving or hiding contract penalties or, even worst, inducing corrupt practices. Penalties should be expensive enough to make the contractor choose to fulfill service standards rather than to incur in penalties, but they should be priced at low enough level that they don't inhibit agency's likelihood of enforcement.

This penalty pricing strategy is also supported by modern deterrence theory. Deterrence theory's basic proposition holds that people are less likely to violate a law if they face sanctions. The traditional theory posited that the more severe the punishment, the less

likely that the person will violate legal norms. Nonetheless, in more recent years the theory includes swiftness and certainty of punishment to make deterrence effective. Studies have shown that the probability of apprehension can be as important as the severity of the penalty itself in deterrence effectiveness. When people perceive a low probability of detention, they care less about the severity of the punishment (based on Legger, 1991).

Competency and honesty are two fundamental attributes to create a productive relationship between the government and the contractor. Although the existence of both characteristics is the desired optimal situation, it might often not be the case. The consequences and alternatives in second-best situations were competency or honesty lack in one or both of the parties will be explored. This analysis will assume that both the government and the contractor present a binary status with respect to these two variables: Competent (C) or Incompetent (I), and Honest (H) or Dishonest (D). Therefore, there are 16 possible situations depending on the parties' behavior. They are represented in the matrix presented in Figure 5.3, where dark gray indicates states that tend to converge.

Figure 5.3: Competency and honesty in the Government-Contractor relationships

Contractor \ Government	C+H	I+H	C+D	I+D
C+H	Desired	←	Contractor may quit	Contractor may quit
I+H	↑ or rebid	?	Agency Abuse	Agency Abuse
C+D	↑ or rebid	Contractor Abuse	↘	↓
I+D	Rebid	Contractor Abuse	→	Corruption

C: Competent, H: Honest, I: Incompetent, D: Dishonest

A competent and honest government agency should try to induce a C+H behavior in the contractor, if it is not acting in such a way. Because an agency with these attributes knows exactly what to expect from the contractor and it has the power to rebid the concession if it found itself unable to encourage a competent and honest attitude in the contractor, they are in a strong position to shift contractor's behavior. Therefore, a C+H agency faced with any kind of contractor will either force the contractor to work in a C+H way or execute their power to rebid. There is no logical reason to expect a long term relationship between a C+H agency and any contractor other than a C+H.

When the government agency is honest but incompetent, the situation is different because they might not know what to demand from the contractor. It can easily be abused by a dishonest contractor. The agency's incompetence will inhibit it from realizing the contractor is taking advantage of the situation and a smart but dishonest contractor can profit this situation for the entire life of the contract, unless abuses are so serious that they trigger public attention. If an I+H agency is faced with a C+H contractor, the last one will probably induce a competent behavior on the agency. It should act smartly to motivate the agency to build up the expertise needed to become competent and level the playfield. The effects of incompetent but honest players on both sides is difficult to predict since they might not realize the situation they are immersed in. Probably incompetence will degenerate into dishonesty in either of the sides and depending on who shifts first, the outcome will vary according to the new state of the players. Alternatively, if the parties acknowledge their incompetence, they could bring external consultants and motivate their staff to build the required skills within their organizations.

A competent and honest contractor faced with a dishonest agency will probably try to find a way to leave the concession as soon as possible. A contractor with such attributes should find no incentive to work with a dishonest government and will probably exit the contract even at an economic cost not to harm its reputation. An honest but incompetent contractor dealing with a dishonest agency can became a victim

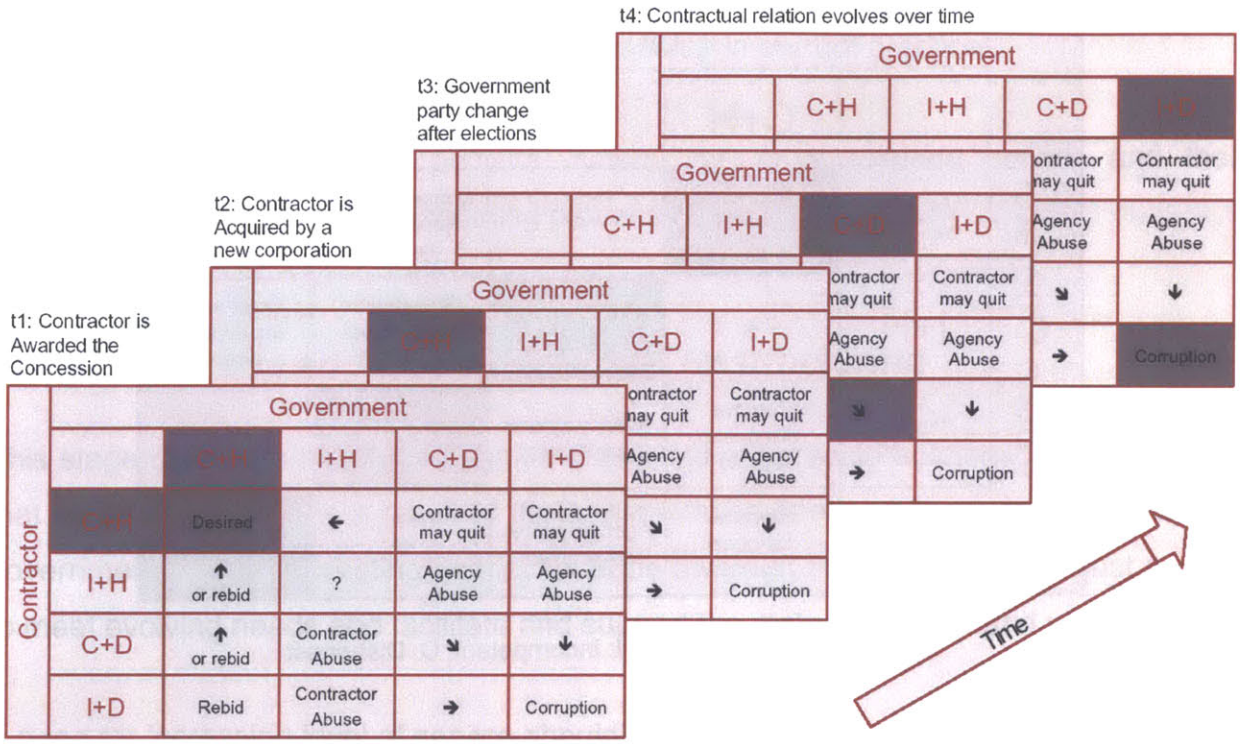
of agency abuse. The agency can demand services out of contract or political favors or speculate with payments terms and conditions. Nonetheless, an I+H concessionaire with a dishonest agency would probably be unstable in time.

Dishonest attributes on both of the parties, independently of competency, will almost inevitably result in Incompetent and Dishonest behavior in the long run because any competent staff will quit both the agency and company. It should be very difficult for organizations with dishonest practices to hold competent and honest human resources. In an I+D environment corrupt practices will emerge as the usual way of doing business.

The behavior of the players is, however, not static. As the concession progresses evolves, competency and honesty can change both in the agency and in the concessionaire. Within government, changes can occur periodically as a result of the electoral process, but even within a single electoral period internal political forces can realign changing the appointees in charge of the transit system. These changes can be in both directions, from dishonest or incompetent practices to honest and competent ones or the other way around. Unfortunately it takes a lot of time to create a culture of honesty and competency within public agencies, but it is very easy to destroy. One incompetent administration can suffice to destroy many years of good practice. Extreme caution should be executed when selecting the public officials that will serve the agency's interests to avoid hurting an existent culture within a healthy public agency.

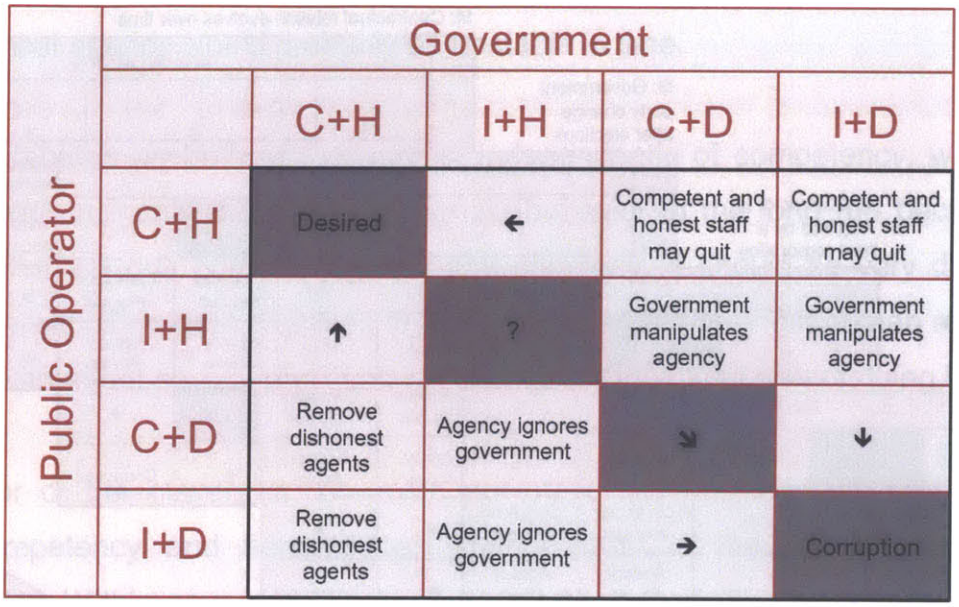
In Figure 5.4 an example of the dynamics of government and contractor is presented. The process starts with C+H agency and contractor, but a corporative merger changes contractor's business strategy moving it to a competent but dishonest behavior. Following an election, the agency's attitude also becomes dishonest and, over time, the concession ends showing I+D attributes.

Figure 5.4: Honesty and Competency evolution over the concession history.



Government operated transit systems are not exempt from honesty and competency issues. In a public owned company an analogous analysis can be performed, assuming that there is a transit agency in charge of producing the transit service and the governments represent the Executive's officials. Although in the long run it is possible that both government and agency's performance in terms of honesty and competency would be equal, there are always transitory effects when one of the parties suddenly changes and the other lags adapting to the new situations. Long range equilibrium cases are located in the diagonal of the matrix while transitions occupy the remaining twelve cells. The sixteen possible situations are presented in the matrix in Figure 5.5 where the shaded cells indicate equilibrium behaviors.

Figure 5.5: Competency and honesty in Government-Public Operator relationships



C: Competent, H: Honest, I: Incompetent, D: Dishonest

A competent and honest agency will maximize its capacity if it is under a government with a similar culture. If faced with a I+H government, it should try to create the adequate competency within the government by encouraging the use of consultants or the enhancement of the government staff. Faced with a dishonest government, public operator's staff may leave the agency.

