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Abstract

Cities are becoming the engine of the world. More and more people are moving to urban agglomerates in search of jobs, culture, and entertainment. Such a movement results in an unprecedented pressure upon the infrastructure of urban systems. Within that panorama, mobility is considered one of the major issues, and one of the cornerstones of the mobility-centered discussion is the fact that, among public transport modals, buses are still one of the main options, especially in developing countries. Bearing that in mind, the aim of the present work is to identify the main elements required to develop and implement a successful bus reform. Based on a comparative case analysis of Seoul and Rio de Janeiro, we conclude the dissertation by proposing a framework for bus reforms. We elaborate on the success factors of a good reform and put forth some recommendations for Seoul, Rio or any city looking for mobility solutions related to their bus management system and aimed at improving quality of life in their urban areas.

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1. **Introduction and Problem Statement**

The idea of this chapter is to present the introduction and the problem statement of the current master thesis. Firstly, I will explore the research question and the objectives of the work. Secondly I will go focus on the discussion about the relevance of the study and make a clearly definition of their scope. At the end, I will describe the structure of the role report.

### 1.1 - Research Question

Cities will be the engine of the world in the current century. Trends such as urbanization, the growth of cities’ GDP, the political role and also the recognition of cities as a hub of innovation and culture will provide them with a unique potential to increase the quality of life of people around the world.

According to a recent study by the United Nations\(^1\), 54 per cent of the world’s population live in urban areas – a proportion that is expected to have increased to 66 per cent by 2050. Projections show that urbanization, combined with the overall growth of the world’s population, could add another 2.5 billion people to urban populations by 2050.

In addition, the report asserts that, in 1990, there were ten “mega-cities” with 10 million inhabitants or more, which altogether were home to 153 million people or slightly less than 7% of the global urban population at the time. In 2014, there were 28 mega-cities worldwide, home to 453 million people or about 12% of the world’s urban dwellers. By 2030, the world is expected to have 41 mega-cities with 10 million inhabitants or more.

Another relevant aspect is the ever-increasing importance of cities as agents of economic development. Saskia Sassen\(^2\)‘s seminal book explores the concept of Global Cities and defines them as the ones which play a central role in the global economic and financial system. In fact, they are said to have become the nuclear engines of economic growth.

The political dimension is also a trend that reinforces the role of cities. Last year, the 2015 United Nations Climate Change Conference – COP_Paris – showed the world that cities could easily take the first step in impacting climate change. The C40\(^3\) negotiated the Paris City Hall Declaration, in which local leaders committed themselves to “delivering up to 3.7 gigatons of urban greenhouse gas emissions reductions annually by 2030 and supporting ambitious long-term climate goals such as a transition to 100% renewable energy in our communities, or a 80% greenhouse gas emissions reduction by 2050”.

Finally, many specialists have addressed the role of cities as a hub of culture and innovation. Richard Florida, for instance, explores the concept of creative class\(^4\).

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\(^1\) World Urbanization Prospects by UN DESA’s Population Division (2014)


\(^3\) The C40 Cities Climate Leadership Group (C40) is a network of the world’s megacities taking action to reduce greenhouse gas emissions. C40 harnesses the assets of member cities to address climate risks and impacts locally and globally.

\(^4\) Cities and the Creative Class (2004).
Charles Laundry develops the idea of creative cities\textsuperscript{5}. There is widespread agreement regarding cities’ importance in producing and distributing innovation.

These interweaving trends all stress the role of cities, but they also strengthen the pressure for more efficiency, sustainability and resilience. Cities have been facing numerous challenges in the fields of housing, infrastructure, transportation, energy and employment, as well as in what concerns basic services such as education and health care.

Among such challenges, transportation emerges as a key issue. Mobility is an essential component in the life of any urban dweller. You need mobility to work, to enjoy your free time, to travel, to live. However, the current situation in most cities around the world is far from optimistic. Ever-recurring traffic jams, absence of public transport, air pollution, car accidents, and rising car ownership rates are just a few examples of how cities are dealing with such an issue. Furthermore, high transport costs hinder cities’ productivity and competitiveness, obstructing poverty-reduction endeavors and becoming a community health hazard in terms of safety and environment (Mitric, S., 2008).

In most developing countries, the upgrade of mobility in cities necessarily hinges upon enhanced efficiency in public transportation. To be more precise, cities must increase the quality of bus transportation systems in order to improve their citizens’ mobility.

There are plenty of studies discussing how cities should develop a transportation reform, or even how a bus reform should be implemented. Nevertheless, there is an absence of practical studies, with practical cases, to inspire and give recommendations for public leaders to carry out such bus reforms.

Thus, my research question is: “what are the critical financial success factors for the implementation of a bus reform in large urban systems?”. I attempt to answer that question by developing a comparative study of Rio and Seoul.

The objective of this work is to identify the main elements required to develop and implement a successful bus reform. I also want to answer the following questions:

a) How can we describe an appropriate framework to design and implement a bus reform?

b) What are the key success factors?

c) What are the recommendations for Rio de Janeiro and Seoul?

\textbf{1.2 – Relevance of the Study}

According to Henning, T., Essakali, M., Oha, J. (2011), many world cities have managed to build on their well-performing urban transport systems to increase competitiveness and attractiveness. Their urban transport systems provide citizens with good access to economic and social opportunities, and to an enhanced quality of life; they likewise enable businesses to efficiently access labor and markets. However, cities in transition and developing countries are experiencing the simultaneous growth of (1) urban population numbers, (2) income levels, and (3) private vehicle ownership rates –

\textsuperscript{5} The Creative City : A Toolkit for Urban Innovators (2012).
The authors maintained that policy makers in these cities must be able to quickly design and implement performance-enhancing measures for their urban transport systems which are commensurate with the challenges they face. This presupposes the ability to conduct self-assessments, learn from good practice elsewhere, and identify the sites for potential improvement, as well as the scale thereof.

In this context, policy makers must acknowledge the high importance of the modal “bus”. To give a specific example, Hong Kong, which is considered to have one of the most efficient public transport systems in the world, has more than 30% of the daily trips of its citizens being made by bus companies (Cullinane S. & Cullinane K. 2003).

According to the data published by the UN (2001), bus transport represents the largest mode of urban transport in the developing world. In fact, over 40% of all trips to work are made by buses in low- and middle-income countries. Among the examples, buses represent more than 70% of the trips in Guadalajara⁶, more than 60% in Istanbul⁷ and more than 50% in most Latin American cities.

Aside from the relevance of the discussion on bus reforms to upgrade cities’ mobility levels, especially in developing countries, it is important to address the concept of governance. According to Swyngedouw, E. (1991), “a proliferating body of scholarship has attempted to theorize and substantiate empirically the emergence of new formal or informal institutional arrangements that engage in the act of governing outside, and beyond, the state”. Governance-beyond-the-state refers to institutional arrangements of governing which give a much greater role in policy-making, administration and implementation to private economic actors on the one hand and to parts of civil society on the other in self-managing what until recently was provided or organized by the national or local state.

The current study will analyze the bus reform of cities using the lens of the governance approach. This perspective will provide unique insights because it recognizes that, while the government plays a leading role in developing bus reforms, the interaction between governments and other actor is vital for better results to be achieved.

1.3 – Definition of the Scope of the Thesis

The discussion of public transport systems comprises a rich array of issues. The development of and investment in different modes of transport; the parking policy; the incentives of private car ownership and land-use planning are just a few examples of relevant issues.

The present work will address the elements of a bus reform. I will use general concepts of public transport system reforms to inspire the discussion and to understand the current situation of the systems. However, all the analysis will be focused on the governance of bus systems. I will center my efforts upon the main elements of a bus reform.

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⁶ Presentation by Luis Felipe Siqueiros in 2014. IGLUS Guadalajara.
⁷ Presentation by Prof. Dr. Ergun Gedizlioğlu. 2014. IGLUS Instanbul.
1.4 – Definition of the Structure

The current study will be structured in six chapters. The first one is the introduction, in which I discuss the objectives of the study, its relevance and also the delimitation of the scope.

The second chapter will comprise the basic foundation upon which the entire thesis will be grounded. Firstly, I will explore concepts of governance and transport systems management in cities. Secondly, the literature of governance of bus reforms will be reviewed. Finally, a framework for a bus reform will be proposed.

The third chapter explains the methodology of the study. The forth chapter will mention the description of the case of Rio de Janeiro and Seoul. In the fifth chapter, I will carry out a discussion and a comparative analysis of the cases and the literature review.

Finally, I will conclude the study with a quick summary of the results. Recommendations for Seoul and Rio de Janeiro will be addressed, and suggestions for future studies will be made.

At the end of the master thesis you will find the references used throughout the investigation, as well as the questionnaires used in the interviews.
2. BUILDING A FRAMEWORK

The objective of this chapter is to develop the literature review of the subject discussed in the current thesis. Firstly, I will explore studies of governance and management of transport systems in cities. Secondly, I will go focus on the bibliography on bus reforms. At the end, my aim is to propose a framework to lead the discussions of the cases.

2.1 - GOVERNANCE AND MANAGEMENT OF TRANSPORT SYSTEMS IN CITIES

There are a plenty of books and papers discussing all the issues related to transport systems in cities\(^8\). I have selected a guidebook from the World Bank\(^9\), and I shall use it as a foundation to organize this section of the thesis.

According to the World Bank (2014), “urban transport planning is very complex and, to be effective, urban mobility solutions need to be multi-dimensional”. In fact, a good plan to improve urban mobility is not just about good new infrastructures; it also needs to be grounded upon a holistic approach. Subjects like land-use planning, traffic management, human behavior, safety, gender, disability, affordability, and the impact on jobs must be combined in a unique plan. It is relevant to combine both supply-side and demand-side measures, while always bearing in mind that users/citizens are the main clients of the process.

In its guidebook, the World Bank proposes a policy framework whose objective is to improve the capacity of the system with fewer resources. The framework “would take into account optimal land use patterns and energy efficiency in transport systems. It highlights the key policy issues that need to be considered, the options that exist and the factors that influence a choice between the options. It recognizes that situations differ from country to country and even from city to city. Choices depend on the local context and so a “one size fits all” cannot apply. Recognizing this diversity, it refrains from making prescriptions”.

According to the guidebook, the first step to develop a transport policy is the definition of an initial vision of the system. What exactly does the city want to be in the future in terms of mobility? Using a business management approach, the guidebook points out that a vision is usually followed by a set of outlines, objectives and goals. Among the factors that should be included in a vision the report proposes: a) Access levels—maximum time to access jobs, education, and other needs; b) Affordability levels—maximum costs in accessing jobs, education, and so on; c) Public transport mode share; d) Maximum emission levels; e) Energy efficiency levels; and f) Safety standards.

According to the guidebook, once these fundamental elements of the vision have been set, a policy framework or a policy strategy should be developed considering the following thirteen elements:

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\(^8\) Among the studies I would recommend the presentations of Fernando García de Quevedo (2014, Transportation in Large Urban Areas. Glossary and Fundamental Concepts) and Luis Felipe Siqueiros (2014, Urban transport). IGLUS, Guadalajara.

- Governance:

Urban transport is one of the most complex phenomena in cities’ infrastructures. It is hard to believe that market forces could solve all the problems inherent to such an industry. The government plays a fundamental role in regulating the relations between stakeholders. The guidebook mentions three main issues regarding regulation: which level of government should be responsible for urban transport: national, provincial, metropolitan, or local; which government sector should take the overall responsibility for urban transport – for example: who should play for the whole of urban planning, transport, or construction —; and, finally, what kind of institution is needed to coordinate all the efforts required.

The level of government that should lead the process depends heavily on the current structure of the government and the patterns that can be seen in the country. “In general, in large countries with several levels of government, the national level could focus on functions such as national policies and standardizing regulations and practices. Provincial and lower levels could focus on aspects like strategic planning, route network design, and enforcement”.

In relation to the government sector that should have be in charge of public transport, this may change as urbanization progresses. “At early stages of urbanization, the construction sector could lead, as the dominant issues relate to the construction of facilities and infrastructure. At slightly more advanced stages, the linkages between land use and transport become important, and so the land use planning sector could take the lead. At more mature levels—where land use plans are virtually frozen—the technical complexities of a transport system become important, and so the transport sector could take the lead”.

Finally, the main subjects that come up when considering a coordinating institution are a) the agency’s scope of responsibilities (i.e., comprehensive, limited to managing the public transport system alone, or limited to strategic planning only); b) how the agency should be empowered (i.e., dedicated legislation, generic statute, executive order, or agreement); and c) how the agency is financed (i.e., public subsidies, dedicated taxes, or authorization to collect taxes and raise revenue from commercial exploitation of property). Again, the guidebook recognizes that a choice depends to a large extent on the current constitutional laws and on intergovernmental fiscal relationships.

With regard to the scope of responsibilities, the report mentions three broad models upon which such institutions are based around the world:

a) The institution acts only as a strategic planning entity that also sets investment priorities but has a limited role in regulation and operations. In this case, the leading agency would only draw up long-term investment plans and set priorities; it would then leave it for other agencies to implement these plans. Long-term plans become a basis for securing investment approval. Examples of this model are the metropolitan planning organizations in the United States.

b) The institution acts only as an entity responsible for managing the public transport system but not its physical infrastructure, like roads and bridges. Even here, it does not operate the public transport system but only regulates it. The local municipality is typically held responsible for the fixed infrastructure. An example of this model is STIF (Syndicat des Transports Îles-de-France) in Paris, France.
c) The institution acts as an entity with a comprehensive responsibility for urban transport. It oversees and directs the public transport system and also has a responsibility toward planning, construction, maintenance, and management of the physical infrastructure, like roads, sidewalks, and parking. Examples are Transport for London (TfL) in the United Kingdom and the Land Transport Authority (LTA) in Singapore. The Lagos Metropolitan Transport Authority (LAMATA) would also fall in this category, though its responsibilities do not extend to the entire public transport system or to the entire road network. However, it does have a responsibility for strategic planning.

Regarding the subject of empowerment, the report outlines four models of how the agency should be empowered:

a) The agency is set up under a special statute and draws legal authority from it. The statute generally spells out its responsibilities as well as the powers to discharge these responsibilities. Examples are TfL in London, LTA in Singapore, and TransLink in Vancouver, Canada.

b) The agency is set up under a generic law that governs similar entities across the country. The listing of responsibilities and powers would not be specific to that agency alone but to all agencies of a similar nature in the jurisdiction covered under the law. Examples are the Indore City Transport Services Ltd in India and lead agencies in various cities in France, other than Paris, that have been set up under a framework law that empowers the establishment of “Organizing Authorities for Public Transport” in the country.

c) The agency is set up through an executive order and draws its powers from that order (usually not having the force of law, only executive backing). Examples are the Unified Metropolitan Transport Authorities in several cities in India.

d) The agency is set up under an agreement between two or more jurisdictions, and the agreement spells out its responsibilities and powers. An example is the 1992 agreement between the municipalities of Pereira, Dosquebradas, and La Virginia, in Colombia, to establish the Area Metropolitana de Centro Occidente, which functions as the lead agency for transport in the metropolitan area.

Finally, in terms of financing, the World Bank guidebook mentions three broad models. Financing could be a) entirely from the public budget, by way of annual subventions, or b) by way of taxes and fees collected by a public agency but dedicated to the lead agency, or c) taxes and fees allowed to be collected by the lead agency itself and used by it. TfL and LTA get significant funds from the public budget, whereas STIF gets the proceeds of a transport tax collected from employers.

This is not a simple debate. In fact, it will influence the whole governance of the system. HooK, W. & Hughes, c. (2016) explore exemplary practices in the National Support for Urban Transportation. The authors concluded that “metropolitan areas need a planning authority that is legally and politically empowered to develop and coordinate transport infrastructure and policy across modes and cities within a metropolitan area. This requires institutions to be empowered with the political and legal authority to achieve goals. In addition, cities need a well-established, budget-constrained mobility planning process that effectively guides long-term transportation infrastructure development. This requires institutions to have the proper organization,
tools, and processes in place to achieve goals. Finally, countries need to be able to plan and implement high-quality, well-designed transport infrastructure without major project delays. This requires an institution’s staff (or consultants) to have the technical ability to collect, analyze, and use data or to plan, finance, design, and engineer infrastructure to achieve goals. It also requires in-house expertise to structure tenders and monitor performance by contractors”.

-  Land use and transport:

The relation between transport and land use is a well-known issue. In fact, there is widespread recognition that the way people are sprawling in cities heavily influences their travel demand. Compact cities like Honk Kong and Singapore have an optimized transport system where citizens need short trips to move around. In contrast, in cities like Guadalajara, people needs to travel long distances in order to have mobility.

According to the guidebook, there are “three main policy instruments available to channel growth in the desired direction. Standards for floor area ratio can be relaxed to allow more intensive land use, or tightened, leading to more sprawl. Mixed-use planning “or transit-oriented development” can be used to intersperse living and working locations and therefore shorten travel distances. Finally, defining urban-growth boundaries, such as by having wide green or no-development zones just outside the boundary, helps make development more contiguous and compact”.

-  Modes of transport:

Another transport issue is the definition of the modes. As a rule, public transport and non-motorized modes are usually more suitable for cities because they generate less pollution, consume less infrastructure from roads, and are more efficient than personal motor vehicles. However, there is a huge cultural pressure for citizens to purchase cars, especially when contemplating the necessity of making long-distance trips. The main issue, from a public policy perspective, is which mode should be promoted by the government.

In general, “individual preferences often tend to conflict with the public good, leaning toward the convenience of personal motor vehicles (cars or motorbikes), without regard for the disproportionate use of road space, energy consumed, and emissions when compared with public transport”.

-  Personal motor vehicles:

Rapid motorization in urban areas has happened primarily because of the growth in use of personal motor vehicles\textsuperscript{10}. In this sense, public policies should determine how cities ae going the manage the increase of motor vehicle ownership rates. In truth, it is believed that cities are undergoing particularly delicate situations, and, if the use of individual cars continues to be stimulated, the situation could be aggravated.

The guidebook affirms that “Land-rich cities that are often grown in a sprawling manner may have no option but to accommodate personal motor vehicles liberally. If alternative modes of travel are adequate and acceptable, then cities can afford to

\textsuperscript{10} According to Henning et al (2011), China has seen a 224% growth in the number of motor vehicles in the short period between 2003 and 2009. Turkey, India, Mexico and Malaysia have seen growths of 69%, 66%, 47% and 44% during the same period.
restrain personal motor vehicles in some way. Motorized two-wheelers, typically motorbikes, are a special field within the broader category of personal motor vehicles. They are convenient and affordable, but unsafe. They also use more road space and cause more pollution than buses, even if they are, generally, preferable to cars on these factors”.

- Public transport:

The report from the World Bank maintains that public transport remains a very relevant element of any kind of transport system. In fact, in any city around the world, public transport is seen as the backbone of the system. The main public policy issues are:

a) Pricing:

The issue here is to define if the cost of the system will be funded by the fares or if non-users that also benefit from the public system will have access to its subsidies. For the World Bank, “the most commonly chosen option is the one where costs are shared. Typically, several cities aim to cover capital costs through the public budget, whereas the operating costs are met from user fees”. The Transmilenio in Bogota, the metro system in Singapore, and the National Urban Transport Policy in India have all adopted this idea; however, it is not always possible to implement it everywhere. “Very often, fares cannot be fixed at a level that is adequate to cover the operating costs, so the gap needs to be covered from other sources. The most important factors that influence a pricing decision are: a) Affordability: how much the users can afford to pay; and b) Public value: how much value the service has for the larger society as a whole”.

b) Quality vs. cost trade-offs:

This is like a mathematical formula. It is hard to increase quality without the increase of cost. This situation is only possible when the system is very inefficient.

c) Coverage and reach of the public transport system, in terms of both space and time:

It is akin to the trade-off of the previous section. The government should decide the geographical area the system will cover. The focus is only placed in areas where you have higher levels of density. In other words, for long-distance places public transport will operate on lower frequencies compared to the city center.

c) Which technology to choose:

A variety of public transport technologies exist, with varying flexibility, cost, and capacity. In fact, we are always dealing with new technologies like Uber, Lift or even driver-less options. The most common options are the metro rail systems for the dense areas and eventually bus systems for sprawling places. It is also important to mention that the subway is the preferred technology for cities that are sensitive to aesthetics or have old narrow roads as their infrastructure.

d) Capacity considerations:

This is an important element. The challenge is how could you address the short-term problems and combine them to long-term desires. The experience of BRTs demonstrates that cities have options.
e) Industry structure and regulatory rigor:

According to the manual, there are three broad industry structures for public transport:

Unified Public Model: a monolithic public entity owns and operates public transport services in the city. This entity organizes and operates all the modes of public transport. It plans all services; decides the routes, frequencies, and service levels; and also manages the entire associated infrastructure. Most cities in the United States and some in Canada (Toronto being one) have this arrangement.

Closely Supervised Private Model: the planning and coordination functions are separated from the operational functions. Planning functions are generally performed by a public entity responsible for making decisions on the kind of service the consumers need. Operations are carried out by a separate agency (public or private) typically under structured contracts. The planning entity does not have to worry about the day-to-day operational concerns, such as availability of buses and crew, scheduling, and so forth. On the other hand, the operator concentrates only on keeping the operations going and does not have to make decisions on the routes to be served and on the service levels. These are done by the planning entity and given to the operator to carry out. This industry structure reflects competition “for the market.” Examples of this model are found in London, Lyon (France), and Curitiba (Brazil), among other cities.