An Incompetent but Honest agency faced with a C+H government will probably be encouraged to increase the staff competency with academic and consulting partnerships. Faced with a dishonest government, it might become a victim of government manipulation. The effects of an I+H agency faced with a similar counterparts are difficult to predict. They can result in mutual improvement if they manage to realize their situation or in corruption if one of them degrades incompetence into dishonesty.

A dishonest agency will be forced to get rid of their dishonest officials if it is faced with a competent and honest government because the latter will try to improve the agency and

its members. If faced with a incompetent government, however, it will ignore government's policies and continue its dishonest practices. The situation where both the agency and the government are dishonest ends up in corrupt practices.

Figure 5.6 summarizes the principal actors, the most relevant actions and their timeframe during the entire contracting process.

Long Range Use and Socio-Economic Restructuring

This stage considers the changes in land use and other socio-economical restructuring that might take place as a result of the transportation service being provided. Both the government and the operating agency must be aware of them in order to adjust service to meet evolving needs and facilitate and support the restructuring of land use.

A need for increasing level of service should be expected if the concession is successful. This will translate in an increasing amount of total subsidy, although possibly decreasing the subsidy per rider, especially if fares are shared with the contractor. Anticipating this future outcome in the contract design can help as an incentive for good performance in the concessionaire, and can avoid the need to rebid or to renegotiate in a non-competitive environment. Rebidding implies the risk of losing a good operator that produces good quality service and that the agency is comfortable working with, only to get a new operator that submitted a lower price but whose competency and honesty is unproven.

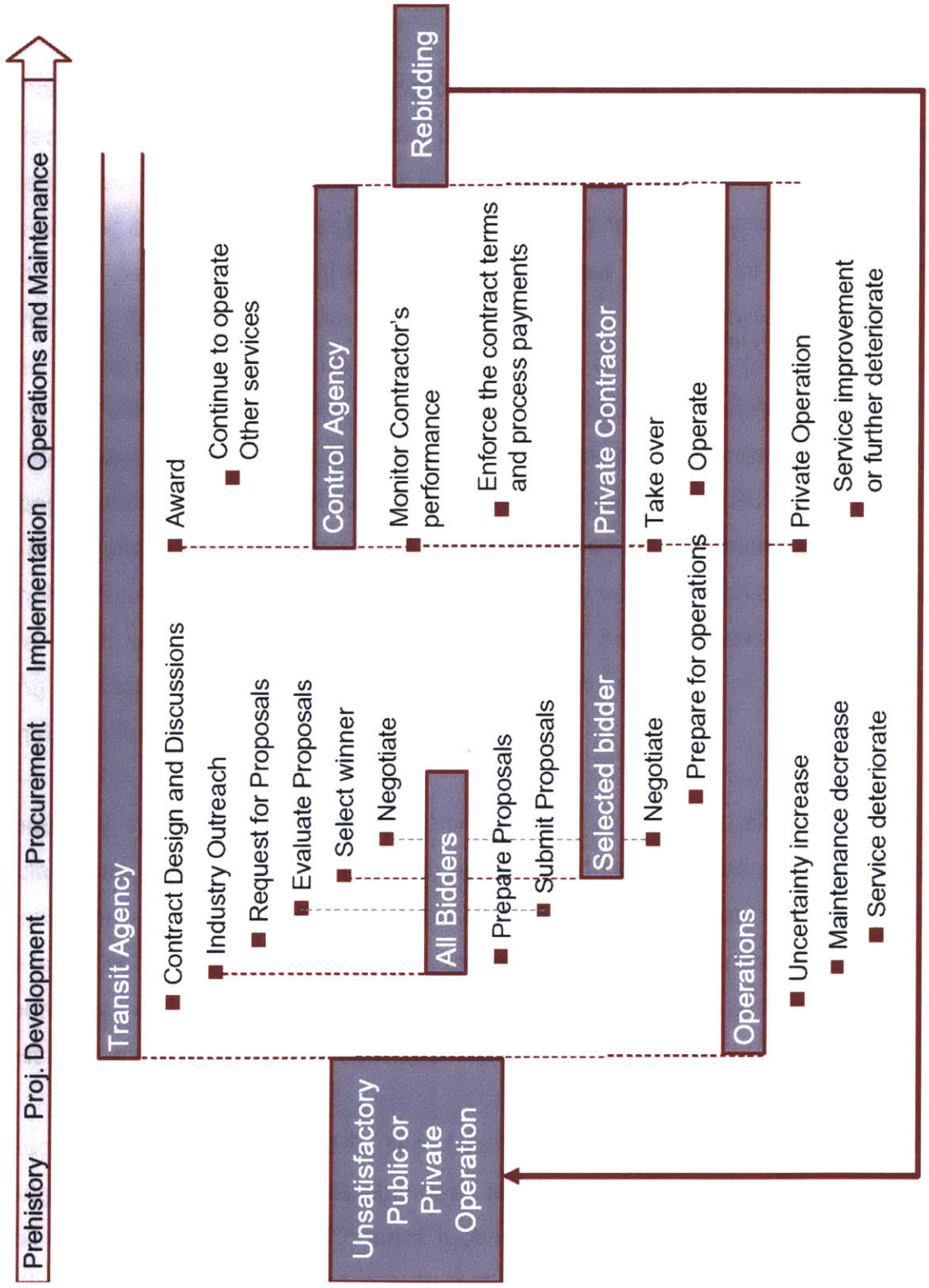
It is, however, necessary to assume that at some point, either because the term of the contract has ended, or because the concessionaire is constantly performing below the expectations, it will be necessary to rebid the contract competitively. This reinstalls most of the risk of the initial procurement process, described earlier in this chapter, with the addition that the agency might be at an information disadvantage with the incumbent concessionaire which, if not corrected, could undermine the ability to attract bidders. Knowing the complexities that a rebidding process involves, the concessionaire might

take advantage of the public agency reluctance to rebid. Focusing on the attraction and retention of competent staff and arbitration capacity maximizes the likelihood of success performance and prepares adequately for the contingency of needing to rebid. Paradoxically, the better prepared the agency is to rebid, the less necessary it might be to actually rebid the concession. Transparency and public attention can help to encourage honest and competent behavior.

One approach that can substantially increase agency's information and leverage at the rebidding stage is to keep part of the operations within the public sector. At this phase, it provides the agency with first hand information on operations and maintenance. The government can have access to cost structures and can evaluate bidders' proposed efficiency, as well as better judge their proposals. Nonetheless, if the public operator engages in bureaucratic practices and gets overstaffed, the performance indicators and costs of the public company might not serve for comparative purposes.

In any case, the rules for rebidding and transitioning should be clearly stated in the contract to avoid problems at the end of the contract. Preferential treatment to the incumbent contractor, if it is performed appropriately, could be use as an incentive to avoid contractor's lack of motivation during the last part of its concession. A "lame duck" private operator could produce bad quality service while waiting for the transfer of responsibilities to the next operator. During this transition phase the outgoing concessionaire must provide access to assets and information, and be cooperative with the incoming contractor. Although this can be stated in the contract, there are few incentives for the outgoing contractor to have a cooperative approach. However, a monetary bonus at the end of the transition phase could introduce some incentive to do it, even if it might be difficult to support politically.

Figure 5.6: Actors, Actions and Time frame in the contracting process



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Chapter Six: Quantitative Approach

Introduction

This chapter presents a quantitative approach to contract design through the analysis of the effect of different schemes of incentives and penalties in the quantity of service provided. Theoretically, any system of incentives and penalties should produce similar results as long as incentives are greater than the marginal cost of producing the desired service and penalties are higher than the marginal savings of not producing it. Nonetheless, the transportation business presents many complexities that make defining and enforcing incentives and penalties very difficult. Marginal costs in transit systems are very difficult to compute and have an enormous variation during the day and week. Advanced cost allocation studies have shown that, for example, hourly bus operating cost can have a 340% variation between a peak and a Sunday hour (Wilson, 2003) and these costs differ among different routes. In addition, monitor tasks are also extremely difficult, because transit systems are usually very extensive in time and space. Even a small scale transit agency has hundreds of daily services from early in the morning to after midnight in dozens of routes, making any type of manual monitoring extremely inefficient.

Consequently, not all incentive and penalty schemes will produce similar results. Each particular arrangement will have its advantages and disadvantages and there might be situations where one fits better than others. Assuming that the ideal situation described before is not achievable, this section will compare second best approaches by modeling the behavior of a transit contractor under different payment schemes when concessionaire's actions escape agency's monitoring capabilities.

New technologies based on GPS, like Automated Vehicle Location and Automated Passenger Counting, have increasingly been improving monitoring capabilities, but they are still expensive. Modern rail control technologies combined with Automated Fare Collection systems could lead to a substantial improvement in service monitoring in

controlled-access systems. Nonetheless, the substantial difference in marginal operating costs during the day, or between weekdays and weekends will long persist, as it is rooted in the peaking pattern of transit demand.

Theoretical Background

To understand the role of the incentives and penalties in the behavior of the contractor, the economics guiding the agency - contractor relationship should be analyzed. Contract economics offers the basic tools to provide microeconomic explanations of price and wage inertia, private rationing, and other phenomena that can be accounted for in terms of contract models, based on individual optimization under a broad set of constraints (Werin and Wijkander, 1992). Transit contracts are considered procurement type contracts because the government is responsible for buying public transportation. Laffont and Tirole studied a typical procurement contract, where the government has to reimburse a fraction $b \in [0,1]$ of the firm's monetary expenditures C. The government pays the firm:

$$p = a + (1 - b).C$$

where a is a "fixed payment" and b is the fraction of the cost borne by the firm. b can also be thought as the power of the incentive scheme and can have two polar extremes:

- The cost-plus contract (b=0). The firm does not bear any of its cost. The cost-plus contract is an extremely low-powered incentive scheme.
- The fixed-price contract (b=1). The firm is residual claimant for its cost savings. The government does not de facto reimburse any of the costs; it pays only a fixed amount. The fixed-price contract is an extremely high-powered incentive scheme.

Linear contracts with a slope b strictly between 0 and 1 are called "incentive contracts". Real-world contracts are often linear, but some have nonlinear features such as ceiling

on transfers from the government or a guarantee that the firm will not lose money (Laffont and Tirole, 1993). Cost-plus and fixed-price, as well as some types of incentive contracts, are commonly used in the transit business.