Loosely Supervised Private Model: there is no centralized or coordinated planning, and there are multiple independent operators. Each of the operators undertakes its own service plans and carries out operations according to its own designs after obtaining a permit from a regulatory authority. There is no integration in their services. Each owns the infrastructure, equipment and support systems that it needs for its own operations. Generally, there are no common facilities or services across operators. This model reflects competition “in the market” and leads to the kind of “penny wars” witnessed in several cities. This is the most common structure in many countries in Africa and Asia.

The report maintains that the “Closely Supervised Private Model seems to have emerged as a good intermediary and is the current global trend. The public agency performs the role of planning and contracts operations from the private sector, which is better placed in undertaking commercial functions”.

The biggest challenge here is how to make the change. In truth, if the current situation is not perceived to be dramatically bad, there is no pressure for changing the model of the industry. At the end, political pressure or willingness on the leaders’ part is the main force to push the reform forward.

According to the study of Mitric, S. (2008) “the desired-practice consists of the private sector delivering services, based on competitively awarded, medium-to-long-term contracts. The public sector retains regulatory functions (deciding on vehicle specifications, routes, service frequencies, fares) and, most often, the ownership of infrastructure (for rapid transit modes). The government is also responsible for system expansion and other long-range planning matters. Whether the reform involves deregulation or formalization, a strong regulatory framework is needed, guaranteed by a competent and politically stable institution”.
- Para transit:

We could define para transit as the set “informal” options of mobility. These modes of transport usually emerge to fill gaps perceived to exist in the formal system. Specific examples include the domush, in Istanbul, or the vans, in Rio de Janeiro. Both systems are legalized now; however, they started because some businessman identified that normal buses and subway lines did not solve the mobility problems of part of the population. The challenge lies in developing appropriate strategies for governmental management of such modes; legal challenges are equally important.

The recommendation from the manual is that “urban transport plans should work toward positioning para-transit as a complement to public transport, not as a competitor. Options for accomplishing this include limiting para-transit vehicles in areas that are congested and already served by public transport; controlling the number of para-transit vehicles licensed to operate in any area; and developing a fare structure that would not create competition with public transit, yet allow for affordable service in places not reached by public transportation”.

- Non-motorized transport (nmt):

Non-motorized modes are one of the most fundamental transport modes and the most sustainable ones. In cities located in developing countries, they are even more relevant, especially for the poor. The challenge is the land use trend. People are often found to be living in remote areas because of land price rates, which renders the use of bikes, for example, non-feasible. Governments should develop solutions for stimulating the use of non-motorized transport.

- Parking:

Parking issues compose an essential component of any urban transport system. In fact, it has become part of the policy for many cities in the world to reduce the population’s usage of personal cars. When you increase the price of parking, people are likely to give more thought to the possibility of using public transport. There are interesting cases of this kind of policy in Singapore.

- Supply vs. Demand management:

There are two ways of matching the supply and demand for transport: you can increase the capacity of the system or reduce the demand to levels that the current capacity can accommodate. The main issues that arise from this theme for governments are: should the government increase capacity, decrease demand or a combination of both?

According to the guidebook, “a key determinant seems to be the level of urbanization. At early stages of urbanization, cities need to build capacity, as the population is expected to grow many times over. Therefore, supply-side measures ensure a basic level of infrastructure capacity. The key demand-side measure at this stage of development will be in spatial planning that emphasizes a compact city and mixed land use. However, as urbanization reaches a higher level of maturity, there will be a case to slow down the supply-side measures and use demand-side measures that seek to more actively reduce the number of motorized trips. It is expected that supply-side measures would, by this stage, have added adequate capacity and demand-side measures should work toward a more optimal use of this capacity”.

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- Alternative fuels:

Depending on their development rates, cities have more or less concern about environmental issues. The discussion of alternative fuels is relevant because public transport is usually the main agent of pollution.

- Financing:

Finance is a key subject in urban transport. Cities need huge investments to increase capacity and quality, and the question is how governments should pay such bills: through public money, private money or a combination of both?

- Role of the private sector:

As I mentioned before, the role of the private sector is an issue. Should the system be provided by private companies or not? This is a discussion that depends on the situation of each city.

- Process of implementation:

Finally, an important element in the development of a transport system is the process of implementation. In truth, any policy, before its formulation, needs the engagement of the main stakeholders in order guarantee a successful implementation. To ensure such buy-in, participatory practices and mechanisms must take place during policy formulation. Among the practices, we could mention the preparation of first drafts and workshops to get suggestions from the public. The information obtained through these and other means would then help structure the upcoming public policies.

ESMAP (2014) used all the elements proposed by the Guidebook of World Bank and summarized the strategy for transport systems as the “Avoid–Shift–Improve” (ASI) approach.

The report elaborates on the aspects of this strategy. “Avoid” actions seek to reduce the need for travel. Travel demand is the average number of trips that people make, multiplied by the average length of each trip. Therefore, travel demand can be reduced by decreasing the average number of trips that people need to make or by shortening the average length per trip, or via a combination of the two. “Shift” actions seek to persuade people to move from personal motor vehicles to public transport or non-motorized modes. Such a shift is desirable because public transport and non-motorized modes occupy less road space, emit less pollutants, and consume less fuel than personal motor vehicles, on a passenger/km basis. Within that panorama, supply-side measures include: the construction of high-density commercial and residential complexes close to mass transit stations; the implementation of common fare cards and fare collection systems; and the improvement of integration between different modes of transport. Demand-side measures, on the other hand, include: increasing the fuel tax so that gasoline becomes more expensive; levying a road user fee or a congestion charge for using personal motor vehicles in certain parts of a city; increasing parking charges for personal motor vehicles; reducing the number of parking spaces available, thus deterring the use of personal vehicles; reducing road capacity by allocating preferential road space to public transport and non-motorized modes; implementing car-free days when people are not allowed to use cars in certain parts of a city; designating some core city areas as “pedestrian zones” so that people are discouraged from using their personal vehicles. Finally, “Improve” actions seek to

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reduce the negative impacts of whatever motor vehicle use is inevitable. There are two types of actions that can be taken: a) management measures and b) technological measures”.

Mitric’s (2008) research summarizes “core strategy features, such as: a) allocation of existing/new street space in line with preference for public transport and non-motorized modes; b) a provision model for public transport based on “for-the-market” rather than “in-the-market” competition, with services operated by the private sector under strong public regulation; c) a financially viable public transport system, with fares commensurate with costs and any necessary subsidies affordable to the government and targeted as much as possible to those in need; d) parking charges as a proxy for user charges for urban roads; e) support for institutions ranging from municipal traffic management departments to multi-modal transport authorities, with urban area-wide jurisdiction; and f) a complementary array of cost-effective, environment-friendly investments in roads and public transport infrastructure and equipment”. 
2.2 - Literature on the Governance of Bus reforms

Using the concepts of the previous section as the base of the thesis, we need to move on to the specifics of the literature on bus reforms. In 2007, the World Bank developed a toolkit for bus reforms\textsuperscript{11}. In their words, the toolkit is “designed to help government officials and policy makers evaluate existing and alternative urban bus systems in developing and transitional countries. It offers practical advice to enact fundamental system reforms”. I will use the toolkit as my main reference.

According to the toolkit, there are four phases in the implementation of a bus reform: i) making a diagnosis and evaluating the bus systems; ii) defining the transport objectives of the city; iii) choosing the reform that best fit their objectives among the different possibilities; iv) make the implementation and the transitions to the new system.

i) Make a diagnosis and evaluate the bus systems:

To evaluate the bus system, the toolkit suggests three steps. Firstly, the city should review the most common problems affecting bus systems. Secondly, an evaluation with specific KPIs should be done. Finally, the factors that influence the bus systems’ efficiency should be analyzed.

According to the toolkit, there are common problems faced by bus systems around the world: Among them:

- **Too few buses or inadequate service capacity.** On main urban routes, waiting times of more than 10 to 15 minutes during the normal working day may be seen as excessive. Overcrowding occurs when every bus operating in the direction of peak traffic flow carries more than its permitted maximum load.

- **Unreliable service.** There are two main aspects of reliability: firstly, whether a service operates at all, and if it does, whether it operates on schedule. Second is the reliability of the vehicles themselves: frequent mechanical failure will detract considerably from service reliability.

- **Irregular frequency.** Irregular and unpredictable service frequencies make a bus service less convenient and may sometimes be a serious problem. Where services are operated according to the determined schedule, a divergence of no more than three minutes from the scheduled time for at least 90% of journeys is normally acceptable on urban services.

- **Poor route coverage.** A problem in many cities, particularly rapidly growing ones, is that bus services in some areas of the city are poor or even non-existent. Route coverage may be measured in terms of the percentage of urban area within 500 meters of a bus stop.

- **Excessive transfer requirements between routes.** Some bus systems are designed on the “hub-and-spoke” principle, which intentionally requires a high proportion of passengers to interchange at one or more focal points. As long as services provide convenient connections, with good interchange facilities and through-ticketing, hub-and-spoke systems have a number of advantages,

\textsuperscript{11} \url{http://ppp.worldbank.org/public-private-partnership/sector/transportation/toolkits}
particularly from an operational perspective. From the passenger’s viewpoint, the route network is much simpler and regular, and high-frequency services are usually available.

- **Excessive fares.** Paying for public transport often accounts for a significant proportion of household spending for those on low incomes, and the level of fares is often a sensitive political issue. Where a large number of passengers have difficulty affording bus fares, the fares may be regarded as excessive.

In many cases, the fares are not excessive in the sense that they are at the minimum level necessary to cover the full cost of providing an efficiently operated bus service. If passengers cannot afford the fares in such a situation, the basic choice is between reducing service standards to an affordable level and providing a subsidy. Restricting fares to an affordable level, without subsidy and without reducing standards, will make the service unsustainable.

- **Low profitability.** Low profitability may be considered to be the operators’ problem, and of no concern to the authorities. However, an unprofitable operation is unsustainable, and if the alternative is an inferior service, then the matter is one of general concern. Profitability may be measured by the cost recovery ratio, which is the ratio of revenue over costs. An acceptable ratio will normally lie within the range 1:10 – 1:15.

- **Excessive subsidy requirement.** One of the most common reasons for cities to reform their bus systems is an excessive subsidy requirement that is projected to rise and become unsustainable in future years. High subsidies result from total revenue being substantially lower than total operating costs. This may be due to a number of reasons. To meet perceived social needs, fares may be controlled at too low a level, and although buses may be busy, the revenue may be insufficient to match the costs. On the other hand, fares may be set too high to be affordable for many people. As a result, low levels of ridership result in low revenues. Poor revenue integrity is another possible cause, so encouraging operators to implement measures to improve revenue control may reduce the subsidy requirement.

It is important to mention the observation of Mitric, S., 2008. He believes that price subsidies and even cross-subsidies in public transport services of large urban systems are a valid instrument of social and transport policy. In fact, the author defended that subsides could be good if the objectives are clearly defined and the subsidy is correctly targeted, has financial feasibility, and is properly deliverable.

- **Poor quality vehicles.** A common complaint is that the quality of buses used to provide the service is poor. There are two aspects of vehicle quality: the specification of the vehicle and the standard to which it is maintained. Vehicle specification may be very basic, providing the minimum acceptable level of passenger comfort and convenience. Or, it may include features such as air conditioning, reclining seats, or provision for easy access by disabled passengers, including those in wheelchairs.

- **Poor safety performance.** An estimated 75% to 85% of fatalities in road accidents worldwide occur in developing countries, despite low levels of car
ownership. A significant proportion of road accidents involve public transport vehicles. The number of kilometers per accident is a measure of safety. Accidents are mainly caused by poor driving and, to a lesser extent, poor vehicle condition due to poor maintenance. Road conditions are not normally a major cause by themselves, although failure of drivers to regulate their speed in accordance with road conditions is a common cause of accidents.

- **Traffic congestion caused by buses.** This is often the case where services are unregulated and provided by a large number of small operators, particularly when small vehicles are used. Compared to private transport, buses require less road space per passenger, and should therefore cause less congestion. However, excessive dwell times, poor driving, inappropriate vehicle size or type, and an excess of vehicles often result in increased congestion. Where many small vehicles are used, instead of fewer larger buses, more road space is required per passenger, and this can also contribute to congestion. If there are too many vehicles in the system, this often creates congestion near terminals, and buses may have to queue in the surrounding streets.

- **Pollution caused by buses.** The principal reasons for pollution caused by buses are poor vehicle maintenance, inadequate enforcement of rules and regulations, and inappropriate vehicle type and size. Poorly maintained buses use more fuel and emit excessive exhaust. This is a common problem where maintenance standards, and exhaust emission standards, are not set and enforced. It is aggravated in places where the number of vehicles in the system is excessive, or where many small vehicles are used instead of fewer large buses.

- **Mistreatment of passengers.** Poor treatment of passengers by bus crews is a common complaint. For example, passengers may be: a) forced to board vehicles that are already overloaded; b) overcharged or c) ejected from the bus before their destination (so that the bus can turn around and carry a more profitable load in the opposite direction) Such treatment is particularly common where bus crews have an incentive to maximize the fares collected, and where rules and regulations are inadequately enforced.

- **Violence between operators.** Typical examples are drivers racing one another to arrive first at bus stops to pick up waiting passengers, as well as deliberately obstructing other buses to prevent them from overtaking. Such tactics endanger other road users and bus passengers. This behavior is one consequence of competition in the market. Where it is in the drivers’ interests to maximize their passenger loads, they will tend to disregard safety and other regulations, particularly where enforcement of rules and regulations is weak.

Once you understand the problems, it is important to use benchmarks and indicators. Facts and data are essential. The toolkit presents a list of KPIs as following:

**Table 1: List of KPIs**

<table>
<thead>
<tr>
<th>Role and importance of buses</th>
<th>Total population in service area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total daily trips (excluding walk trips).</td>
</tr>
</tbody>
</table>
| Total daily trips by public transport.  
Percentage of modal share to public transport  
Average daily ridership  
Average bus boardings per bus trip  
Average daily trips by bus  
Percentage of modal share to buses |
|---|
| **Network description**  
Percentage of urban area within 500 m of bus stops |
| **Fleet description**  
Fleet size: buses  
Number of buses per 1000 people  
Average bus capacity  
Total fleet capacity  
Percentage of seated capacity  
Percentage of air conditioned buses (if appropriate)  
Average vehicle age |
| **Output performance measures**  
Average availability percentage  
Average vehicle utilization rate (percentage of available buses actually used)  
Percentage of peak-only buses  
Average daily km per bus  
Average total daily place-km (place = seated + standing capacity)  
Percentage of lost kilometers  
Breakdown in service per kilometer  
Number of accidents per kilometer |
| **Passenger loading and adequacy of capacity**  
Passengers per vehicle per day  
Average peak hour occupancy ratio at maximum load point  
Average distance travelled per boarding (km)  
Daily passenger km |
| Staff productivity indicators | Total staff per licensed vehicle |
|                              | Drivers per licensed vehicle   |
|                              | Conductors per licensed vehicle|
|                              | Other traffic staff per licensed vehicle |
|                              | Maintenance staff per licensed vehicle |
|                              | Administrative and management staff per licensed vehicle |
| Kilometers per employee per day | Kilometers per driver per day |
| Measuring affordability      | Average fare paid per boarding |
|                              | Average monthly wage           |
|                              | Percent of monthly wage for 50 average boardings |
| Financial performance        | Cost recovery ratio            |


In a benchmark study for public transport, Henning, T., Essakali, M. & OHA, J. (2011) proposed thirteen core indicators that measure the performance of the system in five different categories: uptake of public transport, travel efficiency, accessibility, affordability and quality of the travel experience. According to the authors, the proposed indicators “must satisfy five key principles of performance measurement: 1) specific, covering concisely one aspect of the activity; 2) measureable, constituting objective and quantifiable measures and avoiding subjective measures such as rating or ranking scale; 3) achievable, using data that are commonly obtainable under normal circumstances and not too sophisticated requiring cutting-edge technology for collection; 4) relevant, relevant to the objectives and activities that are being considered; and 5) time-bound, with obtained data within similar timeframe”.

In order to draw on meaningful findings and policy implications from benchmarking, one needs to contextualize physical and socio-economic characteristics of a city, to which travel patterns and use of public transport are attributed, and peer it with right benchmarks. Hence, this study also sets out contextual indicators that would characterize a city’s demography, infrastructure endowment, and economic development.

Finally, to conclude the evaluation of your bus system it is essential to analyze the factors that influence the whole industry.

The first element of the toolkit is the regulatory framework. The main goals of public transport regulation are to ensure that services are operated in line with government
policy; to satisfy the demand for public transport as much as possible; and to maintain standards of quality and safety and control fares at affordable levels (sometimes).

Regulation may also be considered necessary to prevent operators from abusing of a monopoly-based position, or, in a competitive situation, to control undesirable or potentially dangerous aspects of competition between operators. The extent of regulation varies considerably. At its most basic, it covers the licensing of vehicles only, usually with certain provisions designed to promote safety. At the other extreme, it may cover almost every aspect of the transport operation, including: licensing of vehicles, operators, drivers and conductors, construction and use of vehicles, supply of services, fares, safety standards, conduct of drivers, conductors and passengers, administration of route franchising or tendering, allocation of subsidies.

Weak regulation may result in inadequate service capacity, if available resources are inefficiently utilized due to a regulatory regime that permits inefficient operating practices. It may result in the use of inappropriate or low-quality vehicles, or poor safety performances, if construction and use regulations are poorly framed, or poorly enforced. Inappropriate vehicle types, or inefficient operating practices, may in turn result in buses contributing unnecessarily to traffic congestion.

Another aspect of regulation is fare control. Public transport fares are regulated in most developing countries, and enforcement is often more stringent than for any other regulation. The regulations may specify actual fares to be charged; a maximum permitted charge, or a charge for a basic service that operators are permitted to exceed at their own discretion for premium services. Different fare levels may be authorized to reflect different service standards.

An appropriate fares policy is essential to sustain affordable services that meet demand, while providing the operator with an adequate return on investment. There may be a need for a degree of control to ensure that riders know in advance how much they will have to pay, to avoid the confusion which might arise if several operators were to charge different fares for the same journey. This can be solved through a requirement for operators to notify the authority of their fare scales, and to observe a specified notice period before any changes are made.

Finally, the enforcement of rules and regulations is important. A regulatory system must be enforceable. This requires regulations that are appropriate under specific circumstances. Effective administrative and enforcement procedures are also key. Poor enforcement is usually due to a lack of resources, unsatisfactory systems, or general inefficiency or inability on the part of the staff. Different enforcement agencies have different roles. Responsibility for enforcement of transport regulations may lie with a number of bodies, including: police, transport regulatory authority, central and local government departments (such as the licensing authority), road transport department, environment department, operators’ associations, passengers (to some extent).

An interesting research from Hook, W., 2005 observes that a relevant number of cities have been using the BRT lines to improve the regulation mechanisms of their systems. In addition, they use the BRT to facilitate a smooth transition to a sometimes more

12 Kaan Yildizgoz. Head of UITP Training gave a useful presentation in IGLUS module of Istanbul. Financing and Funding of Public Transport. 2014
efficient ‘trunk and feeder’ or ‘hub and spoke’ bus routing system and to increase private sector investment into the transit system.

According to the author, ultimately, “in any system there will be a tension between public interests and private interests”. In fact, the government’s possibility of carrying out sound negotiations for its citizens requires it “to have access to very complete system information, a skilled staff, and sound advice. The more information the public sector has before the contracting begins, the better chance that the contracting will support the public interest.”

In addition, the study mentions interesting cases of bus reforms around the world focusing on the regulation aspects. One example is the BRT of Curitiba and their approach. “As more trunk lines were added, a system of free transfers between different trunk lines operated by different companies was also introduced in 1979. Because there were inevitably some lines that benefited more than others as a result of the free transfers, the bus companies and the Municipality agreed in 1979 to set up a compensation fund to compensate the losers. URBS, which had been created already in the early 1960s, was given authority to manage this compensation fund. Until 1987, the private operators still collected the money from their passengers directly. Then, in 1987, URBS took over direct collection of the fares. It was only at this point that contracts with the operating companies were renegotiated with the private operating companies and URBS established the payment per bus kilometer system, monitored by URBS by simply looking at the odometers. Shifting to direct collection of the bus fare by URBS was a way of allowing the public sector to know the exact level of revenues and ridership. Because the private operators in Curitiba function as de facto monopolies over large parts of the system, with long-term lease rights to operate these lines, negotiations over the fare have been controversial. Unlike in Bogota, Curitiba never had any detailed traffic modeling information to give them a way to predict passenger demand on different routes. This work is only now being done. As a result, they had to take the word of the private bus operators about their operating costs and operating revenues. Many experts feel this compromised the ability of URBS to negotiate a fair deal for the public. While municipal control over fare collection solved the problem about the actual revenue, it still did not solve the debates over the companies’ operating costs. Transit fares in Curitiba are now at $0.55 per trip, compared to TransMilenio’s $0.40 and Quito’s $0.25. Operators claim with some justification that the high fare is because Curitiba requires the operating companies to operate biarticulated Euro-III compliant buses, which cost about $250,000”.