In general, the problem can be formulated as a maximization problem where the goal is to structure the contract in such a way that it results in the contractor taking the action that maximizes the agency's utility or "the agent taking the action that maximizes the principal's utility", using economics terminology (Halvorsen, 1993). This problem, known as Moral Hazard, can be formally presented as follows:

A	is the set of actions and 'a' is an element of this set
X	is the set of outcomes and 'x' is a specific outcome
π	is the payoff to the principal associated with an outcome 'x'
f(x|a)	is the distribution density of 'x' resulting from the selection of an action 'a'
S(x)	is the set of payments to the agent based on the observed outcome
C(a)	is the agent's cost of taking action 'a'

The utility functions are:

Agent (Contractor)	U[S(x)] - C(a)
Principal (Agency)	V[π - S(x)]

And the maximization problem becomes:

$$\max \int V[\pi - S(x)] \cdot f(x \mid a) \qquad \forall a \in A$$

$$st/$$

$$(1) \int U[S(x)] \cdot f(x \mid a)dx - C(a) \geq u'$$

$$(2) \int U[S(x)] \cdot f(x \mid a)dx - C(a) \geq \int U[S(x)] \cdot f(x \mid a')dx - c(a')$$

Where

u' is the agent's reservation level of utility

a' is all of the agents' possible actions other than 'a'

The principal's problem is to find a set of payments to the agent for every possible outcome which will result in the agent taking the action that maximizes the principal's expected utility. The objective function maximizes the principal's expected utility subject to (1) the agent's expected net utility from taking action 'a' is equal or greater than his reservation level of utility, and (2) the agent's expected net utility from choosing action 'a' is at least equal to his expected net utility from taking any other action. The difficulty of the problem is directly related to the number of the agent's possible actions. When there are many options, the above formulation can lead to a monstrously complex contract, full of state-specific payoffs that respond to the slightest changes in the information content of the outcome 'x' (Halvorsen, 1993).

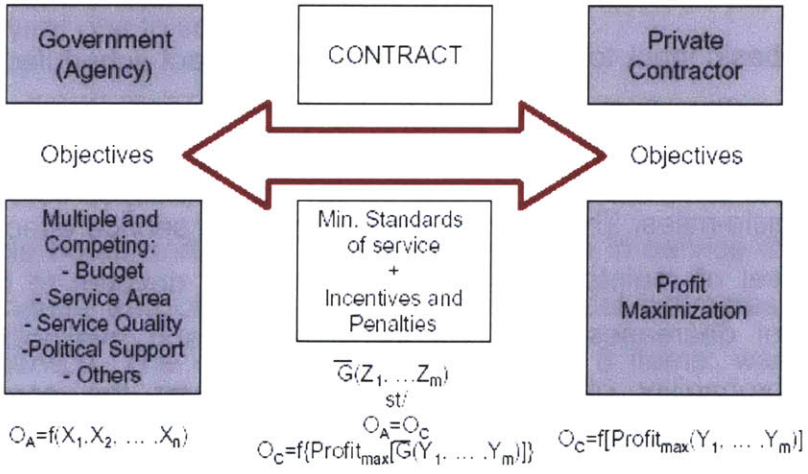
In addition to the moral hazard problem, contract economics also deals with the problem of adverse selection. Adverse selection arises when both parties start out with equal information, but one person does not later get full information about either the relevant actions of the other person or the circumstances surrounding these actions. Although adverse selection can also be mathematically formulated and can affect the design of the contract, it will not be analyzed in detail because if the principal is only seeking one agent (as in most transit contracts), adverse selection's solution just requires that the contract be such that the desired type of agent be willing to enter into the contract and no other type of agent be willing to enter into the contract (Halvorsen, 1993).

It is clear that it is impossible to be able to anticipate every possible action and consequently introduce a system of incentives and penalties that can ensure the contractor behaving in the way desired by the agency. Contract Economics theory provides the basic framework for this analysis, but unfortunately this approach has not been used in transit service contracting because of the sector's intrinsic complexities

(Halvorsen, 1994). Nonetheless, under pre-defined circumstances the behavior of the contractor could be predicted, if it is assumed that maximizing profit is its only objective. Figure 6.1 Illustrates how the contract can be understood as a tool to convert government's objectives into contractor's objective. The contract should act as a mathematical transformation which ensures that government's objectives appear to the contractor as economic incentives and penalties so that, when maximizing its profit, the objectives are aligned.

Different arrangements in terms of the contract type, the payment base or the incentives and penalties -among other clauses- can produce different outcomes in terms of the service provided and the cost of that service. The next section will explore a business-like model for the contractor firm intended to approximate some of the economic and service impacts of the contract documents. This will still be an incomplete approach to the full contract economics' problem because it only solves the agent's part of the problem, but not the principal's maximization. Nonetheless, it helps to illustrate the sensitivity of the contractor to certain contract specifications and, by building an adequate number of scenarios, a heuristic approach to the principal's problem can be used.

Figure 6.1: Contract as a tool to convert a government's objectives into contractor's objective



The Model Conceptually

As described in the previous section, the design of the best contract could potentially be reduced to an optimization problem, where the principal's utility is maximized subject to the agent's utility function and other constraints. Unfortunately, as was illustrated in the previous chapters, many variables influence the agency's decisions, making the utility function very difficult to define. The multiple stakeholders involved in transit agencies create competing objectives such as frequent headways, area coverage or extensive hours of service that have to be accommodated under budget and resources constraints. The complete formulation of the problem seems almost impossible to achieve. Nonetheless, it is possible to approximate the contractor's utility function. This approach can only provide a feasible (not optimal) solution to the problem, but it allows a simulation tool to estimate and analyze the outcome of different contract arrangements.

Because the model is limited to the economic aspects of the contract, private sanctions related to the operator's reputation or other non-economic impacts cannot be incorporated into the model. In this formulation the contractor is considered to be a private profit-maximizing firm. Consequently, the objective function is defined as the net present value (NPV) of the revenue stream produced by the contract. For ease of understanding, the model is divided into three submodels: operations, expenses and income.

Operations: The basic input to this submodel is the contract scheduled service. This is the service information that is put out to bid. The service parameters that were considered are the number of peak hour vehicles, the total revenue vehicle-hours and total revenue vehicle-miles. This submodel calculates the service effectively performed based on the level of maintenance that the contractor devotes to its fleet. As the maintenance level decreases, so does the reliability and availability of the fleet, increasing the probability of not being able to deliver the committed service. Consequently, lower maintenance implies reduced service performance. The maintenance level (expressed as a percentage where 100% implies following all the

manufacturer's guidelines) is the decision variable and will be determined as a result of the maximization problem. Maintenance-reliability and maintenance-availability functions permit the estimation of vehicle availability and reliability based on the level of maintenance. These parameters directly affect the operator performance in terms of number of vehicles in the peak hour, revenue vehicle hours, and revenue vehicle miles.

This submodel also computes, based on the difference between the scheduled and performed services, the cost of the penalties associated with below-standard performance. The model is capable of computing penalties for cancellations in peak hour service, and below-scheduled vehicle hours and vehicle miles. A tolerance level is included for the vehicle hours and vehicle miles penalties to account for the agency's inability to monitor every single trip.

Inter-temporal effects are taken into account when poor maintenance in one year increases the probability of poor availability and reliability in the following years. Specifically deferred maintenance is accumulated every year as the difference between the optimal maintenance (100%) and the maintenance effectively performed each year. The deferred maintenance value also affects the availability and reliability of each year, with increasing deferred maintenance levels meaning lower reliability and availability and poorer performance. Because deferred maintenance is cumulative, its level can easily be greater that 100%, being for example 700% for year eight if no maintenance is performed from year one to seven.

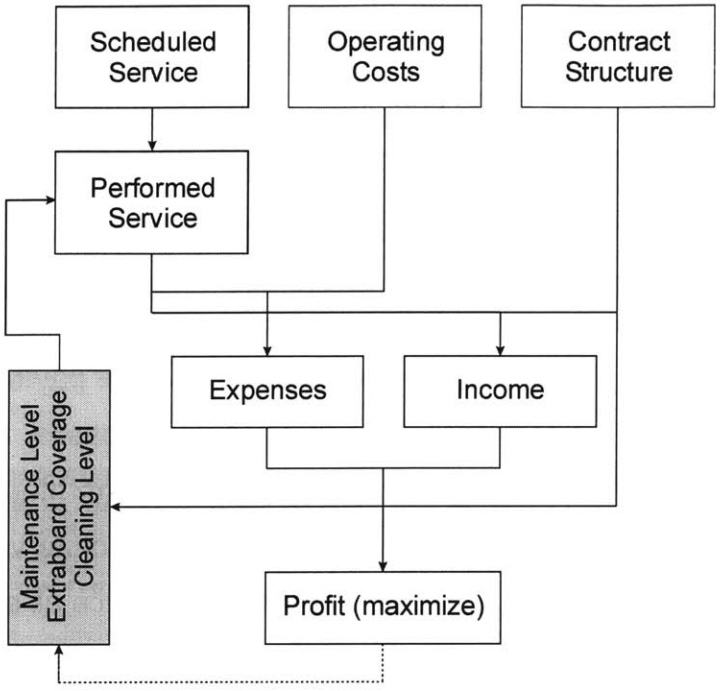
Expenses: The input for this submodel is the actual and scheduled service, and its associated resource requirements. Taking into account the fleet size, the performed amount of vehicle hours and vehicle miles, the vehicles in service during peak hours, and the maintenance and cleaning levels, this submodel estimates the total cost of producing the service. The expenses are divided into 8 items: wages, benefits and payroll taxes, fuel, maintenance, cleaning, insurance, administrative expenses, and other expenses. Each of these items is associated with the real output level, with the exception of wages, insurance and administrative expenses that are related to the

scheduled level of service (because the operator's size is assumed to be set to the contract level). Of course, maintenance cost is also associated with its corresponding decision variable, which results from the optimization process. The standard unitary costs associated with each item are input to the model.

Income: This submodel calculates the incomes to the contractor. Four basic sources of income are included to account for different contract strategies: passenger revenue, vehicle miles, vehicle hours, and a fixed fee. For estimating the actual ridership, the availability and reliability probability are merged to form a combined quality index that will affect the share of the potential customers really captured. This number of passengers, affected by the fare and the revenue share percentage, determines the passenger revenue. Subsidy is calculated based on the vehicle miles and vehicle hour performed multiplied the contract rate, plus the fixed fee. Also as part of the income submodel, the penalties calculated in the operations submodel are subtracted from the total income.

From the difference between the income and expenses for each year, the operating result is calculated. This operation is performed for each year of the contract life and the net present value of that flow is calculated at a fixed discount rate. The model optimizes by varying the levels of maintenance each year to find the ones that maximizes the NPV to the contractor. The results are summarized in a separate spreadsheet, where the NPV calculation is performed. Figure 6.2 illustrates the relationship between all the submodels.

Figure 6.2: Model Flowchart



The intention of this model is not to be comprehensive and detailed, but rather to provide some numerical evidence in contract design discussions. The limitations in this version of the model are many and important, and it should only be taken as a first step in contract modeling. Further studies could definitely overcome many of the simplifying assumptions that were taken and the model could become a much more powerful analytical tool. At this stage, the objective was to introduce the concept of computerized model contract design and prove its viability. Entirely contained in a Microsoft Excel spreadsheet, this tool could be used by government officials in the contract design phase of a concession process, without the need of special information technology.

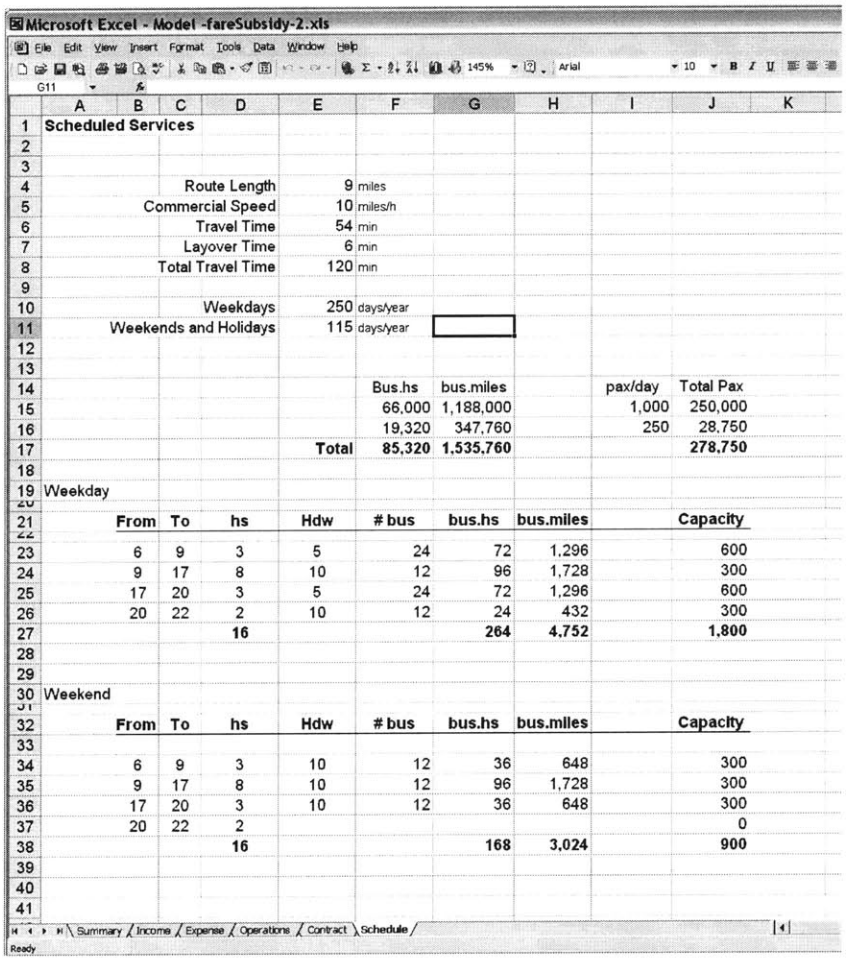
The Model Operationally

The model was built using commercial spreadsheet software, Microsoft Excel. It has 6 sheets, 3 corresponding to each of the submodels introduced above, one for the service schedule, one for the contract specifications (payments and penalties) and a summary sheet.

The model can be used for systems of diverse complexity. However, it is important to stress that the objective of this analysis is to compare different payment schemes and, therefore, only the relative performance is of interest. In all cases, the outputs of the model will be compared with a base case scenario, whose performance is supposed to perfectly match the agency's policy. For that reason, the absolute value of the output variables might not represent reality perfectly. Nonetheless, since all scenarios were run with exactly the same assumptions, their comparisons should still valid. For educational purposes, the model that will be presented is very simple. More complex systems were indeed simulated with this tool, including Tren Urbano, but the added complexity doesn't result in added insight.

Schedule Sheet: The service information must be entered in this sheet: route length, commercial speed, layover time, number of weekdays and weekends per year, and weekday and weekend schedule and average passenger boardings. The model will calculate total travel time, number of vehicles needed, total vehicle-hours and vehicle-miles, total boardings and capacity. These figures, that represent the contractual commitments, are the reference values for performance comparison, and are the input to the operations and expenses submodels. A screenshot of this sheet is presented in Figure 6.3.

Figure 6.3: Screenshot of Schedule sheet



	A	B	C	D	E	F	G	H	I	J	K
1	**Scheduled Services**										
2											
3											
4				Route Length	9	miles					
5				Commercial Speed	10	miles/h					
6				Travel Time	54	min					
7				Layover Time	6	min					
8				Total Travel Time	120	min					
9											
10				Weekdays	250	days/year					
11				Weekends and Holidays	115	days/year					
12											
13											
14						Bus.hs	bus.miles		pax/day	Total Pax	
15						66,000	1,188,000		1,000	250,000	
16						19,320	347,760		250	28,750	
17					**Total**	**85,320**	**1,535,760**			**278,750**	
18											
19	Weekday										
21		**From**	**To**	**hs**	**Hdw**	**# bus**	**bus.hs**	**bus.miles**		**Capacity**	
23		6	9	3	5	24	72	1,296		600	
24		9	17	8	10	12	96	1,728		300	
25		17	20	3	5	24	72	1,296		600	
26		20	22	2	10	12	24	432		300	
27				**16**			**264**	**4,752**		**1,800**	
28											
29											
30	Weekend										
32		**From**	**To**	**hs**	**Hdw**	**# bus**	**bus.hs**	**bus.miles**		**Capacity**	
33											
34		6	9	3	10	12	36	648		300	
35		9	17	8	10	12	96	1,728		300	
36		17	20	3	10	12	36	648		300	
37		20	22	2						0	
38				**16**			**168**	**3,024**		**900**	
39											
40											
41											

Contract Sheet: This input-only sheet holds the key information from the contract. It includes from the schedule sheet the total and peak number of vehicles, and the passengers, vehicle-miles and vehicle hours. The fare, revenue share percentage, subsidy per vehicle-mile, vehicle-hour and fixed, as well as the penalties per vehicle-mile, vehicle-hour and vehicles in peak hour and their respected tolerances are also entered here. A screenshot of this sheet is presented in Figure 6.4.

Figure 6.4: Screenshot of the Contract sheet

Microsoft Excel - Model -fareSubsidy-2.xls

File Edit View Insert Format Tools Data Window Help

G23

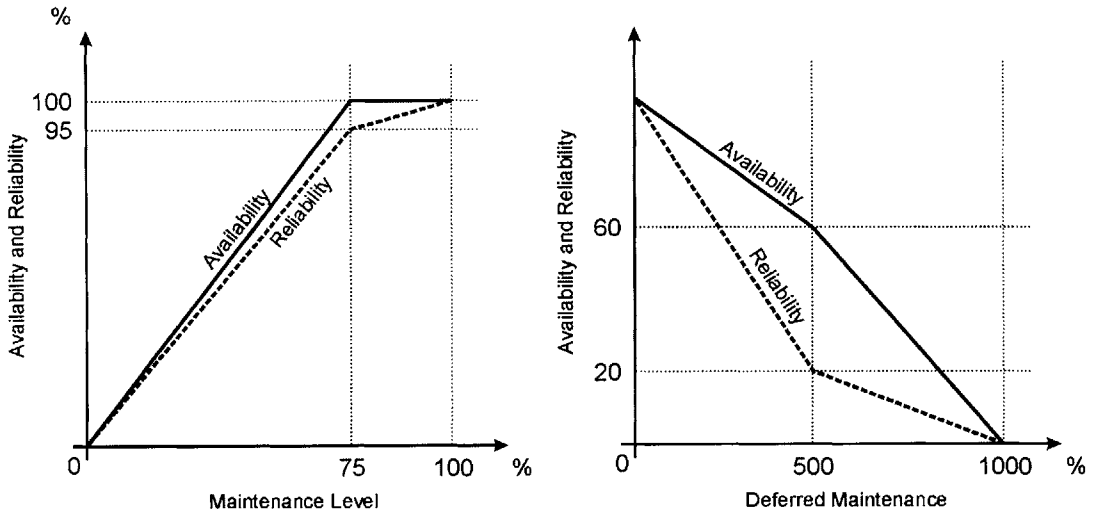
	A	B	C	D	E	F	G	H	I	J	K
1	**Contract**										
2											
3											
4				1	2	3	4	5	6	7	8
5											
6	Passengers										
8		Number of Passengers	#	278,750	278,750	278,750	278,750	278,750	278,750	278,750	278,750
9		Elasticity to Quality of Service	-		0	0	0	0	0	0	0
10											
11	Operations										
13		Number of Vehicles	#	26	26	26	26	26	26	26	26
14		Number of Vehicles in Peak Hour	#	24	24	24	24	24	24	24	24
15		Vehicle Hours	v.hs	85,320	85,320	85,320	85,320	85,320	85,320	85,320	85,320
16		Vehicle Miles	v.miles	1,535,760	1,535,760	1,535,760	1,535,760	1,535,760	1,535,760	1,535,760	1,535,760
17											
18	Payment										
20		Fare	$/pax	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90
21		Revenue Share	%	100%	100%	100%	100%	100%	100%	100%	100%
22		Payment per Vehicle Hour	$/v.hs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23		Payment per Vehicle Mile	$/v.miles								
24		Fixed Payment	$/year								
25											
26	Penalties										
28		Tolerance in Vehicle Hours	%	5%	5%	5%	5%	5%	5%	5%	5%
29		Tolerance in Vehicle Miles	%	5%	5%	5%	5%	5%	5%	5%	5%
30		Tolerance in Vehicle Hours	v.hs	4,266	4,266	4,266	4,266	4,266	4,266	4,266	4,266
31		Tolerance in Vehicle Miles	v.miles	76,788	76,788	76,788	76,788	76,788	76,788	76,788	76,788
33		Penalty per Vehicle Hour	$/v.h	81.25	81.25	81.25	81.25	81.25	81.25	81.25	81.25
34		Penalty per Vehicle Mile	$/v.mile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35		Penalty per Vehicle in Peak Hour	$/v in Peak	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
36											
37											
38											
39											
40											

Summary | Income | Expenses | Operations | Contract | Schedule

Ready

Operations Sheet: The input to this sheet comes from the contract sheet and no user entry is needed. Based on the Maintenance level, the decision variable in the model, this sheet calculates the vehicle-miles, vehicle-hours and peak vehicles actually operated, as well as the actual number of passengers. The monetary value of the penalties and the combined quality index for ridership estimation are assessed here. It also calculates the availability and reliability indices based on pre-defined curves as a function of the maintenance level and the deferred maintenance level, shown in Figure 6.5.