Another interesting case that is pointed out by the study is the Bogota’s TransMilenio and its Private Contracting While Maintaining Customer Service. The contracting in Bogota’s BRT is known as a benchmark example “of balancing the desire for private investment and good management while maintaining good quality customer service. The bus system in Bogota at the time TransMilenio was introduced was composed of thousands of individual owner operators and a few powerful families of bus ‘enterprises’ that controlled the government-issued route licenses and rented them to private bus owners. When TransMilenio began, therefore, the process of transforming the bus ‘enterprises’ and individual bus owners into modern bus corporations was done at the same time as the introduction of the BRT system. TransMilenio regained public control over a dysfunctional, weakly regulated private system”.

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Finally, Hook, W., 2005 asserted that, in many countries, BRT was a useful mechanism for introducing quality controls into licensing agreements. In fact, “by introducing competition between private operators, TransMilenio was able not only to demand that the private operators invest in the system, but also insisted on meeting other social goals as part of the points system for winning the operating contract. Furthermore, because firms compete for service within the same corridor, TransMilenio retained the power to penalize companies for poor quality service without disrupting service in a particular corridor by simply awarding more of the scheduled bus trips to rival companies”.

Estache, A. & Gómez-Lobo, A.. (2004) wrote another report which emphasized the importance of governance. The authors gave a historical perspective of the theme and concluded that the “strong liberalization of the sector during the 90s showed the limits of the approach in terms of safety, prices and accountability”.

In their study about the results of Seoul’s bus reform, the authors recommended “combining restrictions with competition for the market and combining entry restriction with yardstick competition to increase competition”. According to the authors, tendering bus routes could be a powerful regulatory instrument to solve the information issues among the players, thereby increasing competition in the industry.13

Regulation is one of the main factors that influence the whole industry. However, the toolkit elaborates some other elements that are summarized in the following table:

**Table 2: Summary of the factors that impact the bus industry**

<table>
<thead>
<tr>
<th>Issues</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route planning</td>
<td>An optimized system could increase the service level and also the sustainability of the system. Some cities suffered from a bad routing planning that stimulated bad competition.</td>
</tr>
<tr>
<td>Interchange facilities</td>
<td>It is essential to have good facilities in order to integrate the system. A hub-and-spoke system requires integration. Furthermore, users demand quality in the interchanges.</td>
</tr>
<tr>
<td>Through-ticketing</td>
<td>Multiple-journey tickets enable passengers to transfer from one route to another paying just one ticket. This solution influences the route optimization of the system.</td>
</tr>
<tr>
<td>Operating structures and company size</td>
<td>Small players with small structures do not usually have enough money to guarantee the desired level of service. Bus industries require substantial amounts of CAPEX and OPEX.</td>
</tr>
<tr>
<td>Vehicle size, type and maintenance</td>
<td>In general, cities use big vehicles with good maintenance records in the main truck lines. Small vehicle tend to be more frequently used in routes where the demand is lower.</td>
</tr>
</tbody>
</table>

13 The Transmilenio reform is a benchmark. Operators are now paid according to the number of kilometers traveled and the quality of service. This facilitated a radical change in drivers’ incentives; they are now under contract, working regular shifts and are not paid a bonus for each passenger transported. The separation of the operation of buses and the collection of revenues was made possible by the introduction of the pre-paid ticketing system operated by the special revenue collection company. This eliminated the ‘war of the cents’ overnight, radically improving traffic safety and quality of service. The electronic prepaid card system allows for tariff integration throughout the network.
Excessive operating costs and Operating practices - Excessive operating costs produce high fares and are usually not sustainable. These costs could come from bad operating practices. In fact, efficient players are a key part of the bus system.

Bus utilization - More utilization could mean higher levels of system profitability and better services. However, there are some cases where utilization is not the main objective.

Revenue integrity - This is the main issue in the financial model of the system. If you do not have revenue integrity all the regulation procedures could be absent.

Competition in the market - In general, systems with more competition have better players and therefore better productivity indexes. The government should try to stimulate competition as much as they can.

Competition from the informal sector\(^\text{14}\) - This is an example of unfair competition. However, this is part of the game of many cities, and must be taken into consideration when analyzing a bus system.


**ii) Define your transport objectives of your city:**

After having performed a thorough analysis of the system, the second step is identifying the objectives of the reform. The objectives could be financial, in case the system is suffering from solvency problems; operational; or service-related, as when citizens constantly express their dissatisfaction at the current conditions. Such problems tend to emerge in industries where bus services are being provided by a large number of private sector operators with no coordination, where there is absence of competition, or an inefficient state owned-operator. The need for a reform might also be triggered by a social motivation, e.g., to improve affordability, accessibility, or to implement more ecologically-minded services.

**iii) Choose a reform that best fits objectives among the different possibilities**

The World Bank toolkit proposes eight types of reform options. I will summarize them in the following table.

**Table 3: Types of bus reform**

<table>
<thead>
<tr>
<th>Type of reform</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unregulated entry with quality control</td>
<td>Free entry to the public transport market, subject only to a requirement that the vehicles used meet a specified set of standards.</td>
</tr>
<tr>
<td>Unregulated entry without quality</td>
<td>Free entry to the public transport market, without any requirement that the vehicles used meet any standards other</td>
</tr>
</tbody>
</table>

\(^{14}\) Robert Cervero, Aaron Golub (2007) mention that informal transport services—paratransit-type services provided without official sanction—can often be difficult to rationalize from a public policy perspective. While these systems provide benefits including on-demand mobility for the transit-dependent, jobs for lowskilled workers, and service coverage in areas devoid of formal transit supply, they also have costs, such as increased traffic congestion, air and noise pollution, and traffic accidents.
<table>
<thead>
<tr>
<th>Control</th>
<th>than normal vehicle type approval.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area contract: gross cost</strong></td>
<td>When an authority issues a contract to a bus operator giving him the exclusive right to operate bus services in an area that forms all or a substantial part of a city.</td>
</tr>
<tr>
<td><strong>Area contract: net cost</strong></td>
<td>When an authority issues a contract to a bus operator giving him the exclusive right to operate bus services in an area that forms all or a substantial part of a city. Revenues go to private operators.</td>
</tr>
<tr>
<td><strong>Route contract: gross cost</strong></td>
<td>When an authority issues a contract for the operation of one specified route or a specified group of routes. Revenues go to the government.</td>
</tr>
<tr>
<td><strong>Route contract: net cost</strong></td>
<td>When an authority issues a contract for the operation of one specified route or a specified group of routes. Revenues go to private operators.</td>
</tr>
<tr>
<td><strong>Monopoly</strong></td>
<td>A private monopoly is, in effect, an area contract awarded to a private sector operator.</td>
</tr>
<tr>
<td><strong>Public monopoly with management contract</strong></td>
<td>If all bus services within a city or urban area are provided by one publicly-owned undertaking, it is a public monopoly.</td>
</tr>
</tbody>
</table>


**iv) Make the implementation and the transitions to the new system:**

Finally, it is important to structure the transition. According to the toolkit, “this transition may involve the breaking up of a large monopoly into several smaller operators. Or it may require many small operators turning operating units of sufficient size to be eligible to bid for route or area contracts. Encouraging smaller operators to form associations can help to achieve this”.

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2.3 - Framework of a Bus Reform

Bus reforms are undoubtedly a multi-dimensional problem. As maintained by Rittel, H. & Webber, M. (1973), issues related to social and policy planning are usually complex, with a sociological dimension, in contrast to issues related to the basic sciences like engineering or math. In fact, the problems of governmental planning are ill-defined and they rely upon elusive political judgment for resolution.

Using all the references mentioned before, I am proposing the following framework to analyze the main aspects of a bus reform:

**Figure 1: Proposed framework of a bus reform analysis**

```
<table>
<thead>
<tr>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rules</td>
</tr>
<tr>
<td>Values</td>
</tr>
<tr>
<td>Background</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry structure</td>
</tr>
<tr>
<td>The law</td>
</tr>
<tr>
<td>Finances</td>
</tr>
<tr>
<td>Regulation and Incentive policies</td>
</tr>
<tr>
<td>Technology</td>
</tr>
<tr>
<td>Organizational Capabilities</td>
</tr>
<tr>
<td>Infrastructure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency</td>
</tr>
<tr>
<td>Sustainability</td>
</tr>
<tr>
<td>Resilience</td>
</tr>
</tbody>
</table>
```

Source: Author’s analysis

**Part 1: The context**

This is the first element of the framework. Using an institutionalist approach (Pierre, J. 1999), I want to identify the rules, the history and the values of the context where the bus reform has been made. I want to understand the background of the reform.

**Part 2: The actors**

The second step is to visualize the main actors involved in the system. It is important to identify the role of the government, of operators, the civil society, citizens and any other relevant actor. In addition, we should analyze the relations between them and their decision-making mechanisms.

In this part, I will try to analyze the cases answering specific questions among central elements, like:

**Industry Structure:** how many players do you have as operator? Is this a monopoly or not? Who are the market forces?

**The law:** what are the legal instruments that manage the relations between operators and the government? How were they structured? Do you have tenders?
**Finances:** how do you finance your system? How do you finance CAPEX and OPEX? What is the business model? How do you pay the operators? How do you set and control the fares? How do you collect the fares? How do you guarantee the integrity of revenues?

**Regulation and incentive policies:** how do you regulate the relations? Who regulates the relations and how do you finance the agency? Are there any incentive policies? How do you implement then? How do you enforce the rules?

**Technology:** how do you use technology to increase the efficiency of the system and the comfort of its users? What are the main softwares to improve management capabilities? How do you use technology to improve fare collection?

**Organization Capabilities:** what are the main capabilities of the government? Route design, planning and monitoring? What are the main capabilities of the operators? Operating costs, operating practices, vehicle maintenance, bus utilization? How do they guarantee efficient systems?

**Infrastructure:** what is the central infrastructure developed for the bus reform? How is it financed? Are there interchanges in the system? How many? What are the type and the size of vehicles?

**Part 3 - Results**

The final element concerns the results. In fact, we need to identify exactly what the outcome of the bus reform is, and how it impacts the life of citizens. I will split the results in three dimensions and suggests some KPIs:

**Efficiency.** How efficient is the system? I will measure:

- Importance of buses: percentage of modal share, total daily trips;
- Travel efficiency (reliability coverage): speed of trip, travel time, kilometers of network, average vehicle utilization rate;
- Accessibility: percent of urban area within 500 m of bus stops, total fleet capacity, frequency of bus routes;
- Affordability: cost of travel, average monthly wage;
- Travel experience (comfort): passenger per vehicle per day, average peak hour occupancy ratio, average transfers per trip, personal security, comfort.

**Sustainability.** How sustainable is the system? I will measure:

- Financial aspects. Cost recovery ratio;
- Profitability of the system;
- Amount of subsidies.

**Resilience:** How resilient is the system? I will measure:

- Average vehicle age;
- Fuel consumption and pollution caused by buses;
- Traffic congestion.

Finally, it is important to reinforce that the proposed KPIs are just recommendations. The main issue is to identify good indicators to cover the three dimension of the study.

To sum up, the objective of this chapter was to develop the literature review of the subject discussed in the current thesis. The first section explores the bibliography about governance and management of transport systems in cities. Using a World Bank guidebook as a base, we could explore the role elements that should be considered in a transport system in a broad view. On the second section, I made a deep dive in the bus reform literature. Again, I used a toolkit from World Bank as a streamline and got some interesting papers about benchmarks around the world. Finally, I tried to break down both chapters in to a framework of bus reform. The objective is to apply this framework in the case studies of the thesis and at the end refine the framework and recommends it as a reference.
3 - Methodology

This chapter has the objective of describing the methodology used in my investigation. I will present the motivations behind the selection of the type of research, and discuss how I am going to generate the data. The proposed cases and the limitations of the study will also be discussed.

3.1 - Type of Research

There are three types of social research: exploratory, descriptive and explanatory. The first one has the objective of clarifying concepts and ideas in order to formulate hypotheses for future studies. On the other hand, descriptive research aims at describing characteristics of a population, phenomenon, or the relations between variables. Finally, explanatory research proposes to identify a factor which foments a certain phenomenon (Gil, 1989).

I classify my research as exploratory because I wish to add a practical perspective to the discussions on bus reforms; and also descriptive, because I will clarify the characteristics and relations between the actors of the bus governance model.

After defining such types of social research, Gil (1989) addresses the importance of the strategy used for data-generation purposes. Data collection processes could be aggregated in two groups: the first one would include the use of documents, papers, books, etc; and the second group would use data collected from people. According to the author, exploratory research usually resorts to case studies. Yin (2003) is another author who suggests that case studies are the best strategy to collect data when questions like “how” and “why” are emphasized, when the researcher has a limited control of the events, and when the focus is on a contemporary phenomenon in a real context.

For the purposes of the present thesis, I have selected bibliographical research and case studies as strategies for data generation. I am going to use empirical data from the phenomenon that I want to understand and also published materials such as books, papers, newspapers and magazines.

3.2 - Selection of the Case Studies

According to Vergara (1997), there are two main sample-classification categories: a) statistical samples, which use statistical procedures like random sampling to define the groups and b) non-statistical samples, where the selection of the groups uses other criteria – data availability, for instance.

The present study selected the cases according to three main requirements: the feasibility of getting the data, the representativeness of the cases (both of them are considered success cases), and the availability of the interviewees to participate in the research. According to these criteria, two cases were selected:

Rio de Janeiro: Rio is a city of 6.5 MM inhabitants with a large number of challenges in terms of inefficiency and inequality of public services. Since 2010, with a massive calendar of events15, the municipal authority is leading a huge bus reform in the

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transport system. Despite its young age, this new policy has yielded interesting results for cariocas\textsuperscript{16}. As a public servant of the municipal government, I have had the chance of experiencing the transformation and also having access to the main actors of the bus reform.

**Seoul:** Seoul is a megacity in which more than 10 MM people live. It is the heart of a nation which 30 years ago forsook the label of under-developing country to become one of the leading nations of the world. In 2004, the city of Seoul implemented a complete bus reform. Two years later this reform had been considered a success case for specialists, thereby guaranteeing the presidency of Korea to the mayor of Seoul\textsuperscript{17}. Last year I had one of the IGLUS Modules in Seoul, which enabled me to talk with important actors in this process. In addition, the case of Seoul is very well documented in journals, books and websites.

In fact, recognizing the importance of disseminating knowledge, the Korean Ministry of Strategy and Finance (MOSF) and the Korea Development Institute (KDI) launched the Knowledge Sharing Program (KSP) in 2004 to share Korea’s development experience and to assist its developing country partners.

### 3.3 - COLLECTION AND ANALYSIS OF THE DATA

According to Yin (2003), data generation in case studies is mostly accomplished through interviews. Moreover, there are some principles which should be adopted, such as the existence of multiple sources of evidence; the adoption of the case study as the core analysis; and the analysis of the chain of evidence. Vergara (1997) sustains that interviews could be informal or oriented. The informal interview is more open-ended, whereas, in the oriented interview, the researcher could provide the interviewee with the main points of discussion beforehand, thereby allowing for deeper investigations.

In the current study, the interviews were based on semi-structured questionnaires (see Appendix 1). The conversations took place between February and April of 2016. All the interviews were recorded and transcribed. The description of the case was sent to the interviewees to guarantee the validity of the text. I interviewed the following contacts:

**Rio de Janeiro:**

Andre Marques: the mayor’s advisor for the urban transport reform. Andre was the mayor’s right-hand man during the discussions on the bus reform in Rio.

Alexandre Sansão: head of the transport department. Sansão is a public servant with more than 20 years of experience, who was in charge of leading the bus reform in Rio.

Clarisse Linke: head of ITDP in Rio. Clarisse is a transport specialist and lead the main NGO on public transport issues in Rio.

\textsuperscript{16} Carioca is the nickname of people who live in Rio de Janeiro.

\textsuperscript{17} Lee Myung-bak is a South Korean politician and businessman who served as the 10th President of South Korea from 25 February 2008 to 25 February 2013. Before his election as president, he was the CEO of Hyundai Engineering and Construction, as well as the mayor of Seoul from 1 July 2002 to 30 June 2006.
Seoul:

The main source of information was secondary data. Since 2004 a huge amount of studies have reported on the Seoul bus reform.

The analysis of the data will confront the elements of the interviews with the bibliography collected. Firstly, I will describe the cases using the data collected. Secondly, I will compare both cases with the framework proposed in the literature review. Finally, I will challenge the framework by resorting to the empirical analysis.

3.4 - CONSTRAINTS OF THE STUDY

The constraints of the current study are directly related to the adopted method. Case studies should not produce all-encompassing generalizations. According to Gil (1989), among the limitations of case studies are:

- The absence of motivation, on the respondent’s part, to answer the questions;
- The inadequate comprehension of the meaning of the questions;
- False answers;
- The personal influence of the interviewer upon the respondent;
- The influence of the personal opinions of the interviewer upon the respondent’s answers.

To sum up, this chapter has the objective of describing the methodology used in my investigation. Firstly, I presented the reasons why I choose the “case study” as the main type of research of the current thesis. Secondly, I elaborated on the motivations behind the selection of Rio de Janeiro and Seoul bus reform, two world benchmarks that has a lot to teach. Thirdly, I discussed about the collection and the analysis of the data and how I pretend to challenge the literature review with the real cases. I ended the chapter with the constraints of the study and the possible limitations of the conclusions.
4 – Description of the Cases

The present chapter has the objective of describing the cases of Rio de Janeiro’s and Seoul’s bus reforms. Firstly, I will present the case of Rio; secondly, the case of Seoul. Both descriptions will be organized in four sections: context, main actors, interactions/relations between the stakeholders, and results.

4.1 - Bus reform in Rio de Janeiro

Using the framework as a reference, I will start the description of the case of Rio de Janeiro with the background and the context where the bus reform takes place. As I mention before, this is essential to understand the rules that support the governance model. Secondly, I will describe the main actors. The third part is the report of each elements of the framework. The purpose is to identify the relations between the actors. Finally, I will explore the results of the bus reform. In the case of Rio, the city is under the reform and we still don´t have the role picture. However, the data offers a tolerable proxy.

4.1.1 Background/Context

Rio de Janeiro is a city of 6.5 million inhabitants sprawling in an area of 1200 km². The city is located inside a metropolitan region of 12 million people and more than 20 municipalities. According to a famous Brazilian song, Rio is “the marvelous city”, wherein beauty and chaos are jumbled up together. In other words, the city is said to combine a unique natural beauty with a complex system of relations that sometimes look chaotic.

Rio is the cultural capital of Brazil, which, in turn, is a continental nation of 200 million citizens. The history of the city could account for the history of the whole country. Rio was founded during the 1500s just a few years after Brazil had been discovered. Rio became the Capital of the colony during the 1700s. In 1808, after Napoleon’s invasion of Portugal, the royal family moved to Rio de Janeiro and the city become the capital of the Empire.

This was an important time for Brazil. Besides the state of prominence achieved by the country, many institutions were built. Among the changes, it is relevant to address the birth of public transport. In fact, the king of Portugal set up horse cars as the first modal of public transport in Rio.

Some years later, Rio became the capital of the republic of Brazil. The year of 1889 was special for the country and induced many changes in society. Regarding the public transport, horse cars were replaced by trams. In fact, electric trams were the main modal of transport at that time. During the 60s, the capital of Brazil moved to Brasilia. Juscelino Kubitscheck, the then president of Brazil, was responsible for the switch in the national transport policy from a rail-oriented approach to a car/road perspective. Around that time, buses became the main modal in Rio. In 1941, RioOnibus, the Union of Private operators, was founded; and, in 1962, a municipal law defined buses as the only public transport in Rio.

The infrastructure of the transport system in 2008 was as follows: 270 km of train rails, 36,8 km of subway lines, 48,8 km of ferryboat routes, and 8,819 buses operating in 541
routes. A recent study by the Municipal Transport Authority explains the daily trips of cariocas\textsuperscript{18}.

**Table 4: Daily trip profile of Rio de Janeiro**

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of trips</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td>3.431.664</td>
<td>27%</td>
</tr>
<tr>
<td>Bike</td>
<td>128.230</td>
<td>1%</td>
</tr>
<tr>
<td>Metro</td>
<td>503.214</td>
<td>4%</td>
</tr>
<tr>
<td>Rail</td>
<td>270.835</td>
<td>2%</td>
</tr>
<tr>
<td>Ferry Boat</td>
<td>5.508</td>
<td>0%</td>
</tr>
<tr>
<td>Bus</td>
<td>4.672.765</td>
<td>37%</td>
</tr>
<tr>
<td>Van</td>
<td>509.413</td>
<td>4%</td>
</tr>
<tr>
<td>Car</td>
<td>2.864.320</td>
<td>23%</td>
</tr>
<tr>
<td>Motorcycle</td>
<td>84.982</td>
<td>1%</td>
</tr>
<tr>
<td>Others</td>
<td>124.923</td>
<td>1%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12.595.855</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: SMTR / PMUS (Mobility Plan of the City of Rio de Janeiro for the next 10 years).