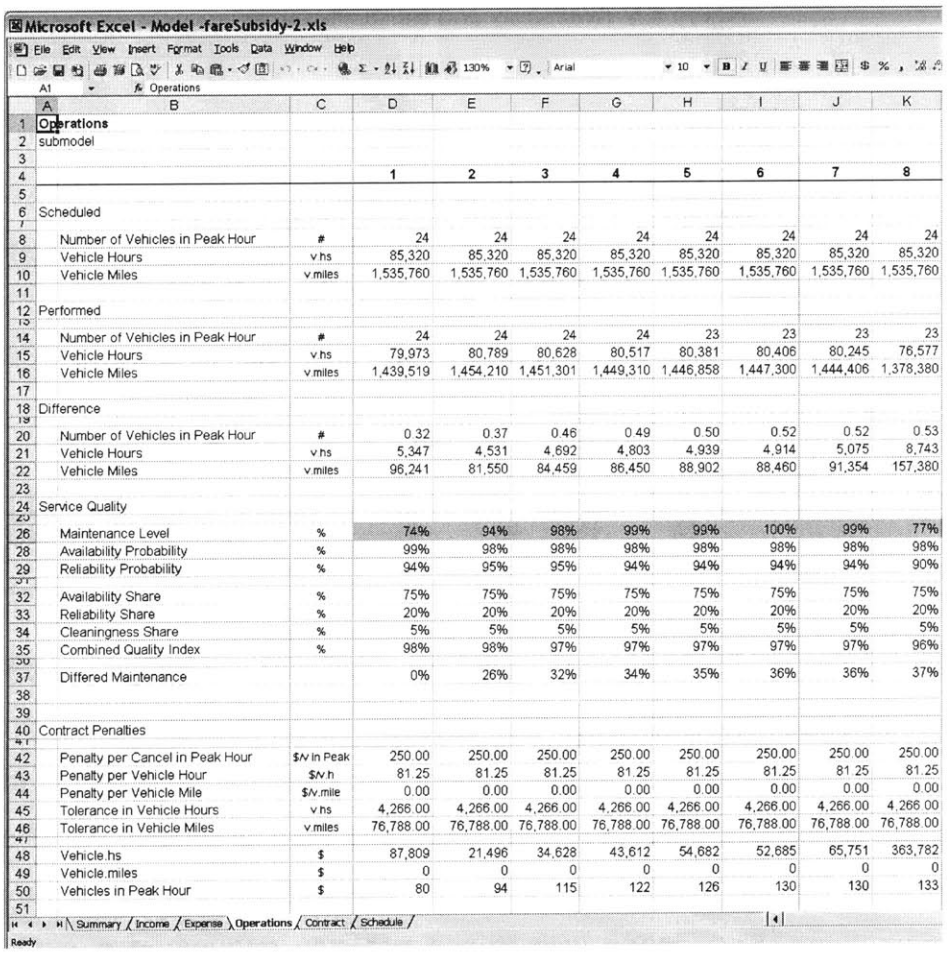
Figure 6.5: Availability and Reliability curves



These availability and reliability curves are hypothetical and are not based on real data. Unfortunately, it was impossible to find studies to date that could provide this information, and its estimation would clearly exceed the scope of this thesis. Nonetheless, the shape of the curve is more important than its precise path because the model is only used for comparative purposes, so the findings should not be weakened by these assumptions. Experience with transit vehicles suggested a curve in which small reductions in maintenance level does not affect vehicle operations greatly, but after a certain threshold, if maintenance expenses are further reduced vehicle performance rapidly deteriorates. These curves represent annual averages.

The actual vehicle-hours and vehicle-miles are obtained simply by multiplying the respective scheduled values by the reliability index. The vehicles actually operated in peak hour are obtained in a similar way using the availability index. The combined quality index that affects the number of passengers is obtained as a weighted average of the above mentioned indices and a cleaning index that is not functional in this version of the model. A screenshot of this sheet is presented in Figure 6.6.

Figure 6.6: Screenshot of Operations sheet



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A1 Operations

	A	B	C	D	E	F	G	H	I	J	K
1	Operations										
2	submodel										
3											
4				1	2	3	4	5	6	7	8
5											
6	Scheduled										
8		Number of Vehicles in Peak Hour	#	24	24	24	24	24	24	24	24
9		Vehicle Hours	v.hs	85,320	85,320	85,320	85,320	85,320	85,320	85,320	85,320
10		Vehicle Miles	v.miles	1,535,760	1,535,760	1,535,760	1,535,760	1,535,760	1,535,760	1,535,760	1,535,760
11											
12	Performed										
14		Number of Vehicles in Peak Hour	#	24	24	24	24	23	23	23	23
15		Vehicle Hours	v.hs	79,973	80,789	80,628	80,517	80,381	80,406	80,245	76,577
16		Vehicle Miles	v.miles	1,439,519	1,454,210	1,451,301	1,449,310	1,446,858	1,447,300	1,444,406	1,378,380
17											
18	Difference										
20		Number of Vehicles in Peak Hour	#	0.32	0.37	0.46	0.49	0.50	0.52	0.52	0.53
21		Vehicle Hours	v.hs	5,347	4,531	4,692	4,803	4,939	4,914	5,075	8,743
22		Vehicle Miles	v.miles	96,241	81,550	84,459	86,450	88,902	88,460	91,354	157,380
23											
24	Service Quality										
26		Maintenance Level	%	74%	94%	98%	99%	99%	100%	99%	77%
28		Availability Probability	%	99%	98%	98%	98%	98%	98%	98%	98%
29		Reliability Probability	%	94%	95%	95%	94%	94%	94%	94%	90%
32		Availability Share	%	75%	75%	75%	75%	75%	75%	75%	75%
33		Reliability Share	%	20%	20%	20%	20%	20%	20%	20%	20%
34		Cleaningness Share	%	5%	5%	5%	5%	5%	5%	5%	5%
35		Combined Quality Index	%	98%	98%	97%	97%	97%	97%	97%	96%
37		Differed Maintenance		0%	26%	32%	34%	35%	36%	36%	37%
38											
39											
40	Contract Penalties										
42		Penalty per Cancel in Peak Hour	$/v.in Peak	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
43		Penalty per Vehicle Hour	$/v.h	81.25	81.25	81.25	81.25	81.25	81.25	81.25	81.25
44		Penalty per Vehicle Mile	$/v.mile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45		Tolerance in Vehicle Hours	v.hs	4,266.00	4,266.00	4,266.00	4,266.00	4,266.00	4,266.00	4,266.00	4,266.00
46		Tolerance in Vehicle Miles	v.miles	76,788.00	76,788.00	76,788.00	76,788.00	76,788.00	76,788.00	76,788.00	76,788.00
48		Vehicle.hs	$	87,809	21,496	34,628	43,612	54,682	52,685	65,751	363,782
49		Vehicle.miles	$	0	0	0	0	0	0	0	0
50		Vehicles in Peak Hour	$	80	94	115	122	126	130	130	133
51											

Summary / Income / Expense / Operations / Contract / Schedule /

Ready

Expenses Sheet: Based on the service actually operated, this sheet calculates the cost of providing it. The main components of the cost are wages and benefits, fuel, maintenance, cleaning, insurance, general expenses and other expenses. The fuel and maintenance costs are proportional to the use of the vehicle. Operators and supervisor wages and insurance are proportional to the number of vehicles, and overhead, cleaning and general administrative costs remain constant. The "other expenses" line is proportional to the sum of all previous expenses. The unit values for wages, fuel, maintenance, cleaning and insurance and the number of operators and supervisors per bus were obtained from a selection of real transit contracts and interviews with private transit operators. A screenshot of this sheet is presented in Figure 6.7.

Figure 6.7: Screenshot of Expense Sheet

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B45 Cleaning

	A	B	C	D	E	F	G	H	I	J	K
1	**Expense**										
2											
3											
4				**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
5											
6	Operations (Performed)										
8		Number of Vehicles	#	26	26	26	26	26	26	26	26
9		Number of Vehicles in Peak Hour	#	24	24	24	24	23	23	23	23
10		Vehicle Hours	v.hs	79,973	80,789	80,628	80,517	80,381	80,406	80,245	76,577
11		Vehicle Miles	v.miles	1,439,519	1,454,210	1,451,301	1,449,310	1,446,858	1,447,300	1,444,406	1,378,380
13		Maintenance Level	%	74%	94%	98%	99%	99%	100%	99%	77%
14		Cleaningness Level	%	100%	100%	100%	100%	100%	100%	100%	100%
15		Extraboard Coverage	%	100%	100%	100%	100%	100%	100%	100%	100%
16											
17	Personnel										
19		Operators	#	63	63	63	63	63	63	63	63
20		Supervisors	#	4	4	4	4	4	4	4	4
21		Office	#	3	3	3	3	3	3	3	3
22		Management	#	2	2	2	2	2	2	2	2
23											
24	Wages										
26		Operators	$	27,040	27,040	27,040	27,040	27,040	27,040	27,040	27,040
27		Supervisors	$	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
28		Office	$	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
29		Management	$	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000
30											
31	Other Costs										
33		Fuel	$/mile	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
34		Maintenance	$/mile	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
35		Cleaning	$/veh	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
36		Insurance	$/veh	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
37		Other G&A	$	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
38											
39	Expenses										
41		Wages	$	2,043,520	2,043,520	2,043,520	2,043,520	2,043,520	2,043,520	2,043,520	2,043,520
42		Benefits and Payroll Taxes	$	510,880	510,880	510,880	510,880	510,880	510,880	510,880	510,880
43		Fuel	$	539,820	545,329	544,238	543,491	542,572	542,738	541,652	516,893
44		Maintenance	$	745,671	956,870	995,592	1,004,372	1,002,673	1,013,110	1,000,973	742,947
45		Cleaning	$	208,000	208,000	208,000	208,000	208,000	208,000	208,000	208,000
46		Insurance	$	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
47		G&A (General Expenses)	$	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
48		Other Expenses	$	250,673	263,676	265,934	266,416	266,259	266,895	266,102	249,134
49		**Total Expenses**	$	**4,578,564**	**4,808,275**	**4,848,164**	**4,856,679**	**4,853,903**	**4,865,143**	**4,851,127**	**4,551,374**
50											

Summary / Income / Expenses / Operations / Contract / Schedule /

Ready

Income Sheet: This sheet computes and adds the income from different sources that the contractor might have based on the contract, and subtracts the penalties to obtain the total income. For determining the fare revenue, this sheet calculates the actual passengers by multiplying the contract forecasted ridership and the combined quality index. A screenshot of this sheet is presented in Figure 6.8.

Figure 6.8: Screenshot of Income sheet

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D30 =+D12+D21-D28

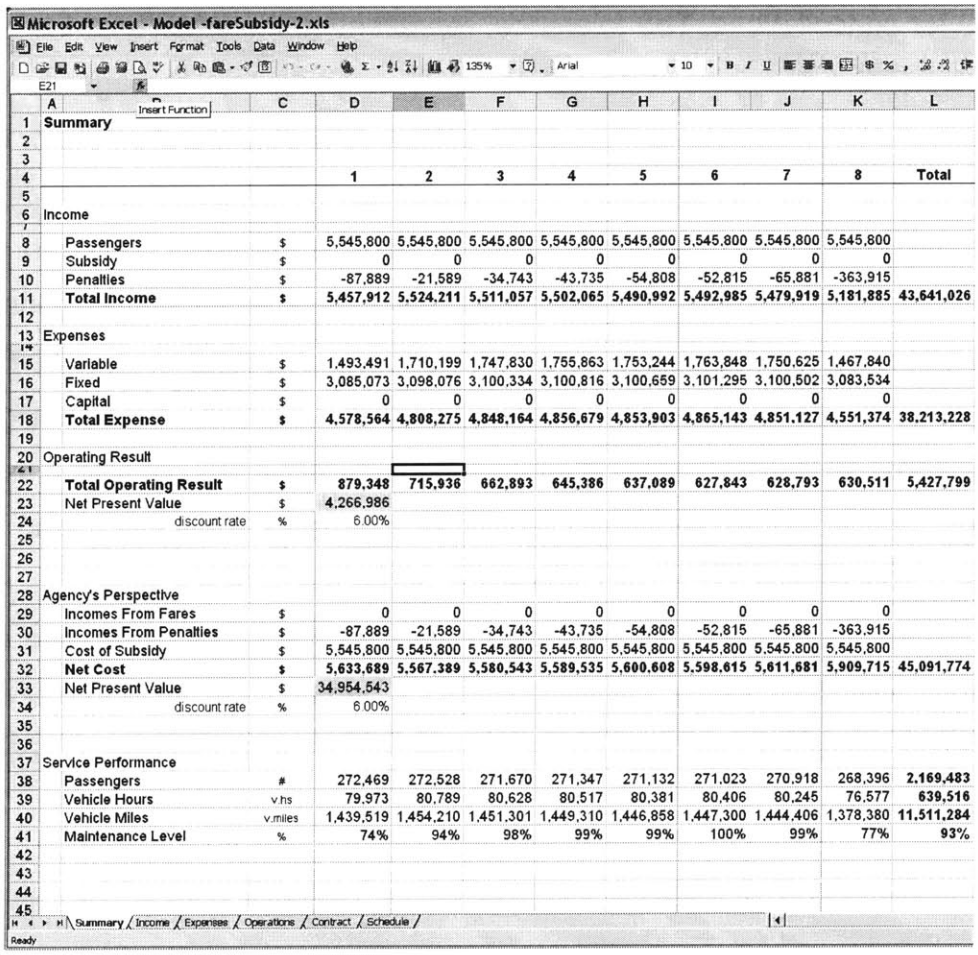
	A	B	C	D	E	F	G	H	I	J	K
1	**Income**										
2											
3											
4				**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
5											
6	Passengers										
8		Passengers	#	272,469	272,528	271,670	271,347	271,132	271,023	270,918	268,396
9		Fare	$/pax	19.895247	19.895247	19.89525	19.89525	19.89525	19.89525	19.89525	19.89525
10		Revenue	$	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800
11		Percentage Share	%	100%	100%	100%	100%	100%	100%	100%	100%
12		**Net Pax Revenue**	**$**	**5545800**	**5545800**	**5545800**	**5545800**	**5545800**	**5545800**	**5545800**	**5545800**
13											
14	Subsidy										
16		Vehicle.hs	#	79,973	80,789	80,628	80,517	80,381	80,406	80,245	76,577
17		Vehicle.miles	#	5,545,800	1,454,210	1,451,301	1,449,310	1,446,858	1,447,300	1,444,406	1,378,380
18		Price per vehicle.hs	$/v.h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19		Price per vehicle.mile	$/v.mile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20		Fixed Price	$	0	0	0	0	0	0	0	0
21		**Subsidy Revenue**	**$**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
22											
23	Penalties										
25		Cancel	$	87,809	21,496	34,628	43,612	54,682	52,685	65,751	363,782
26		Underperformed Vehicle.hs	$	0	0	0	0	0	0	0	0
27		Underperformed Vehicle.miles	$	80	94	115	122	126	130	130	133
28		**Penalties**	**$**	**87,889**	**21,589**	**34,743**	**43,735**	**54,808**	**52,815**	**65,881**	**363,915**
29											
30	**TOTAL INCOME**		**$**	**5,457,912**	**5,524,211**	**5,511,057**	**5,502,065**	**5,490,992**	**5,492,985**	**5,479,919**	**5,181,885**
31											
32											
33											
34											
35											
36											
37	Passengers										
39		Potential Passengers	pax/year	278,750	278,750	278,750	278,750	278,750	278,750	278,750	278,750
40		Combined Quality index	%	98%	98%	97%	97%	97%	97%	97%	96%
41		Real Passengers	pax/year	272,469	272,528	271,670	271,347	271,132	271,023	270,918	268,396
42											
43											

Summary | Income | Expenses | Operations | Contract | Schedule

Ready

Summary Sheet: Compiling the information from the entire spreadsheet, this sheet presents a summary of the costs and benefits of the transit service provided, both from the perspective of the contractor and the government. The aggregate performance indicators presented are passengers, vehicle-miles, vehicle-hours and average maintenance level. Financial indicators include the NPV of the operating result for the contractor and of the subsidy to the agency assuming a 6% discount rate, and the total cost of providing the service. The optimization tool is a maximization macro that finds the combination of maintenance levels for each year of the concession that maximizes the contractor's NPV as calculated in this sheet. A screenshot of this sheet is presented in Figure 6.9.

Figure 6.9: Screenshot of Summary sheet



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	A	C	D	E	F	G	H	I	J	K	L
1	**Summary**										
2											
3											
4			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
5											
6	Income										
8	Passengers	$	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	
9	Subsidy	$	0	0	0	0	0	0	0	0	
10	Penalties	$	-87,889	-21,589	-34,743	-43,735	-54,808	-52,815	-65,881	-363,915	
11	**Total Income**	**$**	**5,457,912**	**5,524,211**	**5,511,057**	**5,502,065**	**5,490,992**	**5,492,985**	**5,479,919**	**5,181,885**	**43,641,026**
12											
13	Expenses										
15	Variable	$	1,493,491	1,710,199	1,747,830	1,755,863	1,753,244	1,763,848	1,750,625	1,467,840	
16	Fixed	$	3,085,073	3,098,076	3,100,334	3,100,816	3,100,659	3,101,295	3,100,502	3,083,534	
17	Capital	$	0	0	0	0	0	0	0	0	
18	**Total Expense**	**$**	**4,578,564**	**4,808,275**	**4,848,164**	**4,856,679**	**4,853,903**	**4,865,143**	**4,851,127**	**4,551,374**	**38,213,228**
19											
20	Operating Result										
22	**Total Operating Result**	**$**	**879,348**	**715,936**	**662,893**	**645,386**	**637,089**	**627,843**	**628,793**	**630,511**	**5,427,799**
23	Net Present Value	$	4,266,986								
24	discount rate	%	6.00%								
25											
26											
27											
28	Agency's Perspective										
29	Incomes From Fares	$	0	0	0	0	0	0	0	0	
30	Incomes From Penalties	$	-87,889	-21,589	-34,743	-43,735	-54,808	-52,815	-65,881	-363,915	
31	Cost of Subsidy	$	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	5,545,800	
32	**Net Cost**	**$**	**5,633,689**	**5,567,389**	**5,580,543**	**5,589,535**	**5,600,608**	**5,598,615**	**5,611,681**	**5,909,715**	**45,091,774**
33	Net Present Value	$	34,954,543								
34	discount rate	%	6.00%								
35											
36											
37	Service Performance										
38	Passengers	#	272,469	272,528	271,670	271,347	271,132	271,023	270,918	268,396	**2,169,483**
39	Vehicle Hours	v.hs	79,973	80,789	80,628	80,517	80,381	80,406	80,245	76,577	**639,516**
40	Vehicle Miles	v.miles	1,439,519	1,454,210	1,451,301	1,449,310	1,446,858	1,447,300	1,444,406	1,378,380	**11,511,284**
41	Maintenance Level	%	74%	94%	98%	99%	99%	100%	99%	77%	**93%**
42											
43											
44											
45											

Summary / Income / Expenses / Operations / Contract / Schedule /

Ready

The simulations

The analysis that will be presented hereon is based on a fictitious transit line created ad-hoc to compare alternative contract payment terms. It consists of a 9 mile corridor with a commercial speed of 10 miles/hour. A 54 minutes one way travel time plus six minutes layover-time produces a total round-trip travel-time of 120 minutes. The weekday service profile shows 6 peak hours operating with 5 minute headways and 10 off-peak hours operating with 10 minute headways. The weekend schedule consists of 10 minute headways over 16 hour operation per day. Peak service requires 24 buses and off-peak 12; two reserve-buses complete a fleet of 26 units. A combination of 250 weekdays and 115 weekends and holidays produces a total of 1,535,760 million bus miles and 85,320 bus hours a year. Passengers were assumed to be 1,000 on weekdays and 250 on weekends, generating a total of 278,750 passengers per year at a $.75 fare. Penalties were set at 25% over the revenue per vehicle-mile or vehicle-hour, and at $250 for cancellations. The tolerance, representing the inability of the agency to perfectly monitor the contractor was set to 10%, meaning that the agency would be unable to detect poor contractor performance unless deficiencies were 10% or more.

Base case: The base case corresponds to the situation in which the contractor performs perfect maintenance of the fleet and provides all the service as stipulated in the contract, obtaining a net margin of approximately 11%. Under such conditions the NPV to the contractor at a 6% discount rate is approximately $ 3,378,000 over an eight years concession. Three alternative basic payment schemes were analyzed first: a fixed fee, a bus-hour rate and a passenger-based fare. The payments were calculated so as to obtain these profits for the base case conditions under the different scenarios analyzed. Therefore, before optimization, all scenarios produced the same base case outcome. The simulation was then run to model contractor's behavior resulting in the optimized figures shown in Table 6.1.

Table 6.1: Simulation results comparison chart

Run	Payment basis			NPV		Performance Indices			
	Fixed (million)	Pax ($/pax)	Veh-hs ($/v-h)	Contractor (million)	Agency ($ per pax)	Veh-hs (million)	Veh-mile (million)	Pax (million)	Maint. (average)
Base				3.378	14.86	.683	12.286	2.230	100%
A	5.546			5.318	15.48	.604	10.876	2.107	89%
B		19.90		3.711	14.86	.656	11.814	2.194	96%
C			65.00	3.429	14.80	.678	12.209	2.227	97%
A				57%	4%	-11%	-11%	-6%	-11%
B				10%	0%	-4%	-4%	-2%	-4%
C				2%	0%	-1%	-1%	0%	-3%

Fixed subsidy (run A): The model showed that, as predicted by theory, the fixed cost payment scheme provides a strong incentive to the contractor to save costs. The simulation predicted that the contractor would reduce the maintenance level and decide to take maximum advantage of the agency inability to monitor deficiencies in service of up to 10%. The optimization tool showed average maintenance levels of 89% resulting in poor reliability and availability, producing 11% less vehicle hours and vehicle miles, and transporting 6% fewer passengers. Because the payment to the contractor is fixed, with the exception of penalties, this cost savings increased the contractor's NPV by more than 50%. From the agency's perspective, the subsidy per passenger transported is 4% higher, as the number of passengers is considerably reduced while the subsidy is not.