According to the data, buses do 37\% of the daily trips. Walking trips represent 27\%, and cars 23\%. Commuting trips stand for 33\% of daily trips. Finally, most trips (35\%) made by cariocas are by reasons such as health, leisure or shopping.

In spite of the relevance of buses for Rio’s transport system, the perception is that the service offered by companies is terrible. Lack of frequency and punctuality, overcapacity, low quality of buses, low comfort levels are just a few examples of the characteristics of the transport system. According to the complaint report of the municipal department, 80\% of the claims are about the bad behavior of the bus driver. Looking at the financial numbers, the IPK (passenger per km) of the fleet is very low and 40\% of the routes are not profitable. The most noticeable movement against the current situation of the transport system took place in 2013, when millions of people took the streets in order to complain about the price and the quality of public transport in cities around Brazil.

Combined with the poor level of bus service, Rio, like most cities around the world, is grappling with a collapse in infrastructure. An increasing number of people want to buy cars and, at the same time, politicians prioritize roads, bridges and economic incentives for the automobile industry. To give a specific example from Rio de Janeiro, the automobile fleet increased 62\% between 2001 and 2011\textsuperscript{19}. Nowadays, the metropolis of Rio is the second worst one in Brazil in terms of time spent commuting between home and work (42.8 minutes per inhabitant)\textsuperscript{20}. A study from the IDTP\textsuperscript{21} also observes a significant increase in traffic congestion. In 2003, the average speed for private vehicles in the most important transportation corridors of the city was 27 km/hr. By 2012, the average speed had declined by 35\% to just 20 km/hr.

\textsuperscript{18} Carioca is the “nickname” of people who live in the city of Rio de Janeiro.
\textsuperscript{19} According to DETRAN. State department of Transit of Rio de Janeiro. (www.detran.rio.gov.br)
\textsuperscript{20} IPEA (Institute of Applied Economic Research) study from 2013.
\textsuperscript{21} ITDP – Institute of transportation and Development Policy 2013.
Within this worrying context, cariocas have been greeted by a momentous opportunity. Between 2010 and 2016, Rio has been experiencing a unique calendar of events that could help to completely restructure the transport system of the city. With the World Cup in 2014 and especially the Olympic Games in 2016, a huge amount of investments came to the city with a focus on mobility. In fact, more than 50% of the investments of the Olympic legacy will be in transport infrastructure.

The bus reform of Rio emerges in this context. Mayor Paes tried to address the challenges of the public transport using the investments brought about by the world events as an “engine”.

In 2010, the bus reform started with a tender aimed at restructuring Rio’s entire bus system. For the first time in history, the relation between the public and private operators was settled in a contract. Rights and duties were written down. Four consortia of companies were held responsible for the whole system for the next 20 years.

Besides the contract, the city hall of Rio launched a series of investments in the infrastructure of BRTs and BRSs in order to reorganize the system and guarantee a better level of service to its passengers. Additionally, a new ticket system was launched. The “Bilhete Unico Carioca” made integration between modals of transport possible, all while using the same ticket and paying the same price. Finally, the usage of GPS and technology made it possible for the municipal authority to develop a new routing plan and regulate contracts more effectively.

4.1.2 MAIN ACTORS

The figure below shows who the main stakeholders of the reform were, as well as their interactions.

**Figure 2: Main actors of the governance system of Rio de Janeiro bus reform**

Source: Author’s analysis

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**Notes:**

22 www.rio2016.com

23 Mayor Eduardo Paes was elected in 2008 and reelected in 2012. He has been the mayor of Rio between 2009 and 2016.
**Rio de Janeiro City Hall**

The City Hall is in charge of route planning, service evaluation, routes’ self-adjustment, contract regulation, traffic management, and infrastructure construction.

Its main departments are:

- SMTR (Municipal Secretary of Transport): route planning, service evaluation, self-adjustment of routes, and contract regulation.

- CET Rio (Municipal Company of Traffic Management) and Municipal Guards: traffic management.

- SMO (Municipal Secretary of Work): infrastructure construction.

- COR (Operation Center of the City): daily management and crisis-oriented activities.

**Operators**

There are four consortia in charge of operating the routes. They run the buses and operate the system; operators include employees, bus drivers and maintenance personnel.

**RioOnibus**

RioOnibus is the union of private operators. They have a strong political power and historically close connections with politicians and council members.

**Citizens**

The public is another important axis of the reform and the most important stakeholders, because they are the real beneficiaries of the reform, as well as its ultimate consumers.

**Civil Society**

There are some NGOs arguing about public transport systems. I could mention ITDP Brazil and Rio Como Vamos, both of which regularly discuss and fight for enhanced mobility. It is also relevant to mention the wealth of academic studies on the theme.

**RioCard**

RioCard is in charge of the operation and maintenance of Rio’s transport card system. Through the card system, the company collects information and data on revenue settlement by routes, companies and bus types. The company is owned by private operators.

**Others modals of transport**

As I mentioned before, Rio has several modals of transport, all of which are important actors in the governance of the bus reform. Examples include subways, trains, vans, taxis and ferryboats.
National and State government

ANTT is the national agency of transport; it rules the national policy of transport in Brazil. On state level, DETRAN is the state department in charge of vehicle and personal licensing.

4.1.3 Interactions/relations between the stakeholders

Industry Structure: how many players do you have as operators? Is this a monopoly or not? Who are the market forces?

Before the tender of 2010, 46 private companies operated the municipal routes. After that, 4 concession contracts were organized by four consortia – each of them operating in an area of the city.

Table 5: Profile of the bus industry in Rio de Janeiro

<table>
<thead>
<tr>
<th>Consortium</th>
<th>No of Routes</th>
<th>Km of Routes</th>
<th>Operational Fleet</th>
<th>Total fleet</th>
<th>Total Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersul</td>
<td>130</td>
<td>3.623</td>
<td>1.505</td>
<td>1.861</td>
<td>19,8%</td>
</tr>
<tr>
<td>Internorte</td>
<td>292</td>
<td>6.554</td>
<td>2.441</td>
<td>2.684</td>
<td>33,0%</td>
</tr>
<tr>
<td>Transcarioca</td>
<td>147</td>
<td>7.290</td>
<td>1.784</td>
<td>2.110</td>
<td>27,2%</td>
</tr>
<tr>
<td>Santa Cruz</td>
<td>207</td>
<td>5.795</td>
<td>1.598</td>
<td>2.156</td>
<td>20,0%</td>
</tr>
<tr>
<td>Total Geral</td>
<td>776</td>
<td>23.262</td>
<td>7.328</td>
<td>8.811</td>
<td>100,0%</td>
</tr>
</tbody>
</table>

Source: SMTR / PMUS (Mobility Plan of the City of Rio de Janeiro for the next 10 years).

In fact, the 46 previous companies organized themselves in consortia of 10 companies, which makes it easy for the city government to regulate them. The problem was that no formal merging took place; each consortium comprises 10 companies with 10 different administrative departments and 10 different garages, which results in increased inefficiency. Two years ago, because of some companies’ breakdown (7 companies have gone bankrupt so far), the consortia started moving towards a real integration.

According to one interviewer, the bus industry structure of Rio is

“... a classical oligopoly structure. The only reason it’s not a cartel is because the government defines the price. Before the new contract, the federation of bus companies had a lot of political power and influence in the executive, judiciary and legislative powers...” (Interview A, responsible person for transport department).

The law: what are the legal instruments that manage the relations between operators and the government? How were they structured? Do you have tenders?

In Brazil, most bus systems do not have any kind of bidding process. Family-owned businesses are usually in a position of dominance. Rio is not an exception: family owners who got the licenses to operate routes during the 60s continue to manage the system. In fact, there was a municipal law that guaranteed the validity of buses’ permits for the next 40 years.

Despite this context, the city government of Rio spearheaded a pioneering tendering process. The grandchildren of the bus operators noticed that a tender process could be
a win-win situation. At the same time, Rio’s government made it possible for the current companies to compete in the tendering process.

After the bidding, 10% of the previous business operators got out of the market and four consortia were formed to operate the system for the next 20 years. For the first time in history, private operators have to follow contract rules. Among the elements of the contract, it is important to address the following:

*Minimum requisites to be met by consortia:*

- Operating Fleet: At least 80% of the fleet for weekdays, 50% on Saturday and 40% on Sundays and holidays.
- Frequency: maximum interval of 10 minutes between the radial lines in the rush hour and 15 minutes in the diametric lines.
- Percentage of vehicle occupancy: 80% on Sundays and holidays, 85% out of the peak hour and between 90% and 100% in peak hours in truck lines.
- Life expectancy of the vehicles: maximum use of 8 years.
- Type of vehicles: truck lines (>100 pax), feeders (from 30 to 69 pax)
- Accessibility: 100% of the vehicles and terminals with accessibility-oriented equipment.
- Bus drivers: 100% of bus drivers having undergone proper training.
- Bus stops: 100% containing clear information on routes and timetables.

In addition, operators were forced to install GPS in the whole fleet, and to equip it with air conditioning systems. The new ticket systems and the parametric formula for the fare were also settled in the contracts, but I will explore this theme in the section on finances.

Finally, it is worth mentioning the big riots of the first semester of 2013. Citizens from many cities of Brazil went to the streets claiming for better mobility services. In fact, the increase of 20 cents in the bus fares were what triggered the riots. On the one hand, this movement exposed the weaknesses of the bus system reform, but, on the other hand, it empowered and politically supported the city government to enforce the original rules proposed in the 2010 contracts. To give a specific example, after the riots the four consortia were forced to hire one of the Big Four to audit their balances.

*Finances: how do you finance your system? How do you finance CAPEX and OPEX? What is the business model? How do you pay the operators? How do you set and control the fares? How do you collect the fares? How do you guarantee the integrity of revenues?*

In Rio, the bus system does not have any kind of subsidies. The concession contract establishes an economic equilibrium according to which fares finance the whole system. In other words, users pay a fee which covers the operation of the system, the OPEX, the buses and the mark-up of the operators. Every four years, the fares are reviewed in order to preserve the equilibrium of the contract.
It is important to mention that there is an annual inflation-based adjustment of the fare. The concession contract established a formula according to which diesel, maintenance cost, vehicles, employees are adjusted in relation to the inflation index calculated by FGV. This was a huge step for the relationship between the government and the operators. Before the contract, annual adjustments had been made based on the political power of private companies.

Operators will receive revenues depending on how many users they transport. One of the reasons to establish four consortia to operate the system was to force companies to consolidate their revenues in one basket and refund the private companies depending on the kilometers they operate. The municipal government could not obey the private companies but could stimulate this transition. The operation of the BRTs proved that this was the only way to operate the system. In BRTs, users pay the fare in the stations and not on the buses. Furthermore, the only way to refund the operators is through the distances and usage of their buses. This transition is a trend and will enable many improvements in the bus service to take place in the forthcoming years.

Another aspect of the financial model is the fare collection. There is a private company, RioCard, owned by the private operator who manages the bus cards of the city. Nowadays, 72% of the passengers pay for tickets, 19% benefit from gratuity, and 9% resort to integration between modals. Among the passengers that pay ticket, 70% use the Riocard, and 30% money. This is a major issue for the management of the system, insofar as the use of money could induce illegal procedures.

According to the city government, the percentage of Riocard users is increasing year by year, suggesting that money would be unusual in a few years. In fact, according to one of the interviewers:

“private companies have realized that they are losing profits with this money practice. After some evaluations, they noticed bad procedures from the bus drivers when people use money. I believe that, in a year, money will have disappeared from buses” (Interview B, mayor advisor).

Finally, we must address the creation of BUC – Bilhete Unico Carioca, a card that integrated the bus systems. With the BUC, any passenger can take two buses in three hours without paying more than one ticket. This is an essential part of the bus reform because it makes the integration between truck lines and secondary lines possible. The Strategic Plan 2012-2016 of the city of Rio de Janeiro promised to integrate all the transport modals under BUC until 2016. In 2015, BUC was integrated to buses, trains and vans. Until 2016, metro and ferryboats were expected to be included in the program.

Regulation and incentive policies: how do you regulate the relations? Who regulates the relations and how do you finance the agency? Are there any incentive policies? How do you implement then? How do you enforce the rules?

All the regulation procedures were established in the concession contracts of 2010. We could split regulation in three dimensions: administrative evaluation, operational

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24 FGV: Getúlio Vargas Foundation is an independent institution that produces inflation indexes for the whole country.
evaluation and economic evaluation.

The administrative evaluation considers the general aspects of the contract. The economic evaluation addresses the economic equilibrium of the contract and the financial numbers. In general, a Big Four auditing firm is hired to evaluate the economic health of the system.

Finally, the operational evaluation consists of in-loco visits to analyze the buses. Employees of the city government attempt to personally examine the physical conditions of the fleet, the conservation aspects, if the buses are overcrowded, and so forth. There are also interventions in the garages of the private companies to check whether the contract’s rules are being abided by.

As I mentioned before, the riots of 2013 empowered the city government to implement a host of changes. One of the movements made was the hiring of a consulting firm to help the transport department to structure themselves to better manage the concession contract. In its diagnosis, the consulting firm pointed out that:

1) Route management: the private companies proposed most of the adjustments of routes and fleet. SMTR has a low participation and influence in these proposals, for there is an absence of skilled employees to deal with this kind of issues.

2) Regulation of the fares: The consortium decided for the split of the revenues, and SMTR is in charge of guaranteeing the fare of equilibrium of the contract.

3) Economic regulation of the concessions: the fares have an annual adjustment with costs that no one controlled. In addition, the cost management is in charge of the private companies.

Despite this diagnosis, the same report stated that the transport department possesses the skills and the technology to improve regulation procedures. A software of business intelligence, the use of real-time GPS to monitor the fleet, a Google Earth visualization plant, and a wealth of data from the private companies were a few examples.

As pointed out by one of the interviewers:

“nowadays the transport department has the mechanism to regulate the contracts. In fact, private companies send real-time data to transport department. The challenge lies in how they are going to enforce the penalties and the bonuses. The current culture is to fine the private companies in less than 500 reals or of 10 Million reals. In other words, nothing happened with the companies that didn’t obey the contract’s rules.” (Interview B, mayor advisor).

Technology: how do you use technology to increase the efficiency of the system and the comfort of its users? What are the main softwares to improve management capabilities? How do you use technology to improve fare collection?

Technology is an important part of the bus reform in Rio. I could mention at least three of its main uses: the operational center of Rio, the big data team, and the electronic monitoring of BRTs and BRSs.
The operational center was constructed in 2010 after a huge storm which ravaged the city and killed citizens in landslides. The center integrates 30 departments from the city government, state and private concessions, 24 hours a day, 7 days a week. The COR is known as the pulse of the city: it manages daily issues, such as car accidents, and big crises, like storms and landslides. It has online information from all the departments, and more than 560 interconnected cameras that are managed by the control room through an 80 square-meters screen. There are more than 400 professionals monitoring the city and taking decisions automatically. The center has become part of the life of cariocas; nowadays, both the media and regular citizens use it as a backbone of information. There is a perception that the COR has improved the traffic conditions of the city.

The big data team of the city hall is a group of seven analysts who combined the available databases to produce solutions for different challenges of the city. The team, which started in 2011, has received recognition from the whole government. Among the projects, transport is a major client. PENSA (the name of the group) made a lot of studies analyzing the GPS information of the buses, identifying parameters such as frequency, routes, and capacity availability. They also use data from mobile phones to analyze the flow of people in the city.

Finally, it is important to mention the electronic monitoring of BRTs and BRSs. There are hundreds of cameras installed in the lanes that generate fines automatically if any car should any car obstruct driving regulations. In fact, technology has proved essential to prevent accidents and to guarantee the flow of buses in the lanes.

**Organization Capabilities: what are the main capabilities of the government? Route design, planning and monitoring? What are the main capabilities of the operators? Operating costs, operating practices, vehicle maintenance, bus utilization? How do they guarantee efficient systems?**

The municipal department of transport (SMTR) has three main responsibilities: the management of public transport; the management of traffic; and communication with citizens. Regarding public transport, there are three main process: planning and projecting, operational management, and evaluation/monitoring of the system. I could affirm that SMTR uses most of its time to solve emergency problems. In fact, there is no culture of work in a pro-active way. A reactive approach is favored, which often results in inefficiency.

To give a specific example, we could analyze the route designing process. According to a recent study, 50% of the routes are juxtaposed with more than 50% of coincident positions. In addition, most of the lines are “stop to stop”. In other words, there is no integration between the routes, which entails inefficiency in the system.

In order to address this issue, the main capability that the government developed in the bus reform was related to route design skills. SMTR proposed four BRT lines and a lot of BRS lines in other to optimize the system and reduce the number of overlaps. In addition, since 2013 the city has been suffering a rationalization process that is significantly changing a lot of routes, especially in the north part of Rio de Janeiro.

Finally, equally noteworthy are the efforts of the government to improve their skills. As I mentioned before, a consulting firm was hired in 2013 to help the government to structure themselves. The diagnoses pointed out that 340 employees in three different
areas were not enough to guarantee the correct management of the system. The firm proposed a redesign of the entire department, with new people, new processes and a new structure. In 2015, a public tender took place, and more than 70 new employees were selected. SMRT plans to incorporate these workers along the current year, and believes that the new configuration of the department will provide them with the instruments to better manage the transport system.

Regarding private companies’ capabilities, I could mention the profile of the owners. As I mentioned before, we are undergoing a generational transition, in which grandsons and granddaughters of the original owners of bus companies are trying to professionalize the management. This new generation is composed of well-educated people who believe that management practices could increase their profits. We can clearly see that some companies are at the cutting edge of business practices, and they are pushing the whole sector to achieve more efficiency.

**Infrastructure: what is the central infrastructure developed for the bus reform? How is it financed? Are there interchanges in the system? How many? What are the type and the size of vehicles?**

The infrastructural dimension is the most important aspect of the bus reform in Rio de Janeiro. We could identity three main elements: the investments to increase the capacity of the system with four new BRT lines, many integrated stations and an LRT in the city center; the investments to increase efficiency with the BRS; and the investments to enhance the quality of the vehicles.

BRT – Bus Rapid Transit is an innovation first introduced in Curitiba that makes a public mass-transport modal with wheels possible. The idea is the implementation of segregated lanes for articulated buses. The ticketing is in the stations (like in the case of subways), and the buses are very comfortable. With less than half of the subway investments with less than half of the time, BRT became an option for many cities around the world to increase the transport system’s capacity. In Rio, it seems to be a good strategy to address the challenges posed by the most important sports events of the world (the World Cup and the Olympic Games).

As we can see in the following figure, the whole city of Rio will be covered by a public mass transport modal.

**Figure 3: The evolution of the transport system of Rio de Janeiro**

![Figure 3: The evolution of the transport system of Rio de Janeiro](image)

Source: SMTR (2009 X 2016)

The investments in BRTs also consider the money to build the integrated stations. The table below presents the features of the BRTs.
Table 6: Main features of the BRT line of Rio de Janeiro

<table>
<thead>
<tr>
<th></th>
<th>BRT – TransOeste</th>
<th>BRT – TransCarioca</th>
<th>BRT – TransOlímpica</th>
<th>BRT – TransBrasil</th>
<th>Bike Lanes</th>
<th>LRT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td>56 Km</td>
<td>39 Km</td>
<td>23 Km</td>
<td>32 Km</td>
<td>450 Km</td>
<td>23 Km</td>
</tr>
<tr>
<td><strong>Number of passengers / day</strong></td>
<td>220.000</td>
<td>400.000</td>
<td>100.000</td>
<td>900.000</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: www.cidadeolimpica.com

Besides the BRTs, the city center of Rio is undergoing a huge regeneration. The biggest PPP of Brazil is funding works in a 5000 km² area which was completely abandoned. As part of the project, an LRT line is under construction. There is also a PPP of approximately U$ 500 MM to build 23 km of LRT. The following figure presets the routes.

**Figure 4: LRT lines of Rio de Janeiro**


The goal of the city government is to have 63% of the population of Rio using public mass transport. It is important to mention the investments of the state to increase the capacity of subway lines in 30%.

The second element of the infrastructure is the BRS – Bus Rapid Service. Such a project consists in the development of specific bus lanes in intense traffic roads to increase the speed of the buses. Among the lanes, there is a rationalization of the routes in order to reduce the number of buses. There is also a technological feature: the lanes are monitored by a series of electronic alarms and cameras.
Since 2011, more than 20 BRSs have been installed. With a small amount of money and just an “engineering intelligence”, the flow of the main roads has increased a lot. Such an initiative sheds new light upon how alterations in management can prove to enhance the system’s general efficiency.

Finally, it is important to mention the investment in the vehicles. This is the only investment made by the private companies and it is key to improving the level of service offered in the bus system. There is a resolution by the transport department according to which new vehicles of the fleet must have air conditioner and accessibility. Nowadays, 55% of the fleet are equipped with air conditioner (in 2008 there were less than 10%) and almost 100% with accessibility.

4.1.4 Results

The proposed framework suggests some KPIs to measure the impact of the bus reform. Basically, the idea is to understand the results in three dimensions: efficiency, how efficient is the system? Sustainability, how sustainable is the system? Resilience, how resilient is the system? As I mention before, the availability of data in Rio is not satisfactory, so I will need to make some proxies.

Efficiency

The bus reform of Rio de Janeiro is still under course. In other words, it is not easy to evaluate the real impact upon the system. I will try to measure the results in terms of efficiency considering the modal share of the city, the operational features of the new BRT lines, the operational features of BRSs, and the quality of the vehicles.

A recent study from the transport department (2014) addresses the modal share in the peak hours of the city. It is interesting to notice that buses are the main modal option and that the BRT is already competing with the subway in terms of the number of passengers. Another aspect is the speed of BRTs, which is higher than the subway’s.

Table 7: Modal share in the peak hour (7 am) in Rio de Janeiro

<table>
<thead>
<tr>
<th>Mode of transport</th>
<th>Passengers</th>
<th>Passengers x KM</th>
<th>Passengers x hour</th>
<th>Average speed (Km/h)</th>
<th>Average KM per passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferry</td>
<td>12,402</td>
<td>95.248</td>
<td>5.957</td>
<td>16,0</td>
<td>7,7</td>
</tr>
<tr>
<td>BRT</td>
<td>52,525</td>
<td>1,059.219</td>
<td>27.928</td>
<td>37,9</td>
<td>20,2</td>
</tr>
<tr>
<td>Subway</td>
<td>66,603</td>
<td>867.502</td>
<td>30.117</td>
<td>28,8</td>
<td>13,0</td>
</tr>
<tr>
<td>Intermunicipal Buses</td>
<td>543,933</td>
<td>6,818.783</td>
<td>411.707</td>
<td>16,6</td>
<td>12,5</td>
</tr>
<tr>
<td>Municipal Buses</td>
<td>579,460</td>
<td>5,474.149</td>
<td>291.665</td>
<td>18,8</td>
<td>9,4</td>
</tr>
<tr>
<td>Trains</td>
<td>64,436</td>
<td>1,569.107</td>
<td>44.761</td>
<td>35,1</td>
<td>24,4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,254,923</td>
<td>14,314.901</td>
<td>767.374</td>
<td>18,7</td>
<td>11,4</td>
</tr>
</tbody>
</table>

Source: SMTR / PMUS (Mobility Plan of the City of Rio de Janeiro for the next 10 years).

Another important piece of data is the evolution in the usage of the bus system. As we can see below, there is a slight propensity towards increasing the number of passengers.
Regarding qualitative aspects of the system, we could elaborate on the new BRT lines. The BRT system displays high rates of satisfaction among its users according to the market research promoted by RioOnibus in 2012. One month after the inauguration, 90% of the interviewers approved of the system, and 91% had reduced their commuting time to half of its original value. ITDP also carried out an evaluation of the BRT and pointed out that Transoeste is a high-level BRT label pertaining to the GOLD category. IDTP also evaluated Transcarioca, the second BRT of the city. According to the institute, the new line is structurally similar to the best BRTs of the world. In the table below, some of the results have been tentatively summarized:

**Table 8: Summary of results of BRT lines in Rio de Janeiro**

<table>
<thead>
<tr>
<th></th>
<th>TransOeste</th>
<th>TransCarioca</th>
<th>TransOlimpica</th>
<th>TransBrasil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction of the operational fleet</td>
<td>21%</td>
<td>25%</td>
<td>50 buses</td>
<td>850 buses</td>
</tr>
<tr>
<td>Reduction of the daily Km</td>
<td>8%</td>
<td>26%</td>
<td>One line</td>
<td>47 lines</td>
</tr>
<tr>
<td>Increase in capacity</td>
<td>58%</td>
<td>20%</td>
<td>60 new buses</td>
<td>550 new buses</td>
</tr>
<tr>
<td>Increase in frequency</td>
<td>44%</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in modals equipped with air conditioning systems</td>
<td>92%</td>
<td>87%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Time Saved per Trip</td>
<td>40 minutes</td>
<td>38 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Time Saved per Commuter</td>
<td>14 days</td>
<td>14 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel Use Reduction</td>
<td>44 million</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission Reduction</td>
<td>Savings / year</td>
<td>Emission Reduction</td>
<td>Savings / year</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------</td>
<td>--------------------------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>Carbon Dioxide (CO2)</td>
<td>107,000 tons / year</td>
<td>65.6 ton / year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen Oxides (NOx)</td>
<td>206 tons / year</td>
<td>113.0 tons / year</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: SMTR, ITDP

Regarding the BRS, the following figure confirms the increase of the travel speed in the main corridors.

**Figure 6: Summary of results of BRS lines in Rio de Janeiro**

![Figure 6](image)

Source: PENSA / CETRIO (2015)

Finally, it is important to mention the evolution of the quality of vehicles. As we can see in the graph below, a trend suggests that 100% of the fleet will be equipped with air conditioning systems in a few years.

**Figure 7: Historical data of buses with air conditioner in Rio de Janeiro (% of the fleet)**

![Figure 7](image)

Source: SMTR (2016)
Sustainability

In terms of the sustainability of the system, the financial numbers suggest that the system is healthy. There are no subsidies in the transport system. To give more detailed numbers, in 2014 SMTR made a study based on the balance sheet of the private companies of the bus system.

Table 9: Financial numbers of private operators in Rio de Janeiro (year 2012)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues from fares</td>
<td>R$ 2,42 BI</td>
</tr>
<tr>
<td>Exemption from fares (elderly and children)</td>
<td>R$ 57 MM</td>
</tr>
<tr>
<td>Revenue from advertisements</td>
<td>R$ 67 MM</td>
</tr>
<tr>
<td>Total revenues</td>
<td>R$ 2,54 BI</td>
</tr>
<tr>
<td>Operation costs</td>
<td>R$ 1,8 BI</td>
</tr>
<tr>
<td>Administrative costs</td>
<td>R$ 300 MM</td>
</tr>
<tr>
<td>Operational cash flow</td>
<td>R$ 300 MM</td>
</tr>
</tbody>
</table>

Source: SMTR

Resilience: how resilient is the system?

Finally, the resilience-related dimension of the results will be measured in relation to the average vehicle age, the evolution of the accidents, and CO₂ emission rates.

Most of the fleet is in accordance with the contract’s regulations. The average bus in the fleet has been in operation for 4,1 years. The following graph shows the number of buses per year of usage.

Figure 8: Number of buses per years of usage in Rio de Janeiro

Source: SMTR (2015)
The evolution in accident-related data points to the existence of some improvements in the system. It is hard to define which particular action resulted in the reduction of the number of accidents; this may have been due to the numerous construction sites currently in operation throughout the city, to the strong state-level policy towards reducing alcohol consumption, or to the new BRT lines. Nevertheless, the fact is that there has been a clear reduction in the number of accidents in the city.

**Figure 9: Number of accidents in Rio de Janeiro (accidents / licensing vehicles)**

![Figure 9: Number of accidents in Rio de Janeiro (accidents / licensing vehicles)](image)

Source: SMTR (2016)

Finally, it is important to measure the environmental benefits of the bus reform. In 2005, Rio de Janeiro made an inventory of its CO₂ emissions. The report suggests that buses were among the primary emission agents. In 2016, a new inventory will be made, but preliminary results suggest that BRTs and BRSs will bring about a reduction of 8% in the CO₂ emissions of the city.
4.2 - BUS REFORM IN SEOUL

Using the framework as a reference, I will start the description of the case of Seoul with the background and the context where the bus reform takes place. I will briefly point out the history of the country and the city and also the motivations behind the bus reform. Secondly, I will describe the main actors of the process. The third part is the report of each elements of the framework. The purpose is to identify the relations between the actors and also guarantee the possibility to compare both cases. Finally, I will explore the results of the bus reform. In the case of Seoul, where the bus reform happened in 2004, we have a plenty of papers and reports discussing the results which enriches the work.

4.2.1 BACKGROUND/CONTEXT

Seoul is the capital of South Korea. With a population of 10.4 MM inhabitants spread in 627 Km² of area, the city is one of the densest in the world. Located within a metropolitan region of 25 MM inhabitants (half of the country’s population), Seoul is the heart and the brain of Korea. It boasts a vibrant and cosmopolitan environment which inspires the whole region of Asia.

The history of Seoul is in practical symbiosis with the history of Korea. The country has been achieving unique rates of economic growth for the past 50 years. The per-capita income of Korea rose from only US$311 in 1970 to US$ 27.090 in 2014. According to the World Bank database, the gross enrolment ratio of 99% with a life expectancy of 82 years puts Korea in a higher position when compared to OECD countries. Simplifying the history of Korea, we can split the recent economic miracle in four main phases:

- Korean War and post-war reconstruction (1950s): the Korean war broke out in 1950, just after the country was liberated from Japanese forces. The country’s entire system of industrial facilities, as well as its basic infrastructure, were destroyed.

- The Era of Economic Rehabilitation (1960s to 1970s): Higher economic growth under an externally oriented strategy. The nation saw an increase in urbanization rates from 39.1% to 50.1%. The national government established an economic development plan and a comprehensive plan for National Land Construction. Bus usage rates increased in most cities.

- Pursuit of Stable Growth and Improved quality of life (1980s to 1990s): economic growth, based upon technological development, continues to take place. The educational reform of the country produced one of the most educated nations in the world, and helped it become a solid base for innovation-oriented companies such as LG and SAMSUNG.

- Pursuit of an equitable welfare society and of environment-friendly sustainable growth (2000s): Nowadays Korea in facing challenges akin to the ones faced by most developed countries. Economic growth seems to have deaccelerated, there is aging population and, social security issues are becoming more prominent – to mention just a few examples.
It was within that context that Seoul built up its mobility system. The city has an integrated transport system with different modes. According to 2015 government numbers, there are 8.197 km of roads, 540 km of subways, and 115 km of BRTs. There are 2.97 MM personal vehicles, 7.485 buses and 72.168 taxis. From a demand-related point of view, Seoul has 32 MM trips/day, and the Metropolitan Region, 52 MM trips/day.

As mentioned before, buses began to play a central role in urban transport in the 1960s when economic growth led to an increase in the population of cities. Buses maintained their position of dominance until the mid-1980s, when discussions regarding other modes of transport gained momentum. At that time, people started to call for better options in terms of quality and speed. The history of Seoul’s subway framework started in 1974 with the construction of Seoul Subway Line 1. The 1988 Olympic Games also boosted the subway’s expansion. Nowadays, there are 9 lines with more than 293 stations.

The following graph explores this issue in relation to the historical data on modal share in Seoul:

**Figure 10: Mode share in Seoul**

![Mode share in Seoul](image)

Source: Seoul’s Metropolitan Government (2010)

This data shows some of the reasons which explain the bus reform that took place in 2004. In 1996, the modal share of buses was 30.1%, higher than 29.4% of subway lines and 24.6% of cars. In 2002, the percentage changed to 34.7% for subways, 26.9% for passenger cars, and 25.9% for buses. In just six years, buses had fallen from first to third in terms of modal split. This situation directly affects the bottom line of bus companies’ revenues. There was a drop in the revenues, while operating costs like personnel hiring and maintenance; oil expenses; and vehicle purchasing kept rising. In fact, the situation was so serious that the entire bus industry was in a structural recession in early 2000.
The second reason for the bus reform lies in the consequences of this higher proportion of cars in the city. Like many cities around the world, with the increase of the income of people came the increase in car ownership rates. According to the Seoul Transport Bureau (2004), the number of cars in Seoul was 2.8 MM, with 3.15 MM cars entering and exiting Seoul from/into the Metropolitan Region. In other words, with 4.37 MM vehicles in operation, Seoul’s transport system was in a state of oversaturation. Some data calculates congestion costs in US$ 1.2 billion (1991) and US$ 7.2 billion (2008).

The reality of the modal shares directly impacts the quality of the service provided to the population. Without money, bus companies make no investments to improve their service. In addition, with increased traffic, the operational cost of companies is also higher. At the time, the result was a combination of uncomfortable services, scarce in predictability and punctuality, with bad and unfriendly drivers. It was like a vicious cycle. At this point, it is crucial to emphasize a specific aspect of Seoul’s reality. For decades, bus services in Seoul were operated by large number of private firms without governmental control of routes, schedules and other aspects of the service. Bus routes were like personal properties of private firms. In other to maximize their profits, companies focused on how to get more passengers, which fostered a daily road-war between drivers, while safety and comfort were blatantly ignored.

Besides all these reasons for the bus reform of 2004, there are other relevant aspects, such as the environmental concerns of the population. The main cause of air pollution were vehicle emissions (67%). The acknowledgment of such a percentage led to renewed calls for the implementation public transport-stimulating policies; the opening of the phase-2 Seoul Urban railway system, with a view to further reducing bus ridership indexes; the expansion of community bus services and the revision of buses’ priority policies.

In this context, the Seoul Metropolitan Government started the implementation of its bus reform in 2004. The story begins with the election of the ambitious mayor Myung-Bak Lee in 2002 (who, in truth, was made president in 2006). Lee underscored the bus reform as one of the main projects of his mandate, and initiated weekly meetings with the team to implement the reform. In August 2002, members of the Seoul Development Institute, academic circles, transport specialists and relevant officials established an implementation action plan for the Seoul Bus Reform. Its main objectives were:

1) Ensuring transportation equity for citizens through the provision of stable bus services.

2) Enhancing the efficiency of business operations.

3) Earning the trust of bus users by means of ensuring punctual bus services, expanding the scope of modals which be used when traveling to a given destination, and providing safe and comfortable services.

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25 The average travel speed of buses in 2002 was 18.9 Km/h, lower than 22.5 Km/h of passenger cars.
4) Ensuring profits for bus service providers in return for providing stable services, and inducing effective management for subsequent enhancements of efficiency in bus operations.

5) Securing the basis for providing stable public transport services to society as a whole by revitalizing the bus transport sector.

On February 4, 2004, at the Seoul City Hall, Seoul’s mayor and the chief of staff of the Seoul Bus Transport Association expressed their willingness to implement the bus reform, and signed the agreement which established the institutional arrangements to guarantee the recognition of business-related and public interests. The reform was conceived according to an integrated approach, one which dealt with many aspects of the transport system. It started with the concept of a quasi-public operational system, in which the government would carry the responsibility of route designing and scheduling, and private owners would operate the routes. The second step was the implementation of a new fare system and a new subsidy policy to guarantee the existence of funds for the right provision of services. Additionally, regulation incentives were reinvented with the support of technology in terms of ticketing systems and also management systems. Finally, there were huge investments in governmental and companies’ capabilities and in basic infrastructure such as BRTs, vehicles, and transfer stations. In the following sections, I wish to develop a more in-depth understanding of these aspects of the reform.

4.2.2 MAIN ACTORS

The figure below shows who the main stakeholders of the reform were, as well as their interactions.

Figure 11: Main actors of the governance system of Seoul’s bus reform

Source: Author’s analysis
Seoul Metropolitan Government

The City Hall is in charge of route planning, service evaluation and routes’ self-adjustment. By analyzing information on buses’ operation provided by the traffic card company and BMS, it develops route plans, funding schemes, provides financial support and operational information, and conducts evaluations of operational services. When the operating income falls short of the operating costs, the City Hall provides financial support at the request of the Joint Bus Operation Committee. Additionally, it conducts an appraisal of bus companies and offers incentives/penalties based on the information on bus operations and monitoring results provided through BMS, as well as information on operations provided by Korea Smart Card. Its main departments are:

- Bus Management Department:
  - Bus policy team: policy development for effective bus operation; supervision of the implementation of the quasi-public bus operation system; provision of guidance to bus cooperatives; improvement of buses’ structure; negotiation of labor-management relations; operation of bus drivers’ qualification system; evaluation of bus services; and development of surveys on public satisfaction levels.
  - Management improvement team: estimation of standard bus operating costs; development of managerial and accounting analyses; establishment of operating cost estimation guidelines; evaluation of managerial soundness; promotion of measures to improve management conditions; implementation of balances of payment analysis; and development of financial support plans.
  - Financial support team: provision of financial support and oil subsidies to city buses; supervision of revenue management; supervision of operating frequencies; definition of operating costs.
  - Route team: readjustment of bus routes and decision-making with a view to improving routes’ efficiency; management of routes and bus dispatches by district; management of bus-related statistics; analysis of data on bus operations.
  - Operational management team: management of the city’s bus operations; enhancement of bus stops; installation of relevant facilities.
  - Community bus team: management of community bus operations; service evaluation; readjustment of fares.
- Traffic information center (TOPIS):
  - Bus information team: development and operation of BMS for city and community buses; management of bus-route and bus-stop databases; generation and analysis of bus-stop arrival and departure information.
  - Bus information service operation and management: training and evaluation of BMS safe operations.

Operators

They are in charge of operating the routes. In one word, they run the buses, report on the receipt of the distributed revenue, report on operation results, and generate management data.
Bus transport cooperative and Bus operating committee

The private companies that operate the buses form this committee. The joint bus operating committee (the bus transport business cooperative) manages the operational revenue account with regard to distribution, calculation, and administrative management. They also negotiate with the governmental party when subsidies are required, and negotiate with bus companies when bus route adjustments are required.

Bus Transport Labor Union (bus drivers)

This union represents the 16,000 bus drivers which worked in Seoul in 2004. Bus drivers are key stakeholders in the process and the union tried to defend their interests in negotiations with the government and private companies.

Citizens and the civil society

As in Rio, the public is regarded as another important axis of the reform. Everyday citizens are likely to be seen as the most important stakeholders, because they are the real beneficiaries of the reform, as well as its ultimate consumers.

Citizens’ committee

The committee consisted of 20 individuals and was set up as a way of third-party conflict mediation on August 26, 2003. The members consisted of one Seoul resident, one person from the Seoul National Police Agency, two people from the Seoul Bus Transport Association, one person from the Seoul Metropolitan Stownbus Corporation, one person from the Seoul Bus Labor Union, four people from civil society organizations, six transport experts, one accountant, and one lawyer.

KOREA SMART Card - Traffic Card Company-Affiliated Clearing House

Korea Smart Card Corporation is in charge of the operation and maintenance of Seoul’s transport card system, and it is also responsible for issuing traffic cards. Through the traffic card system, the company collects information and data on revenue settlement by routes, companies and bus types, as well as operational performance, travel speed, and patterns of embarking and disembarking.

LG CNS, credit card companies and system providers launched the operator named Korea Smart Card Co. (KSCC) in 2003 as a joint venture. It has been in charge of the operation of the smart card ticket system since the Seoul Metropolitan Government initiated a public transport reform in July 2004. The shareholding structure of KSCC shows that the Seoul Metropolitan Government has a 35% stake in the company, thus being its largest shareholder; it is immediately followed by LG CNS, with 31.85%. Solution companies and credit card companies hold the remaining portions, owning 17.42% and 15.73% of stakes, respectively.

National government

The National Police Agency, the Ministry of Land, Infrastructure and Transport and the Ministry of Finance and Economy have some policy and licensing authority in Seoul. For example, the National Police Agency interferes in the investments in the BRT, whereas the Ministry of Land, Infrastructure and Transport interferes in relation to the introduction of a quasi-public bus system.
4.2.3 Interactions/Relations between the Stakeholders

Industry Structure: how many players do you have as operators? Is this a monopoly or not? Who are the market forces?

The number of bus companies dramatically fell from 89 in 1995 to 58 in 2002. To some extent, this decline was due to private operators’ going bankrupt. The Seoul Metropolitan Government also encouraged the consolidation of the firms to eliminate duplication, reduce overhead costs and improve the coordination of services. Although there were many companies, they used to operate as a “monopolized route system”. The routes were like private properties and the government had limited influence on that. Long ago, rich businessmen had obtained such routes, and they had never left.

We could say that system was supplier-centric; that there was a profit-oriented bus operation, with overlapping routes, without intermodal linkage with urban railways; and that users suffered the burden of travel expense caused by the imposition of fares by routes.

Such a structure posed a huge challenge for any reform. Some bus companies were in charge of the so-called “golden” routes and refused to welcome any change. Simultaneously, even companies which were being threatened by financial losses remained skeptical towards political measures. They displayed no reliance on long-term plans.

The law: what are the legal instruments that manage the relations between operators and the government? How were they structured? Do you have tenders?

The legal aspect of the bus reform is extremely relevant to understand their success. As I mentioned before, there was a clear conflict between public usage and private property rights. The government had to convince the whole industry that the bus reform would prove a win-win solution.

SMG tried to solve this issue by introducing the quasi-public system through an agreement elaborated and signed by both the government and private operators. The objective was to change the service arrangements, such as route- and frequency-related parameters, with a view to addressing the population’s demands. As seen in Attachment II, the agreement has 6 parts:

1) Enforcement of the bidding system for 10 axes of the main road routes. In case of bidding, Seoul-based companies will be prioritized, for example by means of awarding Seoul companies extra points in the bidding process. An optimum price tender method will be introduced that takes into account service levels and the bidding price (total cost) to prevent negative effects like low-price bidding. The license awarded as a result of the route bidding process will be limited but will be prolonged if there are no drastic issues.

2) Institutional guarantee of a certain operational profit. Legal grounds, such as the financial subsidies according to the enforcement regulations of the Passenger Transport Service Act, will be reenacted and regulations about the main and branch route bus operation and its financial subsidies will be regulated by Seoul.
3) **Adequate compensation in case surplus vehicles occur.** There will be a resetting of the route system to prevent surplus vehicles. However, in occurrence of such cases, such surplus vehicles will be adequately compensated.

4) **Measures against debts.** Existing debts of the bus companies will be dealt with by each bus company through the reevaluation of its assets, investments, the selling of its vehicle storage facilities and of parts of its route operation licenses. Companies that participate in the Seoul bus reform will consider support through low-interest loans (equivalent to the special ordinance grow middle or small businesses and the small merchants of Cheonggye Stream) and will proactively discuss with financial institutions to conclude loan contracts using city buses as collateral.

5) **Existing operational licenses of the 57 companies will only be changed in their operational content and will otherwise be guaranteed.** To guarantee the existing operation licenses and business licenses of the 57 companies, the bus system reform will be enforced by changing the operational content.

6) **Other.** The details that are needed to execute this agreement will be agreed upon by the City of Seoul and the Seoul Bus Transport Association. Nonetheless, if no agreement can be reached the Bus Reform Public Committee will mediate.

In short, this agreement guaranteed that the bus companies would have legal security and financial support in case of losses. At the same time, the government assured the implementation of the quasi-public system with a new framework behind its management.

**Finances: how do you finance your system? How do you finance CAPEX and OPEX? What is the business model? How do you pay the operators? How do you set and control the fares? How do you collect the fares? How do you guarantee the integrity of revenues?**

The implementation of the new framework changed the business model. In the new system, the government would create the operational plan, build and finance the infrastructure; and the private companies would operate and maintain their fleet and manage the labor. The first bidding of the ten major corridors of Seoul’s bus reform guaranteed the investments on infrastructure on the government’s part and the OPEX from the private companies. In addition, the management of revenue, previously carried out by each company, was also altered: the revenue pool was now managed by the bus operating committee. To mention more precise numbers, the composition of the revenue pool in Seoul buses is composed of 85% fares and 15% subsidy.

Four consortia, each one composed of five companies or less, were selected as organizations which would run buses along the major trunk routes that would be supported by bus-priority measures. These consortia, launched as corporations, would be given six-year licenses. They were chosen based on their bidding prices on the total costs for bus operations in the routes. Their revenues would be managed by a joint revenue management organization established under the joint transport agreement. Should the income from the operation of the routes fall short of the operating costs, the shortfall would be made up for with subsidies from Seoul’s government. Should
the income exceed costs, it would be deposited into the joint revenue management body.

Another aspect of the financial issue of the bus reform is the integrated fare system. SMG changed a flat fare model to a distance-base fare model. The biggest problem with buses before the reform was that they did not provide transfer discounts. Those who could reach their destinations with just one ride paid half the prices paid by travelers who had to make transfers.

The city of Seoul laid three principles for determining fare levels: (1) public transport fares should be set at a level where the cost of the services being provided can be covered by passenger fares; (2) the value of service and the fare level ought to be decided according to users’ perceived quality of service. The higher the quality of service, the higher the consumer demand; therefore, the costs for raising the level of service will be reflected in the process of determining fares; (3) fare burden must be decided on the basis of the users’ ability to bear them. Here, the fares include discounted fares for children and the elderly.

The integrated fare system proposed by SMG allowed users to transfer from one travel mode to another without paying an additional basic fare. Under this scheme, people using community buses to take urban railways would pay the fares in accordance with the distance they travelled, without having to pay the transfer charge. The government decided to simultaneously implement two fare schemes: the “integrated distance-based fare system”, applied for both urban railways and buses, and the “flat fare system”, applied to buses travelling across city limits. In other words, it was decided that a flat rate would be applied to travel distances of 40 km or more.

All fare collection started to be centralized through a clearing house from which bus operators were paid. The mechanism of fare revenue common management works as follows:

a) The transportation smart card company provides the Seoul City Government with information on the fares collected, the length of the operation, and other collected data. The company also transfers the collected revenue to the account of the Revenue Common Management Committee.

b) The Revenue Common Management Committee makes a request to the City Government for permission to withdraw revenue and for payment of due subsidies.

c) The Seoul City Government reviews the request based on the analysis of the data collected from the smart card company and the Bus Management System (BMS) operated by the City Government. The value of the subsidies is decided by comparing total operation costs to the total revenue generated from the bus operation as a whole. Total operation costs are calculated based on the 'standard operation cost' per vehicle and operation kilometers assessed and agreed on by both parties. Total revenue includes revenues from the operation of buses and bus advertisements. If any discrepancy between the Total Cost and the Total Revenue exists, the City Government makes up for the losses in the form of direct subsidy.

d) Once the transfer of revenue and subsidies is approved, the Committee on Revenue Common Management comprised of Bus Companies transfers due shares to each company, according to their operational costs (bus unit/km) in their respective routes.
Managing all revenues in a single account, the system systematically transfers revenues from profitable route operations to make up for losses in non-profitable ones.

**Regulation and incentive policies: how do you regulate the relations? Who regulates the relations and how do you finance the agency? Are there any incentive policies? How do you implement then? How do you enforce the rules?**

The quasi-public operation system is based on the principle that public benefits should be the leading criterion for determining bus routes and operating systems. The City Hall would lay the groundwork for operation and management of trunk route buses, while the individual bus companies are required to make efforts to cut costs through effective management of vehicles and workers. As mentioned before, the revenues were moved to a pool that was managed by the bus reform public committee.

With the implementation of the quasi-public operation system, a new bus service evaluation method was introduced. The new method was designed to induce voluntary efforts to improve management of services, instead of relying on the conventional regulations and penalties. The establishment of the bus management system (BMS) made it possible to monitor bus operations in real time, while the transport card system allowed for the transparent management of revenues. These changes aided the effective implementation of the new evaluation system.

Service evaluation was based on passenger satisfaction levels and operational achievements. Passenger satisfaction level is determined through questionnaire-style surveys, while operational achievements are measured through BMS and traffic card data. The results of the assessment were used for providing incentives or implementing administrative sanctions.

A decision was reached to deposit a certain percentage of the operating profits to secure financial resources for incentives. The City Hall also determined that the incentives could include administrative measures such as giving preferential rights to participate in route biddings, simplifying the procedures for applying for permits to use public garages and facilities, and abating punitive measures against law violations. The city government made it clear that companies offering poor services would be subject to punitive steps such as route closure and bus fleet reduction. The City Hall also stated that such companies would suffer disadvantages when readjusting bus routes and be banned from using public garages.

It is important to emphasize that, among the conflicts generated between government and companies in relation to the introduction of the semi-public system, particularly noteworthy was the calculation of income and expense allocation in bus operation. In particular, the problem of calculating transport production costs/km turned out to be a major conflict. A number of discussions took place with regard to the different criteria used in the collection of data for the calculation of transport production costs, with calls for the standardization of its principles.
Technology: how do you use technology to increase the efficiency of the system and the comfort of its users? What are the main softwares used to improve management capabilities? How do you use technology to improve fare collection?

Technology was a central element in Seoul’s bus reform. Korea considered one of the most well-placed countries in the world in many Smart City Indexes; and such a position was certainly emphasized by the ongoing bus reform. We may focus on three main technological innovations: a) the T-money, b) the Bus Management System (BMS), and c) TOPIS (transportation management system).

T-money

As part of the reform, the city introduced the integrated transit-fare card system (the T-Money System), which can be used not only for buses, but also for the subway. The system credits fare exemption or a discount when transferring between multiple modes of transportation. The collected fare is distributed to the bus and subway service providers according to the portion of riders. The specifications were defined, and the system is standardized.

Korea’s first smart card ticket system was introduced in Seoul in 1996. The scheme, which was initially applied to urban buses in the city, was implemented to achieve the following purposes: ensuring the management transparency of bus operators; and relieving passengers’ burden of paying fares in cash.

T-money card is a contactless smart card. Unlike the previous traffic cards with built-in memory cards, the new card has a built-in CPU (Central Processing Unit) chip that allows it to execute arithmetic functions. T-money played an essential role in the public transport reform. It helped to ensure user’s convenience, effective establishment of traffic, and promotion of relevant industries.

Korea Smart Card Corporation (KSCC) was inaugurated on Oct. 6, 2003 as a legal entity to build and operate Seoul City’s new transport card system. The company was created under the initiative of LG CNS, which had been chosen as the priority negotiation partner for the traffic card project. KSCC is in charge of system operation, card issuance, and traffic fare settlement. It was established with investments from the Seoul Metropolitan Government, LG Group, mobile carriers, credit card companies and the Korea Teachers Cooperative Union. Of these investors, Seoul City has the largest stake in the company.

The graph below shows the evolution of smart card usage in Seoul and illustrates the success of the system.
Bus Management System (BMS)

While preparing for the July 2004 reform of the public transport system, the Seoul Metropolitan Government reached the conclusion that BMS was absolutely necessary. The system was designed to increase citizens’ satisfaction level by securing the reliability of buses, and to generate basic data needed for establishing public transport policies for the future.

The BMS project was implemented by using a fast track construction method. Terminals were installed on 1,429 buses running in 49 routes out of about 7,700 buses operating in the city. BMS is largely comprised of these systems – information collection, information processing, and information provision.

The data collected by BMS is processed and provided to drivers, bus companies, citizens and pertinent Seoul City officials.

a) Drivers: Through a terminal installed on the bus, drivers are provided with information on the distances between buses running ahead and behind, and the time gap with the bus ahead.

b) Bus Companies: Bus companies can monitor operational conditions of buses in real time through the operational terminal program provided by TOPIS.

c) Citizens: By using the Internet, PDA, ARS or mobile phones, citizens can obtain information on buses’ arrival and departure times at bus stops, as well as their estimated time of arrival.

d) Seoul City: Operators at TOPIS can monitor all bus operations in real time. They can check historical statistics on bus operations or bus stops, as well as emergencies and violations.

TOPIS (transportation management system)

TOPIS is the Seoul Metropolitan Government’s integrated transportation management center. It collects information from and provides information to the city’s Road Traffic Management System, Bus Operation Management System, Unmanned Enforcement System, and other related systems.
Seoul’s TOPIS includes an automated system that requires minimal human input for the regulation of illegal parking or traffic law violations inside bus lanes. The installment of surveillance cameras began in 2004. If the cameras detect the presence of an illegally parked vehicle, a sensor is automatically activated. After 7 minutes, if the car is still parked illegally, TOPIS automatically searches for the plate number and puts the car’s information onto the illegal parking record database. This information is sent to the City Hall, where the fee is recorded and then charged to the person who owns the car.

**Organization Capabilities: what are the main capabilities of the government? Route design, planning and monitoring? What are the main capabilities of the operators? Operating costs, operating practices, vehicle maintenance, bus utilization? How do they guarantee efficient systems?**

The main capability of the government became the definition of the bus routing. In fact, the fundamental framework of the public transport reform in Seoul was the reorganization of the bus route system. On the basis of functional classification, bus routes were restructured into trunk lines, branch lines and metropolitan lines. The Seoul area was divided into eight districts. To enhance the efficiency of bus operations, buses were categorized into general trunk line buses, metropolitan trunk line buses, general branch line buses and circular branch line buses.

The criteria for restructuring the trunk and feeder routes were set by considering a number of factors such as their functions and roles, characteristics related to bus operation, usage, and connections with urban railways. The lengths of bus routes were determined by considering urban space structure, travel patterns and operation hours. The final plan for bus route reform was determined through public hearings and procedures arranged by district offices to accommodate different opinions. The number of lines was set at 80 (2,592 buses) for trunk routes, 292 lines (4,451 buses) for branch routes, 43 lines (769 buses) for metropolitan routes, and five lines (44 buses) for circular routes.

Buses were categorized by type, and were given coded numbers based on the division of the Seoul area into eight districts (from 0 to 7). The system was designed to enable bus users to infer a bus’s departure point, destination point, and the route it would take just by looking at its number.

a) **Trunk route bus (Blue Bus):** Runs along major trunk roads; operates between city outskirts and CBD, between CBD and secondary business districts, and between secondary business districts.

b) **Branch route bus (Green Bus):** Facilitates transfers to or connections with trunk route buses or urban railways; operates for short-haul trips within districts.

c) **Circulation bus (Yellow Bus):** Circles CBD or secondary business districts.

d) **Metropolitan bus (Red Bus):** Runs between outlying areas beyond the city border and CBD/secondary business districts in Seoul.
As was the case in bus routing, the government resorted to technology to guarantee the implementation of a scientifically based bus-scheduling framework. Before the reform, the scheduling was based on drivers’ experiences, trials and errors, and headway management by bus companies. After the reform, the government carried out analyses of users’ demand, optimizing bus operations and promoting the scientific management of headway.

Regarding the capabilities of the operators, the reorganization and agglomeration of companies forced them to implement managerial measures, such as cost-settlement procedures and measures aimed at the management of facilities, vehicles and workers.

**Infrastructure: what is the central infrastructure developed for the bus reform? How is it financed? Are there interchanges in the system? How many? What are the type and the size of vehicles?**

The infrastructure was an important element in the chess of the bus reform. The Seoul Metropolitan Government made substantial investments to guarantee the improvement of the quality of the service while at the same time protecting the interest of the private companies in operating the routes. There were four main investments: 1) Median Lanes (BRTs); 2) Transportation Centers; 3) Bus Stops Red Zones and Garages; and 4) New Vehicles.

**Median Lanes (BRT)**

The City of Seoul decided to install median bus lanes along 170 km of roads on 13 routes as part of the project to introduce the bus-priority system. Before the installation of the median buses, the new system was tested through its pilot operation on Samil-no in March 2004. Through this trial operation, the City Hall confirmed that median lanes proved effective in remarkably improving average bus speed.

In July 2004, further installation measures took place in Cheonho-Hajeong and four other sections, whose combined length reached 36.1 km. In March 2005, additional median bus lanes were installed, covering 21 km of streets on three routes. In 2006, the designing process was underway to establish median bus lanes on 21.2 km of roads on three routes.

**Transportation Centers**

SMG researches showed that the number of public transport users would rise if improvements were made to address the inconvenience of walking long distances to transfer from one travel mode to another. Through the analysis of traffic conditions and other regional parametres, the City Hall designated 22 candidate places for transit centers: three in the central business district, eight in secondary business districts, seven at city boundaries, and four on the outskirts. The centers of modal integration made the design of truck and feeder lines possible. Furthermore, the T-money and the new fare system were also tools for improving the efficiency of the systems and enhancing users’ comfort levels.

**Bus Stops Red Zones and Garages**

The red zone can be defined in terms of outside appearance and function. As for appearance, the pavement of the zone is made of red-colored material different from
asphalt in a bid to increase visibility and differentiate it from other lanes. Red zones were first installed at bus stops near the Hongik University urban railway station in April 2004 on a trial basis. The establishment of red zones has helped prevent illegal parking or stopping of taxis or personal cars at bus stops within exclusive bus lane sections, thus helping to increase bus speed and allowing buses to have the right of passage. In addition, it has contributed to improving the qualitative level of the transport culture in Seoul.

The construction of garages for the bus systems is also an infrastructural investment. SMG built garages to increase the feasibility of some routes. As I mention before, the garage were also used as incentives and punishments though the regulation of the contracts.

New Vehicles

Finally, SMG stimulated operators to buy new vehicles and actively increase their quality. High-quality buses with low floors (displaying a concern with accessibility), as well as articulated ones, started to operate in medium lanes. The new buses were also powered by CNG (compressed natural gas) or electricity. In 2013, there were 2,703 low-floor buses, which accounted for 29.9% of the total number of buses in operation.

Citizens’ Committee, Labor union and Communication

There were three aspects in the bus reform of Seoul that do not fit easily within the framework proposed in the literature review section of this work. The existence of a citizen committee guarantees the legitimacy of the process. In addition, SMG’s awareness of the situation of bus drivers and their direct influence upon the labor union made the bus reform a reality. An equally relevant element is the importance of communication – which was part of the management strategy used by SMG to obtain support from the population.

Study and discussion of the bus reform started in August 2002, and a Citizen Council composed of seven citizen groups carried out a substantial agenda setting efforts in June 2003. At that time, the Council requested that an organization be composed to promote the overall bus system reform—to actualize a public transportation policy for citizens. The SMG accepted their request that month, and the Council was asked to recommend the members for the suggested committee on the 28th of June. As a result, the BSRCC was formed, and 20 members26 were selected. On August 26, a tentative plan for the bus system reform was discussed at the first meeting.

The main mission of the BSRCC was to promote the bus reform so as to improve bus services for passengers. From the first meeting on 26 August 2003 until the start of the implementation on 1 July 2004, 19 meetings were held, and, from the reform until the end of December 2004, 9 more meetings were held, thus totaling 28. The meetings were held regularly about twice a month, and averaged 15 members in attendance.

26 Participants: SMG, the Seoul Metropolitan Police Agency, and the SMG Council. Four representatives were from the Seoul Bus Transport Association, the Seoul Community Bus Transport Association, and the Seoul Bus Transport Trade Union. Four more representatives came from civil groups, and eight from professional groups such as transportation experts, accountants, and lawyers. The Bureau of Seoul Transportation, including the departments of Public Transportation, Transportation Improvement Planning, and Transportation Improvement Propulsion, were tasked to support the Committee by preparing discussion materials for the meetings.
The main agenda for the first meeting in August 2003 was the discussion of draft plans for the bus system reform, which the Seoul Development Institute (SDI) had studied for a year from August 2002. It is important to emphasize that, having the authority to make final decisions, the SMG also has more accountability than other members or participants.

In spite of the trials and errors, the BSRCC has been a leader in obtaining positive evaluations from bus users. Participants’ cooperation has strongly contributed to the establishment of a well-founded agenda for the reform.

**Labor Union Negotiations**

Seoul City believes that the quality of bus services could not be enhanced without dealing with the workers’ concern about employment stability. Therefore, it suggested ensuring employees’ job safety by making it a principle to use the existing buses when implementing bus reform measures, thus minimizing the number of buses which are made superfluous. In addition, it also proposed that priority should be given to qualified drivers in the existing companies when recruiting drivers for the routes determined through bidding. The city government decided to improve the level of wages of bus company workers gradually over years, while maintaining the principle that the wages and remuneration should be determined on the basis of labor-management agreement.

The strategy is worth discussing. The city sent a letter to 16,000 bus drivers outlining the measures associated with the reform. It also organized 27 special briefings for the drivers, attended by the mayor and vice-mayor, who provided reassurance that their rights were going to be protected. Indeed, it was assured that they would be better treated, insofar as the government was promising to establish better wages, improved welfare and pension rights.

Finally, the strategy to improve the quality of life of workers had some side effects. Among the benefits, bus workers adhered to the five-day working-week system. This resulted in an increase in the number of non-operating buses during weekends, which has subsequently led to longer bus waiting times, causing inconvenience to users.

**The importance of communication**

In January 2004, an intensive media campaign was launched to explain the changes to the citizens. This focused on why such transformations were necessary; furthermore, the proposed reforms and the anticipated benefits were briefly outlined. The date of July 1st, 2004, was set for the first phase of changes to be implemented. As one might expect, the transfer was not entirely smooth. The first few weeks could be described as some sort of chaos with high levels of dissatisfaction – but the careful planning and media outreach eventually did pay off as the new system started performing within a six-month period.

**4.2.4 Results**

The proposed framework suggests some KPIs to measure the impact of the bus reform. Basically, the idea is to understand the results in three dimensions: efficiency, how efficient is the system? Sustainability, how sustainable is the system? Resilience, how resilient is the system? As I mention before, there are a plenty of data of Seoul’s case. I believe all the proposed dimensions will be covered in the following description.
Efficiency

The results of the bus reform in terms of efficiency will be measured in relation to five dimensions: importance of the buses (daily trips); travel efficiency; accessibility; affordability; and travel experience.

The first table shows the evolution of daily trips in the systems. Between 2003 and 2010 the numbers of passenger per day increased in 17%.

Table 10: Public transport passengers per day by year in Seoul (1,000 passengers)

<table>
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<tr>
<th></th>
<th>2003</th>
<th>2004</th>
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<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td>Bus</td>
<td>3,932</td>
<td>4,025</td>
<td>4,197</td>
<td>4,655</td>
<td>4,583</td>
<td>4,602</td>
<td>4,605</td>
<td>4,599</td>
</tr>
<tr>
<td>Subway</td>
<td>4,438</td>
<td>4,539</td>
<td>4,556</td>
<td>4,533</td>
<td>4,532</td>
<td>4,577</td>
<td>4,730</td>
<td>4,845</td>
</tr>
<tr>
<td>Total</td>
<td>8,370</td>
<td>8,564</td>
<td>8,753</td>
<td>9,188</td>
<td>9,155</td>
<td>9,179</td>
<td>9,335</td>
<td>9,444</td>
</tr>
</tbody>
</table>


Regarding the travel efficiency of the systems, we can see in the table below that the number of passengers per driver was 233 in 2003, increasing to 281 in 2010 with a rise of 20.6%. The number of passengers per vehicle was 485 in 2003, increasing to 609 in 2010 with a rise of 25.5%. Another piece of data which is very relevant is the number of routes. As we can see, the trend is the reduction of routes. It seems that the government was trying to optimize the system by deactivating unprofitable routes.

What remains unclear is whether, upon withdrawing such routes from the macro-system, the government was taking the public’s interests into account.

Table 11: Changes in bus productivity in Seoul bus companies

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<th>2003</th>
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<th>2005</th>
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<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Companies</td>
<td>57</td>
<td>69</td>
<td>69</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>Routes</td>
<td>365</td>
<td>457</td>
<td>402</td>
<td>395</td>
<td>390</td>
<td>381</td>
<td>375</td>
<td>369</td>
</tr>
<tr>
<td>Passengers/bus</td>
<td>485</td>
<td>485</td>
<td>539</td>
<td>599</td>
<td>592</td>
<td>595</td>
<td>606</td>
<td>609</td>
</tr>
<tr>
<td>Passengers/driver</td>
<td>233</td>
<td>233</td>
<td>232</td>
<td>242</td>
<td>243</td>
<td>246</td>
<td>248</td>
<td>281</td>
</tr>
</tbody>
</table>


In addition, according to Wright (2005), the implementation of the median lanes (BRT) showed an improvement of between 30 and 75% in average bus speed during the first years of the bus reform, which compares favorably with the 32% travel time saving achieved subsequent to the BRT in Bogota, Colombia.

The accessibility and affordability of the system after the reform were also impacted. As I mentioned before, there were substantial investments in new low-floor vehicles, and also in stations to integrate the system. In what concerns affordability, the new distance-based fare system produced a 5.2% decrease in fare per ride (from 670 won in May 2004 to 633 won one year later). The main reason was the possibility of
integration between the modals of transport. In addition, the T-money offered the possibility of monthly and annual discounts for the whole system, and also structured the discounts for children and the elderly.

The results in terms of travel experience could be measured through customer satisfaction surveys. The levels of passenger satisfaction with bus and taxi provisions had been virtually identical in the 2003 survey (i.e. bus service 4.75 points, taxi service 4.72 points). By 2006, however, when the reform measures had taken effect, there emerged a significant disparity between the levels of bus passenger satisfaction and taxi passenger satisfaction. In 2006 the satisfaction of bus passengers, at 5.68 points, was much higher than that of taxi users, at 4.87 points. This suggests that the efficacy of bus travel increased significantly in the competition between transport modes. Customer satisfaction perception between 4.75 points in 2003 and 5.68 points in 2006 represents a greater, 19.5%, improvement, and confirms the general support of Seoul citizens for the BRT and the public transport policy

**Sustainability**

The table below contains financial information related to the system’s implementation and maintenance. As we can see, it is not clear if the bus reform produced good or bad results in term of sustainability. Between 2004 and 2005, the system’s deficit increased 82%. If we use 2009 as a comparison parameter, then the deficit value is almost twice as high. The evolution of the average cost per day is also impressive: with a more efficient system, such numbers would be expected to decrease, not increase.

**Table 12: Operation costs and revenues of Seoul bus companies**

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total costs (U$ mil.)</td>
<td>651</td>
<td>1,326</td>
<td>1,322</td>
<td>1,345</td>
<td>1,359</td>
<td>1,361</td>
</tr>
<tr>
<td>Total revenue (U$ mil.)</td>
<td>526</td>
<td>1,098</td>
<td>1,115</td>
<td>1,175</td>
<td>1,179</td>
<td>1,122</td>
</tr>
<tr>
<td>Deficit (U$ mil.)</td>
<td>125</td>
<td>228</td>
<td>207</td>
<td>170</td>
<td>180</td>
<td>239</td>
</tr>
<tr>
<td>Ave. cost/bus/day (U$)</td>
<td>214</td>
<td>469</td>
<td>466</td>
<td>475</td>
<td>481</td>
<td>491</td>
</tr>
<tr>
<td>Subsidies (U$1,000)</td>
<td>163</td>
<td>222</td>
<td>195</td>
<td>164</td>
<td>189</td>
<td>290</td>
</tr>
</tbody>
</table>


The subsidies allocated by Seoul city’s authority to address the bus system’s deficit were approximately $139 million in 2003 (pre-BTR), which increased to $222 million in 2005, $290 million in 2009, and $362 million (by some estimates) in 2010. The reason why subsidies for the bus deficit show an upward trend is to be found in an increase in the amount funded for the enhanced buses’ infrastructure and for operation-related debts.
Resilience: How resilient is the system?

As pointed out in the literature review, it is hard to measure the resilience of the system, or to ascertain how the bus reform influences the resilience of the system. I will work with two main indicators: bus traffic accidents and pollution indexes.

The following table addresses the reduction of bus accidents after the bus reform. The results are very consistent: between 2003 and 2010 there was a reduction of almost 60%. In terms of injuries, the number is also significant, with an improvement of almost 50%.

Table 13: Decline in monthly bus accidents and injuries in Seoul (2003–2010)

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus accidentes</td>
<td>2,742</td>
<td>1,947</td>
<td>1,789</td>
<td>1,207</td>
<td>1156</td>
<td>1,080</td>
<td>1,114</td>
<td>1,038</td>
</tr>
<tr>
<td>Injuries</td>
<td>2,089</td>
<td>1,446</td>
<td>1,424</td>
<td>1,189</td>
<td>1,151</td>
<td>1,064</td>
<td>1,095</td>
<td>1,013</td>
</tr>
</tbody>
</table>


Another dimension covers the environmental results of the reform. Out of a total of 8,110 buses prior to the reform, only 1,504 were equipped to use clean CNG fuel. The overwhelming majority of buses (81.5%) used diesel fuel, making that group of vehicles one of the main contributors to air pollution in Seoul. As of 2011, 1,329 low-floor buses, 20 articulated buses, and 7,234 CNG buses are in operation in Seoul.

To sum up, the present chapter has the objective of describing the cases of Rio de Janeiro’s and Seoul’s bus reforms. Firstly, the case of Rio was presented and illustrates many elements that were discussed in the literature review. The fact that I am part of the city government team during the transport system change makes it possible the assessment of the “in box” details of the reform. Secondly, the case of Seoul was presented. The description illustrates how relevant is the case and all the characteristics that makes it a benchmarks. However, it is important to recognize the side effects of the reform that was also part of the description.
5 – Discussion and Analysis

The current chapter has the objective of analyzing and discussing the cases of bus reform, comparing them with the literature review previously carried out. I will use the framework to organize the whole discussion and attempt to draw parallels between the cases.

Background / Context

According to the World Bank (2007), there are four phases in the implementation of a bus reform: a) Evaluation of the bus system; b) Definition of the transport-related objectives of your city; c) Establishment of a reform option; d) Carrying out of the implementation and the transition.

Regarding the evaluation of the bus system, we could say that Rio and Seoul are quite similar. Both are megacities with major infrastructural challenges. Mobility is an issue and buses represent a great proportion of passengers (Rio: 70% and Seoul: 30%). Both systems were seen to have inadequate service capacities. Problems include people waiting too long for a bus; bus services largely considered to be unreliable; and irregularity and unpredictability in terms of frequency and punctuality. In addition, both systems displayed poor route coverage and excessive fares.

We could also mention that both municipalities were in a similar political timing. Mayor Paes and Mayor Kan were at the beginning of their respective terms, occupying new positions in their political career. Both executives have the leadership and the ambition to make a profound change in the bus service (Kim, K. & Dickey, J. 2006).

After having performed a thorough analysis of the system, the second step is identifying the objectives of the reform. The objectives could be financial, in case the system is suffering from solvency problems; operational; or service-related, as when citizens constantly express their dissatisfaction at the current conditions. Such problems tend to emerge in industries where bus services are being provided by a large number of private sector operators with no coordination, where there is absence of competition, or an inefficient state owned-operator. The need for a reform might also be triggered by a social motivation, e.g., to improve affordability, accessibility, or to implement more ecologically-minded services.

Comparing what happened in Rio and Seoul to the approach proposed by the World Bank, both cities can be said to have established objectives in these three dimensions. Nevertheless, we can see that Rio was more focused on the operational and service-related objectives, whereas Seoul was primarily guided by financial objectives. In fact, a huge difference is that, in Seoul’s system, private bus companies were in a delicate financial situation. This singularity helped Seoul during the entire reform process.

It is important to address another difference between the cases. The development of the strategy of the bus reforms was completely distinct in each one. The World Bank (2014) emphasizes that “choices depend on the local context and so a “one size fits all” cannot apply”. In fact, any policy, before its formulation, needs the engagement of the main stakeholders in order to guarantee a successful implementation. To ensure such buy-in, participatory practices and mechanisms must happen during policy formulation. Among the practices, we could mention the preparation of first drafts and
workshops to get suggestions from the public. The information obtained through these and other means would then help structure the upcoming public policies.

Seoul follows the guidebook. The city spent at least two years in preparation. They invited a group of specialists who collected the data, made scientific studies of the mobility patterns of the city and, at the end, proposed the reform strategy. Seoul’s government knows exactly where they want to be in the near future. On the other hand, Rio did not set up a strategy. In the language of business, we could say that Rio developed an emergent strategy (Mintzberg, H 1994). It is likely that this difference may account for why the bus reform in Seoul took two years to be completed, whilst Rio’s reform is still in operation.

Finally, there were the financial factors. The Seoul Metropolitan Government is definitely richer than Rio’s. In fact, Seoul had the money power to push the reform forward with high levels of subsidy. Rio, on the other hand, benefited from the approximation of a unique calendar of massive events, which attracted a massive amount of investments to increase the mobility of the city.

**Main actors**

Regarding the main actors of the bus reform, we could say that there are more similarities than differences. In fact, both figures are quite the same. The only aspect that should be mentioned is the role of the citizens. Seoul created a citizen committee since the beginning of the bus reform and this engagement helped the city government in many situations. Rio de Janeiro almost neglected the citizens; this is a fault that is still bringing problems to the city government. The riots of 2013 are just one example of how important civic involvement is.

**Structure of the industry**

The toolkit of the World Bank affirms that the “structure of the transport system is an important factor in determining the nature and cost of the service provided and the types of vehicles operated”. Usually, if small private operators rule the system, most of the buses are small. In fact, small companies do not have the financial power of big organizations. A contrasting example is a scenario in which the public transport system is vastly dominated by large corporations. This generates few incentives for a good coordination of the network. In short, the operator of the system – its size, in particular – can exert a significant influence on its operating costs. Seoul and Rio have almost the same number of private operators, 46 and 58 respectively. Both systems have an oligopoly-based model where competition is limited. A slight difference is that Rio has four consortia to manage the whole system.

In their study about the results of the Seoul bus reform, Estache, A. & Gómez-Lobo, A. (2004) recommended “combining restrictions with competition for the market and combining entry restriction with yardstick competition to increase competition”. According to the authors, tendering bus routes could be a powerful regulatory instrument to solve the information issues among the players, thereby increasing competition in the industry. Both of the cases analyzed integrated tendering processes into their reforms; the problem was that the same private companies that operated before the reform won the tenders. The routes were still like private properties and the government has limited influence on that.
In Seoul, Kim, S & Shon, E. (2010) analyzed the side effects of the bus reform and concluded that “there is still no competition in the market, and a continuous increase of subsidy levels”. Despite that fact, there were no visible entry barriers in the market; the reality is a scenario without competition. New players did not join the market. This conclusion could also be made regarding the situation in Rio. In fact, this is a challenge that neither case has overcome yet.

The law

The guidebook of the World Bank (2014) made some generalizations about the structures of the public transport industry in different countries. They suggest that there are three main types:

a) Unified Public Model: where a monolithic public entity owns and operates public transport services in the city.

b) Closely Supervised Private Model: where the planning and coordination functions are separated from the operating functions.

c) Loosely Supervised Private Model: where there is no centralized or coordinated planning, and there are multiple independent operators.

The cases of Seoul and Rio would be labelled as closely supervised private models. As well observed by (Mitric, S. 2008), “we have the desired practice of the private sector delivering services, based on competitively awarded, medium-to-long-term contracts. The public sector retains regulatory functions (deciding on vehicle specifications, routes, service frequencies, fares) and, most often, the ownership of infrastructure (for rapid transit modes). The government is also responsible for system expansion and other long-range planning matters”.

The third step of the World Bank toolkit is to “choose a reform option among the eight different possibilities”. With this in mind, we could define Rio’s reform as a gross cost route contract – such a categorization applies to situations in which an authority issues a contract for the operation of one specified route or a specified group of routes and all the revenues are distributed to the private operators according to their work. Conversely, Seoul’s reform is a net cost route contract – a scenario in which an authority issues a contract for the operation of one specified route or a specified group of routes and the authority pays a subsidy to the operator if the bus services are unprofitable. The toolkit maintains that, in this type of reform, the operator has to forecast both his costs and his revenues. It is important to mention that Seoul is different from this label because the government is also responsible for making this kind of forecasts.

The most relevant issue in the legal dimension is how governments can engage private operators for the reform in order to establish a robust legal framework that guarantees the duties and the rights for both parties. The singularity of the sector is that the government is usually in the hands of the private sector. It is very hard to completely substitute the current players for new ones in the short term. In Seoul, the city government dealt with this issue by signing an agreement in February, 2004. As I mentioned before, to encourage the participation of bus companies in the voluntary route-adjustment process, the city government needed to come up with a scheme to cover the operating costs. The city government decided to pay for the operating costs
in advance by considering the difficult financial conditions being faced by bus companies. To ensure objectivity, two accounting firms, one selected by the City Hall and the other one chosen by the cooperative, estimated operating costs. In Rio, the situation was slightly different. The fragility of the old instruments induced private operators to agree to participate in a bidding process. In fact, Rio set up a concession contracts where all the rules were written out.

**Finances**

Several cities around the world have tried to cover capital costs with the public budget and the operating costs with fares obtained from usage. The Transmilenio in Bogota, the subway system in Singapore, and the National Urban Transport Policy in India have all adopted this principle (World Bank, 2014). Rio and Seoul followed the international benchmarks regarding the CAPEX and the OPEX of their bus systems.

A relevant difference between Rio and Seoul is the subsidy policy. In fact, one of the most common reasons for cities to reform their bus systems is an excessive subsidy requirement that continues to rise and becomes unsustainable over the years (World Bank, 2007). Rio does not have any kind of subsidy. The belief of the current mayor is that subsidies will work as a snowball that no one will have control over on the long run. Despite this belief, it is important to mention the observation of Mitric, S., 2008. He pointed out that price subsidies and even cross-subsidies in public transport services of large urban systems are a valid instrument of social and transport policy. In fact, the author stated that subsidies could be good if the objectives are clearly defined and the subsidy is correctly targeted, has financial feasibility and is properly delivered.

Seoul’s subsidy policy was common before the bus reform and reinforced after that. On the one hand, the reform considerably increased the level of the bus service in Seoul. On the other hand, financial sustainability is weak because of the huge amount of subsidies in the system. In fact, as part of the bus system reorganization, the government of Seoul signed a contractual agreement with private bus companies to reduce the business risk to zero. Even the operating cost was covered at the beginning of the process. The obvious result was the willingness of the private companies to jointly implement any kind of bus reform. However, as pointed out in Kim, 2005, it meant that SMG “had to cover an operating subsidy of US$135 million in the six-month period after the reforms. This meant that annually they would need to pay US$270 million annually just for bus services, almost three times what they were paying prior to the reorganization”.

The study from Kim, S & Shon, E. (2010) reinforced this conclusion and added to the idea that the subsidy policy adopted by Seoul promotes non-competitiveness. In their own words, “the revenue and subsidy are apportioned to each operator based on the vehicle-km supplied using a simple linear standard-cost model. Operators keep none of the revenue but their operating costs are reimbursed with a management fee.” As I mentioned before, there was no revenue-related risk for private operators, who received a fixed income from governments. This type of contract is similar to a gross cost regime of a tendering contract; the significant difference is that Seoul’s scheme is not exposed to competition. Most countries originally bargained annually and individually with each company over both costs and transfers. What is different in the practices in Korea is that the municipal governments bargain with the association of private bus companies in the region. As a consequence, as well as the high mode share
of buses in general, private bus companies in Korea tend to have a stronger bargaining power.

Another financial aspect of the bus reform is the fare model. Here, the studied cases took completely different paths as we can see in the following table:

**Table 14: Types of fare model – Seoul and Rio de Janeiro**

<table>
<thead>
<tr>
<th></th>
<th>Type of Fare System</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rio de Janeiro</strong></td>
<td>Flat; revenues go directly to the private companies.</td>
<td>• Easy to communicate;</td>
<td>• Encourages competition among bus drivers and antisocial or dangerous behavior;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hard to guarantee revenues’ reliability;</td>
<td>• Encourages bad competition between the private companies;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hard to regulate the systems.</td>
<td>• Passengers who need integration between modals pay more.</td>
</tr>
<tr>
<td><strong>Seoul</strong></td>
<td>Distance-based; revenues go to the trustee and later refund private operators.</td>
<td>• Fairer for passengers;</td>
<td>• Poor people (who live far from the center) usually have to pay more.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Stimulates the integration of truck and feeder route systems;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Government could easily propose regulation incentives;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduces any incentives for speeding, reckless driving, and discrimination.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s analysis

It is important to mention that Seoul’s model is almost hybrid. The “flat fare system” is applied to buses travelling across city limits, for example in the metropolitan region. In other words, the city government made an option to apply a flat rate for travel distances of 40 km or more. I believe that in the long term Rio will move to Seoul’s model. The BRTs have shown that this is a trend that cannot be modified.

Another element of the financial dimension of bus reforms is the fare collection and how the fare integrity is preserved (World Bank, 2007). In this respect, Seoul is some steps further than Rio de Janeiro. Seoul is the capital of one of the most “smart countries” of the world, and this can be seen in their use of T-money, a superb technology which is spreading to other cities (Audoin, M., 2015). Almost 100% of passengers use it. In Rio, the Riocard technology offers many problems. Lack of fare integrity, lack of integration between modals, confusion between different types of
cards are just a few examples of the challenges. Finally, it is relevant to mention who the owner of the card company is. In Seoul, a consortium of SMG, LG and private funds built the company. On the other hand, in Rio the owners are just the private operators.

As a benchmark, it is relevant to mention the recommendations of Park, J. & Kim, D. (2013) regarding the pre-requisites to adopt Seoul’s fare system. “First, the system requires smart card ticket usage at 100%. This is because travel distance and fares can be calculated only for passengers using smart card tickets. Second, as for the buses employing a flat rate system, it is necessary to install distance-calculating devices on the buses or at bus stops. There is also a need to replace the existing ticket vending machines, and to continuously monitor the card ticket issuing machines to find out any malfunctions and implement repairs. Third, it is necessary to provide support to people with mobility handicaps (disabled, elderly, children, etc.) in regards to the use of public transport services. Fourth, rate tables should be posted properly to provide exact information on the determination of fares, because under an integrated distance-based system, it is difficult for passengers to figure out correctly their travel distance and the expenses they have to bear. Fifth, it is necessary to increase demand for bus travel”.

Regulation

According to the World Bank (2014), there are three main subjects to be addressed in a discussion of a regulatory institution of public transport. Firstly, the institution’s scope of responsibilities (for example, comprehensive, limited to managing the public transport system alone, or limited to strategic planning only). Secondly, how the government will empower the agency in order to implement the regulation procedures (for example, dedicated legislation, generic statute, executive order or agreement). Finally, how the agency will guarantee their funds. The guidebook proposed three types of agency:

- a) An institution which operates as an exclusively planning entity that also sets investment priorities but has a limited role in regulation and operations.
- b) An institution which is responsible for managing the public transport system but not the physical infrastructure, like roads and bridges.
- c) An entity with a comprehensive responsibility for urban transport that oversees and directs the public transport system and also has a responsibility toward planning, construction, maintenance, and management of the physical infrastructure, like roads, sidewalks, and parking.

Seoul’s and Rio’s authorities are part of the city government. Both of them have departments in charge of transport management. The type of agency would be more similar to the second type proposed by the World Bank. The physical infrastructure, i.e., the installment of roads and bridges, is managed by the construction department of each government. The financial support came from the municipal budget of each city.

An important element of the regulation is rule enforcement. A regulatory system must be enforceable. Mitric, S. 2008, mentions that “this requires regulations that are appropriate under specific circumstances. Whether the reform involves deregulation or formalization, a strong regulatory framework is needed, guaranteed by a competent
and politically stable institution”. Seoul has very strong procedures to guarantee that the rules of the contracts are being followed. The technology of the bus systems and the capacity of the employees to manage the data are the foundation of Seoul’s well-regulated framework. They promote a yardstick regulation where efficiency is an element of remuneration. Rio de Janeiro still has opportunities regarding regulation enforcement. There is still an all-pervading culture saying that the government fails in holding private companies responsible for achieving the goals previously set in contracts. The municipal government has recognized such challenges and is moving forward to improve its procedures. The hiring of employees is an objective solution. With the right training, SMTR could institutionalize a new culture of bus regulation.

Another aspect of regulation is fare control. An appropriate fare policy is relevant to sustain reasonable services that meet demand aspirations and at the same time provide private operators with an adequate return on their investment. Hook, W., (2005) present some international cases of bus reform and it seems that Seoul follows the cases of Curitiba and Bogotá. On the other hand, fare control is the Achilles' heel of the Rio bus reform. Rio set up a formula in the concession contract to give transparency for the annual adjustment of fares. However, critics still claim that there is an absence of information. NGOs usually highlight the political power of private operators as the main force in defining fare levels. As I mentioned before, the 2013 riots were mostly triggered by the increase of 20 cents in Rio’s bus fares. Such a scenario suggests that the city government should develop more elements of transparency and try to engage the main stakeholders in the process of fare adjustment.

**Technology**

Technology is a relevant element of the bus reform in any country and is kindly neglected by the literature of the World Bank. As we saw in the case of Rio, the operational center of the city and the big data team (PENSA) have been crucial for the success of the bus reform. In addition, buses’ GPS systems offer plenty of solutions to enhance the management of the system.

We could say that Seoul is a benchmark in terms of technology use. There were three main technological innovations: a) the T-money, b) the Bus Management System (BMS), and c) TOPIS (transportation management system). In a markedly pragmatic approach, all of Seoul’s innovations were designed to solve real problems. The T-money made the integration of modals possible, guaranteed the integrity of the revenues and produced large amounts of usable data. In addition, the BMS provided information and knowledge to manage the daily operation of the buses and also the long-term plans. Finally, TOPIS is a high-end center, a reference for many cities around the world, and it has proved immensely helpful in dealing with everyday traffic-related situations.

**Capabilities**

Another element of a bus reform lies in the outlining of the capabilities of the government and of private operators. The changes of the bus systems of Seoul and Rio led to the generation of a new process that needed new capabilities and trained employees to make it happen.
Among the new capabilities, route design is one of the most important. Rio and Seoul used route design as a pillar of the reform. Both cities tried to optimize the routes and establish truck and feeder lines. In fact, cities need a well-established, budget-constrained mobility planning process that effectively guides long-term transportation infrastructure development. This requires institutions to have the proper organization, tools, and processes in place to achieve goals (HooK, W. & Hughes, C. 2016 and World Bank, 2007).

The route design of Rio had two phases. The first phase started with the introduction of the BRT lines. The whole map of routes which overlapped with BRTs was redesigned. The implementation of BRSs also changed the route system. The second phase consisted in a rationalization of the whole system, which started at the beginning of 2016. Many routes are changing and the population is not supporting the process. NGOs constantly accuse the government of blatantly favoring the interests of private companies, who, in turn, criticize the City Hall’s centralized approach. In short, we believe that the current lack of transparency could force the government to halt the process. In fact, one of the city officials recognized that the rationalization should come together with the implementation of BRT lines. Communication is another issue that is neglected by the city.

The process of Seoul is also labelled as a half success. Kim, G. 2012 discusses some news from the period of the reform WHICH affirm that about half (49%) of the route alterations and abolitions had the intention of improving financial conditions of private operators. Citizens were questioning themselves as to what exactly were the objectives of the bus reform: profits for private companies or better quality in the services. The same news mentions that the city government did not make sufficient communication efforts, and the frequent route adjustment elicited complaints from users. According to another piece of news, “to reduce the financial deficit, the city government is frequently taking adjustment steps such as route abolition, route shortening and reduction in the number of buses put into operation, targeting routes with low ridership and overlapping lines. The profitability of routes is directly related with the amount of subsidies the Seoul city government has to provide. Thus, there is a tendency to close or reduce the number of unprofitable lines. Efforts should be made to improve bus service reliability and refrain from frequent route changes”. (Seoul Shinmun, 2005. 6.27 apud Kim, G. 2012).

Finally, it is important to address the capabilities of the operators. Operating practices can have an important impact on operating costs, and also upon the profitability of the operators, fare levels, service capacity, reliability and frequency. Scheduling procedures are particularly significant (World Bank, 2007). The new generation of bus players in Rio recognized the importance of productivity. Recently, seven companies went bankrupt, which reinforced the relevance of efficiency. The city government is trying to create mechanisms to induce industry consolidation and the sharing of well-executed practices. To give a specific example, we could mention the formation of the four consortia. Each consortium is made by ten companies. Each company has their own administrative department, personnel department, and so forth. One of the outputs could be the merging of all these departments into one main structure for the entire consortium.

The situation of Seoul was quite similar. The efforts to increase efficiency demand some time. In fact, the study of OH, M. & KIM, S. 2005 concluded that “the
productivity of bus companies was found to have fallen compared to the pre-reform period, according to the results of a productivity evaluation based on the operating distance, which is the criteria for giving out subsidies”.

**Infrastructure**

An interesting research from Hook, W., 2005 observed that a relevant number of cities have been using the “BRT lines to: a) Facilitate a smooth transition to a sometimes more efficient ‘trunk and feeder’ or ‘hub and spoke’ bus routing system; b) Increase private sector investment into the transit system; c) Change private bus operating contracts to include quality of service requirements”. I could affirm that this is the case of Seoul and Rio de Janeiro. Seoul invested in medium bus lanes as the initial step of the bus reform. Rio de Janeiro also used BRTs as a main element of the reform. The unique calendar and the huge amount of investments to increase the mobility of the city guaranteed the funds to improve BRT lines.

Another dimension of the infrastructure are the interchanging facilities. Bad conditions in interchange facilities will increase passengers’ inconvenience in transferring from one bus route to another, thereby inhibiting integration policies (World Bank, 2007). Both studied cases recognized the relevance of interchange facilities to improve integration between modals and also to stimulate passengers to use truck and feeder route systems. There was a significant amount of money in Rio and Seoul for intermodal stations.

Finally, a recurring complaint in many cities is that the quality of buses which are being used to provide the service is poor. According to the toolkit of the World Bank, each type of vehicle has a role to play, and to some extent all may be complementary to one another as part of the overall public transport system. Rio and Seoul followed the theory in this sense. A relevant amount of money was devoted to the renovation of the fleet. Articulated buses were bought, accessibility increased, and an air conditioning system, which is obvious in Rio, became a pre-requisite.

**Other elements**

The description of Rio and Seoul’s cases of bus reform sheds light upon some elements which are slightly neglected in the guidebooks of the World Bank. The toolkit mentions this issues but does not offer them the relevance that they deserve. In fact, I did not explicitly show these elements in the proposed framework.

The first element is the role of citizen participation. Seoul proved that new ways of governance could be the success factor for a breakthrough in city management procedures. The city government recognized that a complex issue like a bus reform needs a new approach wherein the government is just part of the solution. Before the beginning of the reform, Seoul created the Citizen Committee, in which plenty of stakeholders were represented and jointly took part in collaborative decision-making processes. I could say that a citizen committee would definitely help Rio de Janeiro’s city government to deal with the idiosyncrasies of such a reform.

The second missing element is communication. In Seoul, the extensive changes in routes caused significant confusion for the public at the beginning of the implementation. Passengers did not understand the number of the buses and the new bus routes; fares had increased for long distances because of the distance-based fare
system; and the T-money card did not work properly. The chaos among passengers indicated that more time and communication efforts were needed to engage the citizens for the gentle implementation of the bus reform. Rio de Janeiro suffered the same impacts. To give a specific example, the rationalization process is still a source of headache for the municipal leaders. I believe that this is part of the game. However, communication efforts could work to minimize such setbacks. The reality is that politicians are very good at political marketing but have a lot of trouble in conveying information related to day-to-day actions. In this sense, a robust bureaucracy (in the good sense of the word) with skilled employees is strictly necessary.

Finally, it is important to correctly manage the issue of bus drivers. As we could see along the description of both cases, a relevant part of the problems of the bus systems came from bus drivers’ work conditions. In Rio de Janeiro, the labor union of bus drivers is not seen to be strong. Because of that, the city government leaves work relations in the hands of private operators. On the other hand, Seoul interfered directly in the negotiations drivers’ wages. At the beginning, it looked like a good approach; however, this proximity induced politicians to intensify labor conditions, which consequently increased the cost pressure of the system. City governments must find the “fine tune” of this stakeholder management in order to guarantee good conditions for bus drivers while also preserving the health of the system.

Results

The last element of the proposed framework of the bus reform are the final results. As we could see in the description of the cases the results are mostly positive. In Seoul, the reform occurred in 2004. There are vast amounts of data and studies documenting the results of the bus reform in the short and medium term. In contrast, the reform of Rio is still under implementation. There are some results, especially related to the new lines of BRT, but it is still too early to define the impacts for the long run.
6 – Conclusions

The twenty first century will be the era of cities. The process of urbanization grants cities a unique position in the contemporary world. More and more people are moving to cities in order to get jobs, broaden their cultural horizons, make new friends; in other words, to get a better quality of life. Some specialists compare the city to a hub of economic opportunities and innovation. In this context, cities are suffering a huge infrastructural pressure. In fact, it is believed that many places around the world are not prepared for the challenges posed by the contemporary scenario.

Among the challenges presented, mobility has been known to be one of the most critical ones. Cities are collapsing. The car-based culture of most of the world produces a chaotic situation where traffic congestion consumes billions of dollars of our citizens. Governments have to deal with this issue by increasing public transport capacity, insofar as that is usually the most effective way for people to move around.

Buses are the main mode of transportation in many cities of the world, especially in developing countries. Budget constraints create a situation in which the best solution to improve mobility levels is a bus reform. There is a wealth of studies discussing how cities should develop a transportation reform, or even how a bus reform should be made. However, there is an absence of practical studies, with practical cases, to inspire and give recommendations for public leaders to implement bus reforms. The current work wants to fill this gap.

My research question, therefore, is: “what are the critical financial success factors for the implementation of a bus reform in large urban systems?”

The objective is to identify the main elements required to develop and implement a successful bus reform. I have attempted to do that by making a comparative study of two successful cases: Seoul and Rio.

Seoul’s bus reform started in 2004 with an historical agreement signed by the mayor, the transport authority, and the private operators. All of them agreed to change the bus system by adopting a “quasi-public model”; according to such a paradigm, the government assumes the responsibility for route planning, management and monitoring of the system, and private companies operate the buses. The government also introduced a new fare system and new processes of contract regulation. Seoul used technology as a pivotal element, with the T-money innovation, an impressive bus management system (BMS), and a cutting-edge traffic monitoring tool (TOPIS). The reform was consolidated with a significant investment in medium bus lanes (BRTs) and other forms of infrastructure. The results are clear, and the efficiency and resilience of the bus system have turned Seoul’s reform into a benchmark.

Rio de Janeiro, conversely, used the huge amount of investments in mobility made possible by the forthcoming presence of the world’s biggest sports events (the World Cup and the Olympic Games) to address the challenges of the city’s bus system. The city government combined the structure of concession contracts that established the duties and the rights of all stakeholders with new lines of BRTs to increase the capacity of the public transport system. Rio de Janeiro is expected to triple mobility rates by public transport until 2016, thereby establishing a new level of service – one based on frequency, punctuality and comfort for all users. Among the innovations, the city government has created an integrated card (BUC) and used the technology of the
Seoul and Rio offer a myriad of good insights into the development of a bus reform. In fact, the comparative analysis underscored some success factors for the implementation of meaningful innovations in the transport system. First of all, leadership is the base of every change. A strong, empowered, ambitious leadership is essential for things to be transformed. Secondly, a strategy must be designed in order to address the peculiarities of each context. It is impossible the follow a universal, one-size-fits-all book. Third, a bus reform should combine infrastructure solutions with a feasible financial model. Finally, citizens must be engaged during the whole process. At the end of the day, they are the owners and the clients of the bus reform.

Despite the fact the Rio and Seoul have achieved amazing results in their reforms, some recommendations to refine the process could be ventured:

**Rio de Janeiro:**

- Strategy and planning are key success factors to implement a bus reform, and I believe this was neglected by the city government. In fact, it seems that “timing” was a problem. Instead of adopting the whole reform at once, Rio is still attempting to operationalize some of the proposed measures;

- Another recommendation is related to the management of the relations between private companies and the government. It is clear that the concession contracts were a relevant step. However, there are still some opportunities to enforce the regulation. Rio should develop new systems and new capabilities to better manage the concession, thereby increasing the efficiency of the systems;

- The fare system might still benefit from further improvements. The BUC (Bilhete Unico Carioca) is not enough to guarantee the full-fledged integration of the system. New technologies must be adopted and a distance-based fare model should be evaluated. Moreover, the whole process demands more transparency;

- Finally, citizen engagement must be actively pursued. The idea of establishing a citizens’ committee, as was the case in Seoul, could be a solution for Rio de Janeiro.

**Seoul:**

- The adoption of the new route tendering strategy made significant changes in Seoul’s bus system. However, there is still a lack of competition. The only way to increase the productivity of the system is through the adoption of new tender procedures to produce competition. New players must join the market, and, in order to do so, they must be granted opportunities by the city government;

- There remains something to be said with regard to the subsidy policy. Seoul spent a large amount of money on subsidies. Most of the cities have budget constraints which hinder or obstruct the adoption of similar policies. As previously discussed, subsidies could be used but in a better way. The complete absence of risk for private companies creates an environment of laziness. The city government should change the regulation procedures and, once again, create incentives for competition.
Moreover, there are some recommendations which are common to both cases. Firstly, there was no relation between the public transport policy and the land-use departments. Even though Rio and Seoul are megacities with international exposure, the Silo Effect is a reality. Secondly, the metropolitan discussion is still very incipient. Seoul’s authority is a metropolitan government, but metropolitan issues have not been given their due treatment. There is still a lack of integration with the metropolitan area. Finally, despite the great results of both cases, the bus reform has not changed the pattern of the public transport usage. In fact, we have not seen people moving from private cars to public transport. In other words, sustainable solutions have not been achieved yet.

In conclusion, the comparative analysis of the proposed cases with the literature of the current work suggests a framework to implement a bus reform. As I mentioned before, frameworks have limits in their usage but could eventually help to structure the main steps.

**Figure 13: Proposed Framework of Bus Reform implementation**

Source: Author’s analysis

First of all, the city government must elaborate a detailed diagnosis of their system – a fact-based analysis resulting in a structured strategy to develop the reform. A sound, clear understanding of the context will help the leader anticipate and address the regular obstacles of the process. At this stage, a stakeholder mapping should be made in order to understand the needs and interests of each participant, as well as the relations between such interwoven actors.

Once the plan has been devised, implementation should follow immediately. During this stage, some elements should be taken into consideration:

Industry structure: competition is the engine of the system and, as such, it should be reinforced.

The law: a legal instrument should be settled upon. The definition of duties and rights of the main stakeholders is essential.
Finance: the transport system should embody the feasibility of an intelligent, fair model. Authorities should aim at combining the public interest with the profitable ambitions from the private sector.

Regulation: the rules should be clear for all. In addition, governments should create mechanisms of incentive to force bus companies to improve their efficiency.

Technology: Technology and innovation should be partners at the reform. Governments should use them as much as they can.

Capabilities: Skillful employees and efficient operators are part of the reform. Government and private players should seek new capabilities with extensive training.

Infrastructure: A bus reform should be combined with a growth in capacity. In addition, interchange facilities and improvements in bus quality would intensify the effectiveness of the reform.

Citizen engagement: The citizen is the client and the owner of the bus reform. They should be part of the solution by demanding new ways of governance with regard to mobility issues.

Results: results should be monitored constantly. Without monitoring, governments could lose the correct path of the reforms.

Finally, the current work has shown a broad range of possibilities of new studies related to the bus reform theme. First of all, I believe that the thesis analysis of Rio’s and Seoul’s case is not exhaustive. In fact, we still have many aspects that should be addressed. A longitudinal study with Rio and especially Seoul to analyze the long-term effects of the bus reform would give a real panorama.

The second range of studies that came up from the current work is related to others benchmarks. As I mention in the literature review, cases like Curitiba and Bogotá have a plenty of elements to inspire other cities to implement the bus reform. In other words, the application of the proposed framework in success cases around the world would be relevant.

Regarding the type of research used in the master thesis, I focused on a qualitative study. As I mention in the methodology chapter, this method is suitable for the propositions of the current work. However, I believe that quantitative studies would also add to the debate. Among the examples of researches: empirical studies to test the hypothesis of the framework proposed in this thesis; empirical studies to validate or call into question the success factors of the bus reform proposed and quantitative studies to test the correlation between the results of the bus reform and the political framework of the cities;

Finally, I believe that success cases should be studied but also the failure cases. Quantitative and qualitative researches of failures in bus reforms around the world would add up to the literature. Despite the difficulty to obtain data from failures, a complete understanding of their development could assist the implementation of a successful bus reform.
7 - REFERENCES


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Appendix I: Questionnaire

Guidelines of the Interview:

1.1 – Personal Data
Name: ___________________ Gender: _________ Age: ___
City of residency: _____________ Academic background: ______
Professional occupation: ______

1.2 – Background
What is the history of the transport systems of your city?
What is the history and the importance of the bus system in your city?
How was the bus system before the bus reform proposed?
How was the context?
What were the motivations to implement the bus reform?
How is the culture of using public transport of your city?

1.3 – The actors
Who are the main actors in the bus system of your city?
Can you describe the functions of each actor?
How are the relations between them, and how is the decision-making process? Did that change over the bus reform?

Industry Structure:
How many players do you have as operators?
Is this a monopoly or not? Who are the market forces?

The law:
What are the legal instruments that manage the relations between operators and the government?
How are they structured? Are there tenders?

Finance:
How is the bus system financed? How do you finance CAPEX and OPEX?
What is the business model? How do you pay the operators?
How do you set and control the fares? How do you collect the fares? How do you guarantee revenue integrity?

**Regulation and incentive policies:**

How does the government regulate the relations between the actors of the bus system? Who regulate the relations and how do you finance the agency?

Are there any incentive policies for bus operators, and how are they implemented?

How about the rules, how are they enforced?

**Technology:**

How is technology used to increase the efficiency of the system and the comfort levels of its users?

What is the main software to improve management capabilities? How is technology used to improve fare collection?

**Organization Capabilities:**

What are the main capabilities of the government? Route design, planning and monitoring?

What are the main capabilities of the operators? Operating costs, operating practices, vehicle maintenance, bus utilization? How does an operator guarantee efficient systems?

**Infrastructure:**

What are the central infrastructures developed for the bus reform? How did the system finance them?

Do you have interchanges in the transport system and how many? What are the type and the size of vehicles?

**1.4 - Results**

What are the main results of the bus reform? Please elaborate the results in terms of:

Efficiency: Importance of buses, Travel efficiency (reliability coverage), Accessibility, Affordability, Travel experience (comfort);

Sustainability: Financial Management, Profitability of the system, Amount of subsidies;

Resilience.

**1.5 – Final considerations**

In your opinion what were the success factors of the bus reform?

If you had a chance what would you do different and what would you reinforce?

What about the next steps? What is your vision for the future of the bus systems in your city?
Agreement

The 57 participating bus operating companies in the Seoul Bus Transport Association have agreed at the extraordinary general meeting held on January 16, 2004 upon this Agreement which is a result of discussions of the Bus Reform Public Committee and reflects the reform plans of the bus routes and their operation system that Seoul City is planning starting from the second half of 2004. They have authorized the Chief of the Seoul Bus Transport Association with the power of attorney to sign the Agreement with Seoul City. Therefore the mayor of Seoul City and the Chief of the Seoul Bus Transport Association agree to execute the following provisions using their best efforts.

1. Enforcement of the bidding system for 10 axes of the main road routes
   • A bidding system will be enforced for 10 axes of the main road routes.
   • In case of bidding Seoul companies will be prioritized, for example by way of awarding Seoul companies extra points for the bidding process.
   • An optimum price tender method will be introduced that takes into account service levels and the bidding price (total cost) to prevent negative effects like low price bidding.
   • The license awarded due to the route bidding process will be limited but will be prolonged if there are no drastic issues.

2. Institutional guarantee of a certain operational profit
   • Legal grounds, as the financial subsidies according to the enforcement regulations of the Passenger Transport Service Act, will be reenacted and regulations about the main and branch route bus operation and its financial subsidies will be regulated by Seoul City ordinances.
   • To guarantee objectivity and fairness expert institutes will be consulted to calculate the adequate transport cost and cost per route per km as well as adequate operational profit. Such numbers will be finalized after a review by the Bus Reform Public Committee but will also consider prior discussions with the bus industry.
   • Agreed transport costs and adequate operational profit will be guaranteed even if the total income by total cost is negative. This will be regulated by ordinances.
   • In case there are changes to the price due to agreed change factors, such as an increase in wages, there shall be an institutional measure to adjust the cost.

3. Adequate compensation in case surplus vehicles occur
   • There will be a resetting of the route system to prevent surplus vehicles. However in occurrence of such cases, such surplus vehicles will be compensated adequately.

4. Measures against debts
• Existing debts of the bus companies will be resolved by each bus company through reevaluation of its assets, investment, selling of its vehicle storage facilities and parts of its route operation licenses.

• Within the next five years, in cases of vehicle storage facilities that the bus companies want to sell and that are needed for the bus reform, there will be prioritized buying equivalent to the public procedure for the procurement of administrative assets (real estate).

• Companies that participate in the Seoul bus reform will consider support through low interest loans (equivalent to the special ordinance grow middle or small businesses and the small merchants of Cheonggye Stream) and will proactively discuss with financial institutions to conclude loan contracts using the city buses as collateral.

5. Existing operational licenses of the 57 companies will only be changed in its operational content and will be otherwise guaranteed

• To guarantee the existing operation licenses and business licenses of the 57 companies, the bus system reform will be enforced by changing the operational content.

6. Other

• The details that are needed to execute this agreement will be agreed upon Seoul City and the Seoul Bus Transport Association. However if no agreement can be reached the Bus Reform Public Committee will mediate.

February 4, 2004

Mayor of Seoul LEE Myung-bak

Chief of the Seoul Bus Transport Association KIM Jong Won