Subsidy per passenger (run B): When a passenger based subsidy scheme was tested, the simulation also predicted a reduction in the performance indicators, but not as great as with the fixed payment. Under this payment scheme the contractor has an incentive to carry more passengers by providing better service quality. Unlike in the fixed payment case where the only limits to cost savings were the contract penalties, with a passenger based subsidy the contractor also has to trade off income with service quality. Unfortunately, the effectiveness of this incentive is dependant on the elasticity of ridership to service quality and demand patterns. In systems with large percentage of captive riders its value is considerably reduced.

The simulation forecast a 4% reduction in vehicle-miles and vehicle-hours and a 2% reduction in passengers. These results are plausible considering the uneven distribution of marginal cost in the transit business. It might well be the case that late night or mid day off peak service with very small demand are more expensive to provide than the subsidy the contractor receives for the passengers being carried. Taking advantage of the agency's inability to monitor every run, a profit maximizing concessionaire could decide not to provide that particular service. The contractor's NPV increased by 10% due to maintenance and service savings. The average maintenance index is 96%, representing a 4% reduction from the base case. The government subsidy per passenger showed no change because the government is paying on a per-boarding base.

Passenger based subsidies are a very powerful incentive tool. Contract economic theory emphasizes that when quality is unverifiable, the regulator must create the incentives of an unregulated firm to provide quality without throwing away the benefits of regulation. First, it must reward the regulated firm on the basis of sales. Second, the threat of non-renewal of the regulatory license, of second sourcing or of deregulation makes the regulated firm concerned about its reputation as a quality supplier (Laffont and Tirol, 1993).

Under a fixed payment scheme, the contractor will provide the minimum agreed quality of service because his payment is guaranteed independent of any quality improvement. Service quality is protected only by the fear of incurring penalties, which can only be invoked if the service deficiency is detected, and must be serious enough in economic terms to discourage the contractor from providing deteriorated service quality. With a passenger based payment scheme, the contractor is given a direct economic incentive to provide an increased quality of service, as long as patronage and revenue increase justify it.

An interesting application of per-passenger subsidies is the revenue share technique, in which the contractor is allowed to keep part or all of the farebox revenue. Unfortunately

many reasons seem to inhibit the use of revenue sharing contracts in the US, including: passenger counts reliability, risk shifting to the contractor, reduced agency's flexibility, information asymmetry and public accountability issues. However, not all of them are strong arguments against the implementation of revenue sharing. Accurate passenger counts, while essential to a passenger based payment scheme, are also vital to the agency's business and should not be dispensed with even in the absence of contractor operation. Furthermore, modern information technology can play an important role in reducing both passenger count uncertainty and information asymmetry concerns. Risk allocation and service flexibility, on the other hand, are of more concern to this incentive mechanism. Nonetheless, some strategies can help to overcome these issues. A passenger cap scheme can assure the contractor a minimum low-risk payment, and a cautious selection of contracted routes and contract terms can reduce flexibility concerns. Finally, the public accountability perceptions of transit fares can be overcome as indicated by some positive experiences (Raspall, 2003).

Subsidy per Vehicle-hour (run C): Using a service based payment scheme obviously generates a strong incentive to provide the scheduled service. Only small savings in maintenance will be tolerated as poor reliability, under this scheme, means less income. Nonetheless, because reliability is not seriously affected with minor maintenance reductions, the contractor can decide that small savings in maintenance are worth the trade off. This is, indeed, what the simulation showed. The vehicle-hours and vehicle-miles suffered almost no change, the average maintenance level was 97%, and the contractor's NPV increased by only 3%. The agency's NPV was virtually unaffected by the contractor's cost saving decisions.

This payment basis has the additional advantage of permitting the shiftimg of the burden of proof to the contractor and from the agency. In essence, the contractor has to prove that the service was provided. If any particular issue is under dispute, it would be on the concessionaire's side to demonstrate it compliance to the contract terms. The major drawback of this system is that the contractor, although motivated to give the maximum quantity, has little incentive to provide good quality service. Under relaxed

supervision, the concessionaire could run the vehicles at more convenient hours than the ones stipulated in the contract or avoid difficult or congested routes that reduce the vehicle rotation efficiency. The agency is never absolved from a serious monitoring role.

Fixed and variable subsidy: One of the contractor's biggest concerns on either passenger or service based payment schemes is the risk of being unable to cover their fixed costs if ridership decreases or the agency decides to change service. This uncertainty should be considered by the agency because, if private transit firms decide to provide service under such conditions, it will inevitably be reflected in the price. A solution to this problem would be to split the subsidy into a fixed payment and a variable amount dependant on the number of passengers or vehicle-hours. With this approach the contractor is guaranteed a sum to cover all or part of its fixed cost, considerably reducing its risk. There is still a performance based incentive to drive the concessionaire towards adequate quantity and quality. The split between the fixed and the variable components will depend on the trade off among risk perception and incentive strength. Additionally, this scheme reflects the marginal cost of providing transit services more clearly, facilitating agency evaluation of service or policy changes.

Using the same base case, two additional scenarios were run. In both cases the fixed portion of the subsidy was made equal to the fixed components of the total cost. They are composed of overhead, General Administrative expenses, insurance and vehicle cleaning, and represented almost 20% of the total contractor's cost. Variable costs including operators, fuel and maintenance, constituted the remaining 80% of total costs. The vehicles were considered owned by the agency, so their depreciation is not reflected in contractor's costs. The results of these simulations are presented in Table 6.2.

Table 6.2: Simulation results comparison chart

Run	Payment basis			NPV		Performance Indices			
	Fixed (million)	Pax ($/pax)	Veh-hs ($/v-h)	Contractor (million)	Agency ($ per pax)	Veh-hs (million)	Veh-mile (million)	Pax (million)	Maint. (average)
Base				3.378	14.86	.683	12.286	2.230	100%
D	.970	16.42		3.884	14.92	.650	11.698	2.183	95%
E	.970		54.63	3.476	14.77	.667	12.011	2.208	93%
D				15%	0%	-5%	-5%	-2%	-5%
E				3%	-1%	-2%	-2%	-1%	-7%

As expected, the simulations showed that these approaches produced an intermediate result between the fixed and the variable payment schemes. Using the passengers transported as the base for the variable part of the payment (run D) implied a reduction of 5% in terms of vehicle-hours and vehicle-miles, and a 2% decrease in boardings. A 5% fall in average maintenance level permitted the contractor to increase its NPV by 15%. From the agency's perspective the Subsidy per passenger remained almost constant. Alternatively, using a vehicle-hour based payment for the variable part of the scheme (run E) produced a 2% decrease in vehicle-hours and vehicle-miles and a 1% reduction in passengers. The contractor's NPV increased by 3% while the subsidy per passenger decreased by 1%.

Both approaches considerably increased the contractor's performance compared with the fixed payment scheme. At the same time, they reduce the concessionaire's risk compared with the other variable schemes by including an assured minimum cash stream that covers the contractor's fixed costs. The decision on whether to use a passenger or vehicle-hour incentive for the variable part of the payment should be based on the judgment of the trade off between quality and quantity of service, and the subsidy. A vehicle-hour payment will ensure the quantity of the service, as the contractor always has the incentive to produce more service hours. On the other hand, there are fewer incentives for service quality because the concessionaire is paid regardless of the quality. A boardings based payment will put more emphasis on the quality of service because the contractor would like as many passengers as possible,

but can also result in the concessionaire not running very low demand services. Moreover, this incentive is less effective when the majority of the riders are captive.

Findings

The analysis showed that different payment schemes do in fact affect the contractor's general behavior as expected. Model assumptions and the simple route simulated do not permit judging the advantages of any of the schemes in absolute terms but, the relative performance of the different payment schemes compared to a base case allow some conclusions. The findings are aligned with incentive theory and intuition, but the fact that they are also supported through the simulation process strengthens them.

Variable payment schemes are preferred to fixed subsidies because they provide a clear incentive for the contractor. To reduce contractors' risk, encourage participation and obtain lower prices in the bidding process, variable payments should be combined with a fixed fee, to assure the contractor a minimum recovery of its fixed cost structure. Depending on the demand patterns and the available technology to monitor contractor's performance, the agency should trade off service quality and quantity to base its decision on the variable payment. All else being equal, passenger based subsidy will tend to create an incentive for quality, while a service based payment will create a quantity incentive.

Both parties need, however, to be mindful that the basic purpose of the relationship is to provide high quality and reliable service, and not a game between the agency and the concessionaire for getting the last cent from the contract. Because of the complexities of the transit industry there will always be situations when the cost of paying a fine will be lower than the marginal cost of providing the specified service, or of the cost of enforcing the contract. To deal with this reality, there should be a common understanding between the parties that the penalties are also a diagnostic tool to discover problematic lapses in service quality, with the goal of "curing" these defects. The contractor and the agency should collaborate together to identify service quality

problems, propose solutions, and agree on satisfactory terms to overcome them. Contracts should be structured to reflect this philosophy by the promotion of transparent procedures to identify and remedy service problems.

Further research should improve the model by increasing the number of decision variable, improving the quantity and precision of the contractor's cost and behavior functions, and migrating to a more powerful platform. Such a tool should permit not only the comparison of different payment arrangements, but also assist the public sector in defining improved schemes and the price of penalties.

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Chapter Seven: Findings and Conclusion

Findings from the Case Studies

The analysis of the case studies using the qualitative and quantitative framework permitted the identification of the following guidelines for the different stages of the contracting process.

Prehistory

- Proponents of concessions should build a big support group. That would ensure having enough leverage when the opportunity window opens. The inclusion of non-political actors can help positioning the case in the media and make the alliance less vulnerable to elections.
- Search for creative financial strategies to increase the attractiveness of the project and the perception of opportunity.
- Information from other transportation systems, other public services or other countries experience can be used to improve the understanding of the advantages and risks of transit concessions.
- Consult with experts when there is not a solid knowledge base in the public administration. Concession processes are complex and different from the usual agency's task and require a particular expertise. Public agents that had been involved in privatization processes, not necessarily in transportation, can be very valuable for the project.
- Carefully study the legal framework in advance. Prepare all modifications of laws or procedures that concession might require.

Project Development and Procurement

- Prepare plans for the entire transportations system. Even if the concession affects only part of it, its effects will spread. Feeder and parallel routes will need to be reorganized to meet new demand patterns.
- The concession can take a long time, especially if the system is under construction. Develop sustainable transportation plans to gain users during construction and prepare operators for the new network.
- Consultants with experience in concession processes can be extremely useful because transit contracting has many particularities. If there is a need to import knowledge for the project, develop a technology transfer program that permits the creation of local know-how.
- Timing is critical, especially in systems already in operations. The "lame duck" operator has no incentive to be efficient and can affect users and harm the process by deteriorating the assets and the public perception. Long procurement time can also cause important changes in the system state from the request for proposal to the contract award, forcing the parties into a renegotiation before even starting operations.
- If needed, work in parallel. Many of the activities can be carried out in separate offices. A private consulting firm can be effective at preparing part of the paperwork or help in developing the concession strategy.
- Carefully analyze the advantages and disadvantages of different bidding strategies. Multi-phase multi-envelope approaches give more leverage to the government, but there is a trade off between time and quality in procurement design. Very long processes can lose support.
- Study the adequate concession duration. Transitions are difficult and frequent rebiddings expensive, but very long contracts can reduce agency's leverage and contractor's efficiency.
- Having more than one concessionaire can be very useful. It increases the government's leverage in case of missperformance as the threat of replacing the contractor is permanent, but it can deteriorate some economies of scale. Keeping

part of the system under public operation can have similar effects, plus it can ease control and rebidding task with first hand information.

- Get feedback from the industry. The structure of the contract should fit the bidders' standards. Otherwise the most qualified contractors will refuse to bid.
- Ensure a dedicated fund source when government's ability to pay might be a bidders' concern. Include arbitration alternatives when legal system is expensive or suspected of bias.
- It is important to attract as many bidders as possible. A large number of options increase government's leverage and ensure price fairness. It also increases the chance of having competent operators in the pool.
- Incentives and penalties should be reasonably priced. Very expensive penalties may result in difficulty to enforce, reducing the deterrence and diagnostics effect.
- Ensure transparency of public acts during the process. Involving people from the opposition can help reduce negative perceptions.
- Responsibility and accountability should always be clear in the documents when more than one contractor is involved. Preview effective intra and inter contractor means of cooperation.
- Unions can stop the process. Start negotiations with the unions in advance. Government should usually lead them to level the field to bidders and be sure of receiving comparable offers. Work in an honest manner with them and agree on government disengagement after contractor takeover.
- Negotiations with contractors after selection of the best bidder are always difficult because the government suddenly loses a lot of leverage, especially if conditions changed from the moment of the request for proposals. Encourage maximum transparency during the negotiations to avoid negative public image.

Implementation

- Require the contractor to start working on the take over from the same day it is confirmed as the preferred offer.

- Transition might be conflicting. Prepare plans for assets transfer and cautiously execute them. This is a vulnerable stage for the contractor, so don't hold assets unnecessarily.
- Comply with all obligations, including payments to laid off workers, and withdraw from the union environment as soon as the contractor takes over.
- Be flexible with contractor's needs during the transition phase. Relax penalties if needed.
- Carefully monitor private contractor to private contractor transitions. Ensure access to the site and assets.

Operations and Maintenance

- The agency-contractor relationship is vital for a successful concession.
- Promote, by all means, competency and honesty within the agency.
- Long term goals should always guide agency's policies and decisions.
- Provide the mechanisms to ensure that the agency keeps the knowledge and expertise gained during the concession process and ensure adequate funding for the control agency to perform effectively.
- Build mechanisms to ensure the knowledge can last longer than political terms.
- Pay the concessionaire on time and according to the contract.
- Permanently monitor the contractor's performance and assess the penalties when needed.
- Assure flexibility in dealing with contractor's demands.
- Use the arbitration process to avoid expensive and long legal disputes.

Other cases, not analyzed in this thesis, also support these findings. Bibliography on the British Rail and Underground concession process highlights comparable findings during the concession process. For further reference see Wolmar, 2001 and 2002.

General Conclusions

Private production of public transportation has the potential to reduce governments' financial constraints on transit investments and operations. Nonetheless, the participation of private companies in the provision of a public service requires the implementation of a regulatory regime to guarantee a minimum quantity and quality of service across different areas of the city and different time of the day. For intermediate to large scale transit systems, concession contracts have been the most commonly used regulatory tool.

Concession contracts have the advantage of describing the obligations of the parties in advance, giving predictability and security to both the government and the contractor. Concession contracts are similar to other commercial transactions, and can be enforced through courts or an arbitration procedure. However, in long term contracts, parties are vulnerable to hold up risks and contract incompleteness. To minimize these adverse effects, a comprehensive understanding of contract design and the contracting process by the public sector is needed.

The framework developed in this thesis considers the identification of different stakeholders and their relative leverage during the concession process. Government has the greatest responsibility because it has to build and maintain the supporting coalition while negotiating with the unions, the contractors, and among different public agencies. A staff of competent and honest public agents working in an agency with sufficient resources is the best way to successfully navigate the challenges of a concession process. To make the concession's efficiency gains sustainable, government should keep the expertise and knowledge that was created during the concession process, and provide the staff independency of political cycles and contractor's strategic business decisions.

Good contract design and monitoring is important and can prevent eroding situations that can harm the relationships between the agency and the contractor. Previous

concession experiences around the world, some of which were analyzed here, provide valuable lessons on both how to do the right job and how to de the job right. Among other, the government should ensure the right timing, publicize the process, be open to contractors' concerns, and find secure funding sources and dispute resolution procedures to increase the number and quality of the bidders. Information technology, contract models and other simulations tools can improve agency preparation during decision making and contract monitoring phases.

Honest and competent officials and managers working collaboratively should overcome contract design drawbacks and service quality problems, being mindful that the most important objective of the contract is high quality transit services. The agency-contractor relationship is the most important asset in successful concessions because only competent and honest public and private management working together are capable of achieving the win-win opportunities that transit contracting provides.

This research had an exploratory approach and leaves a great potential for further research. On its qualitative portion, it bridged transportation engineering with a variety of social sciences. Further research could concentrate in increasing the robustness of the framework by studying these related fields in detail and extending its application to other case studies. The quantitative approach, an application of contract economics and business modeling, could be improved by increase model's precision and exploring concrete applications in contract design.

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In Boston: John Attanucci, Anne Berry, Richard Brown, Joe Ferretti, Fred Salvucci, and John Sedlak (in Houston)

In Buenos Aires: Patricia Brennan, Jorge Kogan, Ester Litovsky, Juan Pablo Martinez, Horacio Pesce

In San Juan: Ricardo Alvarez, Joan Berry, Benjamin Colucci, Paxi Cordova, Carmen Correa, José Espada, Ariel Felix, Jaime Gutierrez, Felipe Luyanda, Gabriel Moreno, Gabriel Rodriguez, Juan Suarez, and Freya Toledo

List of Contracts

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Figure 4.6: Tren Urbano contracting process timeline:

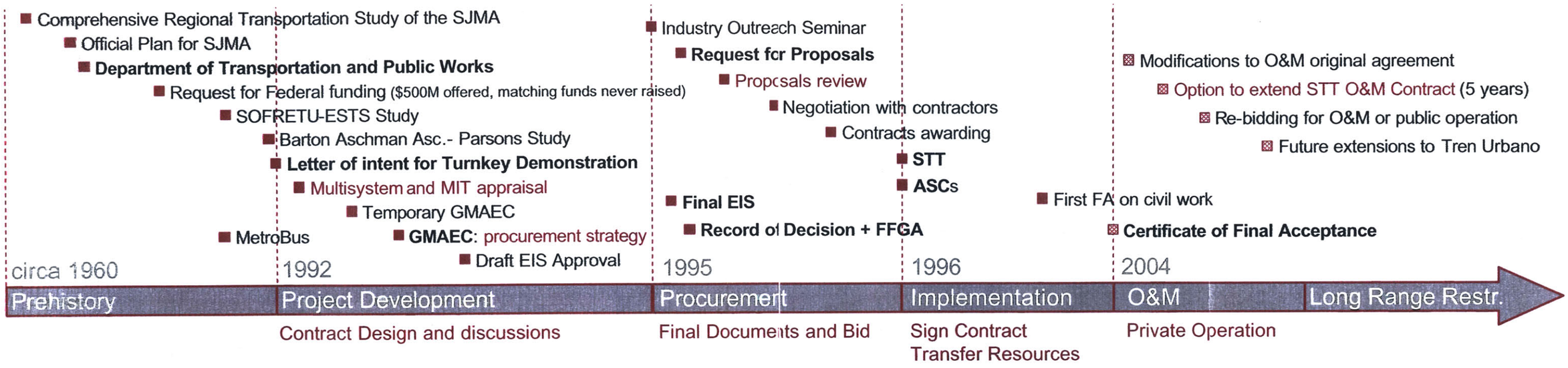

Figure 4.8: Metrovías contracting process timeline:

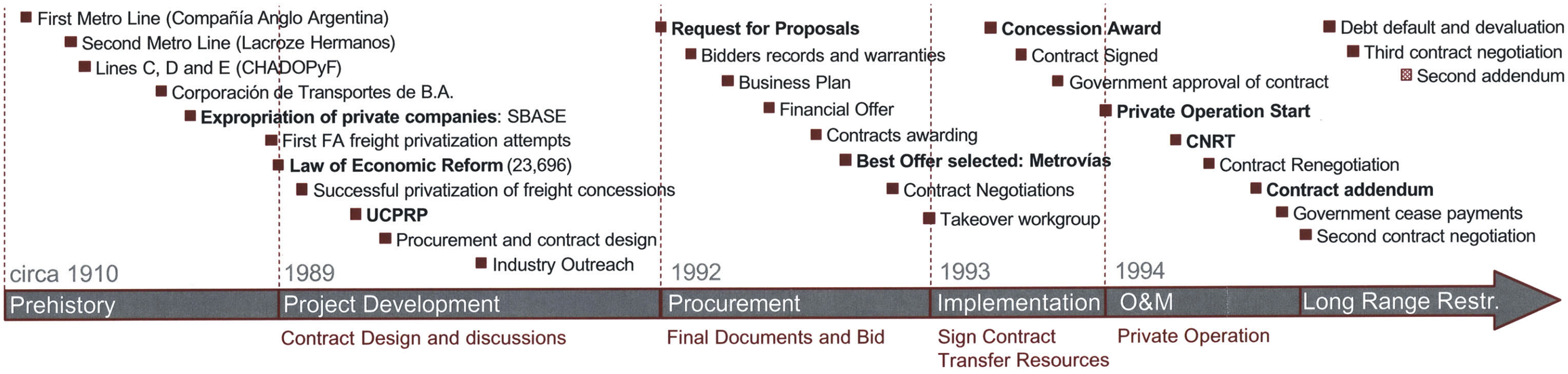

Figure 4.10: Boston Commuter Rail contracting process timeline: