

DEVELOPING BUS RAPID TRANSIT SYSTEMS IN BRAZIL THROUGH PUBLIC PRIVATE PARTNERSHIPS

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ABSTRACT

By the end of the 1970's, Brazil was leading the implementation of high-flow bus priority schemes. Busways were introduced in cities like São Paulo, Curitiba, Porto Alegre, Belo Horizonte and Goiânia under the coordination of a Federal agency. But the constitutional reform of 1988 delegated most of the Federal attributions back to States and Cities including those related to urban transit transportation, causing the curtailment of a successful national program. Many Brazilian cities are incapable of contracting financial debts to implement public infrastructures and private investments geared towards implementing new urban transport infrastructure are still very limited.

In Brazil, there is a great predominance of buses over rail-based technologies in the provision of transit services. The operation of the transit systems is mostly private, with fares covering vehicle capital and operating costs whereas the public sector provides and maintains the infrastructure for operating the bus services. This paper explores new dimensions for the participation of the private sector in the provision of the transit infrastructure based on public-private partnership (PPP) schemes conceived for bus rapid transit (BRT) projects in São Paulo and Porto Alegre.

The regulatory-normative framework in Brazil is based on the concept that the State should provide only infrastructure services that are essential and when no other source is available. The 1995 Concessions' Law provided the legal-institutional framework for private participation to proceed on a wider scale in the country. A 2004 law establishes the general rules for PPP and provides for solid public payment guarantees as part of an additional effort to attract the private sector to invest in infrastructure and to eliminate the existing bottlenecks that have put the Brazilian economic development on hold.

BRT systems, as opposed to rail-based technologies, have the ability to deliver a high-quality mass transit system within the budgets of even the low income municipalities. It is estimated that only the Brazilian cities with more than 1 million inhabitants present a potential for implementing 590 km of bus corridors. Most of the already existing busway corridors in Brazil need renovation and BRT systems offer the opportunity of increasing transit productivity while overcoming the problems generated by the irrationality of multiple superimposed radial routes converging to terminals located at the city centres.

The BRT project of Porto Alegre consists of a diametral route crossing the city centre and linking trunk and feeding interchange terminals being planned to accommodate areas dedicated to retail and service activities. It is expected that these areas shall generate enough revenues to remunerate private investors, under a PPP scheme, for the construction of the terminals and most of the infrastructure required to upgrade some sections of the existing busways to BRT standards. The BRT project for the East-Northeast zone of São Paulo proposes to use value capture mechanisms made legal by the Statute of the Cities, enacted in 2001. These include the concept of an urban operation – a legally defined set of interventions and projects to be carried out within a specific area – and the issue of tradable certificates of additional building rights in the area. In combination, these mechanisms allow the anticipation of the financial resources required to execute the proposed projects needed to raise property values in the region.

INTRODUCTION

Brazil had a leading role in high-flow bus priority systems by the end of the 1970's. EBTU, a federal agency for public transportation based in Brasilia, coordinated national and international actions that lead to the implementation of busways operated, in some cases, by more than 200 buses/h/direction in cities like São Paulo, Curitiba, Porto Alegre, Belo Horizonte and Goiânia. For example, Curitiba is known as the first Bus Rapid Transit (BRT) system in the developing world; São Paulo introduced a high-flow ordered bus conveying system in mixed traffic conditions, and Porto Alegre implemented the busway concept combined with the ordered bus conveying system.

Following the recommendations of international multilateral organizations, EBTU's successful model of centralizing the coordination and promotion of regional wide public transportation policies was transferred to other countries in Latin America such as Mexico and Venezuela. A somewhat similar initiative is starting now in Colombia, where BRT systems are booming. Nonetheless, the constitutional reform promoted in Brazil in 1988 delegated most of the duties and functions of the federal government back to states and cities, including those related to public transportation, causing the closure of EBTU and the curtailment of a successful urban transportation program.

Since the 1990's, the lack of a fiscal responsibility limiting the expenses of the public sector has made many Brazilian municipalities incapable of contracting financial debts to implement public infrastructures. While the energy and the telecommunication sectors went through a rapid process of privatization in Brazil, private investments geared towards the implementation of new urban transport infrastructure are still very limited in the country. Road, rail and port sectors secured some private investments for infrastructure through concessions. But transportation problems in urban areas tend to have metropolitan scale and decisions require the agreement of multiple decision-making instances. Furthermore, as metropolitan authorities do not have legal power in Brazil, it is very difficult to get agreements over a common transportation project for a metropolitan area comprising several cities ruled by different political parties.

In Brazil, there is a great predominance of buses over rail-based technologies in the provision of transit services. The operation of bus transit systems is mostly private, with fares covering vehicle capital and operating costs. Thus the public sector provides and maintains the infrastructure for the operation of the buses. BRT systems recently implemented in Latin America (e.g. cities of Colombia, Mexico and Ecuador) were funded by the public sector, while the private sector maintained its conventional role in providing and operating the buses.

Even in the case of the successful BRT systems, value captured by the public sector has been very limited. At least for the case of Curitiba, the role of its BRT system in shaping the urban development and property values is unquestionable.

This paper intends to explore new dimensions for the participation of the private sector in the provision of the transit infrastructure based on models conceived in São Paulo and Porto Alegre. For both cases being presented, it is important to mention that the financing models for the infrastructure are independent of those required for operating the transit systems. In other words, the cost of investments in the infrastructure is not meant to impact the transit fares.

The paper starts by describing the change in the political and economic scenarios that took place in Brazil during the 1990s after the reform of the State, identifying challenges and opportunities arising for the urban transportation sector. It then outlines the advances in the Brazilian bus priority schemes stemming from national policy for public transportation prevailing during the final three decades of the last century and characterizes the decline of these schemes over time for the specific case of Porto Alegre. The paper ends by presenting innovative opportunities for the participation of the private sector in the implementation of BRT systems in Porto Alegre and São Paulo.

The Reform Of The State, Challenges And Opportunities For Investments

The 1988 Brazilian Constitution is far more decentralized than its predecessor as it recognizes Cities as a third, independent level of government. Formerly, Cities were considered creations of their respective States. Now the three established levels are: Federal, State and City. The new Constitution increased municipal revenues by doubling the proportion of Federal taxes that must be shared with the Cities. It requires States to transfer an increasing share of state-collected taxes to the Cities within their jurisdictions. The new Constitution also mandated an increase in Federal tax sharing to the States. However, the States made little net gain from the transfer reforms, because the increase in Federal tax sharing was offset by the federally mandated increases in States' tax sharing with the Cities under their respective jurisdictions.

The new Constitution did not redefine the distribution of functions between levels of government, despite its reallocation of revenues (Burki et al, 1999). After an aborted effort to legislate a systematic devolution of functional responsibilities, the Federal government decided to adopt a case-by-case negotiation that is still in process. Meanwhile, urban public transportation in Brazil is suffering from a persisting crisis as the Federal, State and City Governments have not given any priority to this sector for many years (Aragão and Brasileiro, 1999). It is important to mention that the new Constitution failed in not recognizing the Metropolitan as a fourth level of government. As the large Metropolitan areas in Brazil are each formed by dozens of cities invariably governed by different political parties, it is very difficult to amalgamate a coalition to address common problems such as the daily transit commuting of passengers crossing neighboring cities.

The new Constitution maintains the public sector as the ruler of the urban transportation. The deliverance of the transit services may be delegated by a concession contract or permission, provided that the operator is selected under a formal tendering procedure. In practice, regulation has been weak and often absent on most of the transportation sector as consequence of the lack of proper instruments to foster both intra and inter modal connectivity (Pinheiro, 2003).

The regulatory-normative framework in Brazil is based on the concept that the State should provide only infrastructure services that are essential and when no other source is available. So the Brazilian policy of calling the private sector is a fundamental component in the process of reformulating the State and recovering its capacity for investing in projects capable of improving the quality of life of the society at large. In 1995, the Programa Nacional de Desestatização (National Privatization Program) and the Concessions Law (Law 8987/95) provided the legal-institutional framework for private participation to proceed on a wider scale in Brazil.

Efforts have been developed to attract the private sector to invest in infrastructure and to eliminate the existing bottlenecks that have put the economic development on hold. Law 11079/2004 establishes the general rules for public-private partnerships (PPP) and is supplementary to the existing public bidding and concession laws. A PPP is defined as a concession agreement and is essentially a build-operate-transfer concession designed for projects that require additional government support to take off. There are two types of concessions contemplated by the PPP Law. In the so-called “sponsored concession” the objective is to provide public services directly to users and, in this case, the private investor, in addition to fares paid by the users of the public services, is remunerated by the government. The other type of concession is referred to as “administrative concession”, as it aims at rendering services directly to the public administration, not to the end users.

The Brazilian PPP necessarily includes compensation by the government to the private partner. In this respect, it is different from the regular concession contemplated in Concessions Law, as the PPP involves sharing of risks between the parties. Therefore the government can transfer to the private sector projects that would not be economically feasible simply through fares paid by their users. In addition, the PPP law establishes the possibility of remunerating the private investor for its performance according to goals and objectives set to the project.

In general, Brazil has not been able yet to attract the necessary investments from the private sector. Be it at the Federal, State or City level, the Brazilian Government has a reputation of being an unreliable payer, thus driving investors away from public projects. So, the PPP law provides for solid public payment guarantees. Among such guarantees are: (i) the reserve of specific revenues, (ii) special funds provided for by law, (iii) bonds posted by international entities and by private financial institutions, and (iv) public funds or government owned companies created for such purpose.

PPP projects have to comply with the Federal, State and City governmental yearly budgets. There is a limit for PPP payments. Each contracting governmental entity may allocate up to one percent of its annual net revenue as remuneration to private investors involved in PPP projects. Moreover, the law also establishes the creation of the Guaranteeing Fund for Public-Private Partnerships (Fundo Garantidor de Parcerias Público-Privadas - FGP) to warrant any required payments by the Government to the PPP. FGP is to be managed by financial institutions directly or indirectly controlled by the Federal Government and will be allowed to post back bonds for insurance companies, financial institutions and international entities that guarantee the payment by the Federal Government in PPP agreements. At the State and City levels similar procedures have been adopted.

An innovative characteristic of the PPP law is the possibility of choosing arbitration as the dispute settlement mechanism for contracts drawn up according to the provisions of PPP rules. This provides an additional advantage for private investors, as it circumvents the lengthy process that involves court decisions in Brazil and allows for the possibility of

counting on a specialized external evaluation of the situation. Another interesting feature of the normative regulatory structure in Brazil that is also part of the PPP law is the intensive process of consultation with society.

In general terms, PPP projects shall have a minimum value of 20 million Reais (approximately 10 million US Dollars). The agreement shall be effective for a minimum period of 5 years and a maximum period of 35 years, extensions being allowed. PPP are therefore appropriate financing mechanisms for small, medium-sized or large projects. And since the law is applicable to Cities, States and the Federal Government, there shall be projects of every size. Cities such as Porto Alegre have created their own PPP Legislation, based on the Federal Law.

Bus Priority Schemes In Brazil

The evolution of transit sector in Brazil has been closely associated with its political and socio-economic context. The Federal Government had little interference in decisions related to urban transport until the mid 1970s when EBTU was created to formulate a national urban transportation policy. At that stage the majority of the investments in the urban transportation sector were being directed towards the improvement of the traffic conditions for private vehicles. With advent of the oil crisis – at that stage Brazil was an oil importing nation – and in view of the somewhat chaotic perspective being faced by the urban transportation sector, by the late 1970s, in addition to investments in upgrading and implementing rail systems in a few metropolitan areas (São Paulo, Rio de Janeiro, Belo Horizonte, Recife and Porto Alegre), bus priority schemes were either being implemented or were already operating in several cities.

A World Bank report (1987) classified some of the bus priority schemes in Brazil as “...the most imaginative and radical bus priority measures carried out anywhere in the world”. Brazilian bus priority schemes included the development of the bus corridor concept. Bus corridors were designed to cater for demands that were difficult to handle by more conventional schemes and involved: (i) the introduction of segregated median busways along existing urban arterial roads; (ii) the adoption of articulated and bi-articulated buses with high-level platforms built on top of truck chassis – and thus less expensive than the equivalent capacity low floor buses; (iii) the implementation of a third median lane for bus overtaking at bus stations allowing for the simultaneous operation of express and local service lines; (iv) the reorganization of bus systems usually through trunk and feeder services; and (vi) the provision of pre-payment facilities for bus fares at the stations.

A world-wide study on the performance of busways in developing cities conducted by TRRL (Gardner et al, 1991) revealed that some features implemented in Brazilian bus corridors, such as bus convoying (Szasz, 1978) and bus overtaking at busway stations, increase the operational speed and the capacity of busways. But bus corridors have to be faced as a system, not limited to the roadway itself and within this context, still little can be said on the impact of bus corridors on land-use development in Brazil because of the lack of relevant studies (Lindau and Senna, 1993). Curitiba displays, however, a fine example of how transportation and city can be developed in unison (Fouracre, 1975; Cervero, 1998). Where bus corridors in Brazil have been implemented in isolation from a firm and coherent system of regulation, political stability, coherent long term planning and land use strategies, the results have been either partial, inefficient systems or overcrowded systems, that cannot adequately meet demand (Hensher, 1999).

EBTU (1982) published the first Brazilian state-of-the-practice report on bus priority schemes describing the systems introduced in Porto Alegre, Goiânia, Curitiba, Belo Horizonte, Rio de Janeiro and São Paulo. In the following decade, few priority schemes were discontinued whereas the majority was consolidated and expanded (Lindau and Senna, 1993). Twenty years later, SEDU/PR and NTU (2002) surveyed Brazilian cities with more than 300,000 inhabitants and found out that, although 58% of the cities were yet to implement any road-based priority measure, Brazil had some 400 km of roads with priority treatments for buses. As for technological developments, there were few advances in upgrading road-based transit systems until the early 1990s when Curitiba improved its system to standards similar to what is now termed BRT (Menckhoff, 2005).

Opportunities for BRT in Brazil

Aproximately 110 million Brazilians live in 437 cities with more than 60,000 inhabitants. They produce some 150 million urban trips per day. Bus transit caters for about 30% of this total daily demand (ANTP, 2007). Considering the dimension of bus transit in supplying the demand for urban transportation, 400 km of roads with priority treatments for buses represent too little specially when taking into account that only Curitiba (72 km) and Porto Alegre (50 km) respond for 30% of the overall total. Even in Curitiba and Porto Alegre, the proportion of roads with bus priorities accounts for only 6% of the roads used by buses.

Project Transporte Expresso Urbano (ANTP, 2007), that presents the characteristics of a BRT system, developed in São Paulo by ANTP with the support of Hewlett Foundation, estimated that only the Brazilian cities with more than 1 million inhabitants present a potential for implementing 590 km of bus corridors. The Latin American experience is revealing that BRT systems can (Menckhoff, 2005): (i) be highly productive in moving passengers at a fraction of the cost of other high-capacity modes; (ii) create a new, more attractive image for road-based public transportation; (iii) almost invariably raise the political standing of the mayors responsible for their implementation.

BRT systems (GTZ, 2005) have the ability to deliver a high-quality mass transit system within the budgets of even low income municipalities (Hensher, 2007). Thus BRT are natural candidates for qualifying for political, technical and/or financial support of Brazilian Ministry for the Cities as their objectives are mostly in accordance to those set by the National Policy for a Sustainable Urban Mobility, PNMUS (Ministério das Cidades, 2004). PNMUS establishes that the criteria to evaluate projects that are submitted for support must take into account the following preceding priorities: (i) people over vehicular movement; (ii) public over individual transport; (iii) universal accessibility – including the disabled; (iv) regulated and socially controlled transportation systems over non-regulated; (v) network based over isolated road interventions; (vi) multimodal over single mode projects; (vii) interventions capable of reducing poverty and promoting social inclusion by enabling the access of poorer people to public services; (viii) interventions that promote and favour multi-centrality and urban densification, protect the cultural, environmental, architectonic and landscape patrimony of the cities, and eliminate socio-spatial segregation.

As to adequately fit into the prevailing environment of Brazilian cities, a BRT based transportation project should be, amongst other features: (i) properly integrated to existing modes including the non-motorized; (ii) capable of promoting a better use of land along the BRT system and the recovery of property values at the city centre; (iii) image and quality-driven as to attract users of other less-efficient motorized modes including car users; (iv) safer for pedestrians and other road users; (v) more secure for bus users, who tend to face higher levels of criminality than other transport users; (vi) more efficient as to reduce the current cost

of bus operations per pass-km and thus promote mobility for the poorer sectors of the society; (vii) less harmful to the health of bus passengers that currently face long waiting times at heavily polluted bus stops before being able to board a specific bus; (viii) capable of including road and signalling interventions that improve the right-of-way of regulated public transportation; (ix) planned for providing improved bus stations and terminals to guarantee accessibility to the disabled; (x) capable of achieving a reduction in energy consumption and GHG emissions.

Public Transport in Porto Alegre

Porto Alegre is the southernmost capital of Brazil and is located in the state of Rio Grande do Sul. Its metropolitan region, comprising 31 cities and covering around 10,000 km², has a total of over 3.5 million inhabitants and is the fourth largest in population in the country. There is a high demand for transportation services in the region that is facing an increasing rate of private motorization, which currently stands at 2.3 inhabitants/motorized vehicle in the city of Porto Alegre.

A fleet of around 1,600 relatively new (5 years average) buses, owned by 15 operators organized in an arrangement of 4 private and 1 public consortia of operators that divided the city in different catchment areas (Dominguez et al., 1999; Costa et al., 1999), operate the 320 regular urban lines of Porto Alegre, transporting an average monthly demand of around 24 million passengers (EPTC, 2007). The city-regulated private mini-bus system has a fleet of 400 vehicles and a monthly ridership of almost 2 million passengers (Nodari et al, 1997). Another fleet of some 1,500 buses, also owned by private companies, operate longer metropolitan routes generally ending at the centre of Porto Alegre and carry a total of approximately 8 million passengers per month. A single suburban metro line (33,8 km) operated by Trensurb, a state-owned company, has a monthly ridership of around 4 million passengers. While the operating and vehicle capital costs of bus and mini-bus services are covered by the fares paid by users, the suburban metro is subsidized by the Brazilian National Government (Lindau and Rosado, 1989; Halcrow Fox, 2000).

Advance, stagnation and decline of the open busway system

Porto Alegre started to implement bus corridors by the end of the 1970s. These corridors characterize what today is defined as an open BRT system (GTZ, 2005). With the exception of the recent corridor implemented along Terceira Avenida Perimetral, all other corridors are radial, presenting one median bus lane in each direction, low-level platforms and no overtaking at bus stops. Figure 1 depicts the network of the existing bus corridors of Porto Alegre.

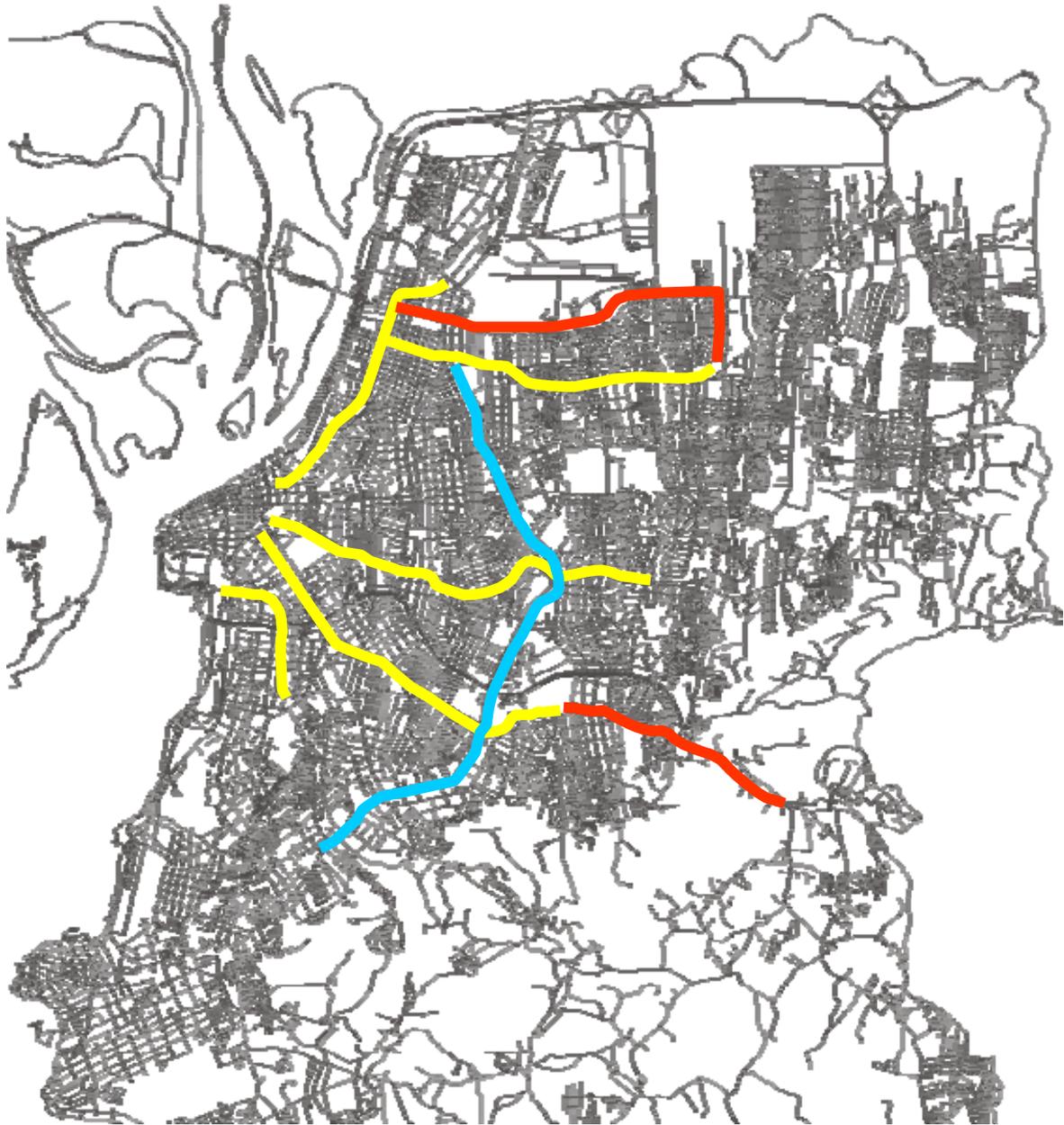


Figure 1: Bus corridors of Porto Alegre

Extremely high peak passenger volumes have been reported in the past along Assis Brasil corridor, i.e., over 26,000 passengers per hour and direction in the early 1990s thanks to a bus conveying system (Gardner et al, 1991). Although efficient in moving passengers, the wall effect created by many buses queuing at heavily loaded bus stops of Assis Brasil corridor generates a negative visual intrusion effect (Menckhoff, 2005).

Project BIRD IV (EBTU, 1986), developed by EBTU with the support of the World Bank, would reshape the public transportation radial supply as to match the mobility needs derived from the geographic dispersion of economic activities being faced by Porto Alegre - for example, the city centre is no longer the main destination of working trips (EDOM, 2004). This project would provide the means for the implementation of a public transportation system consisting of a full network of trunk and feeder bus services. Its potential benefits included: (i) the possibility of paying a single fare while traveling from any origin to any destination; (ii) the reduction of the overall operating cost of the system, and thus the fare, by

eliminating superimposed bus itineraries along the corridors; (iii) reduction of congestion in the city centre due to the replacement of several radial bus services; (iv) reduction in travel times as higher operational speeds would result from less buses traveling along the corridors, while passengers would also benefit from transversal lines shortening the trips of those formerly interchanging radial services at the city centre.

BIRD IV project was never implemented as the Federal Government decided to close down EBTU. Even so, this three decade-old initiative provides clear evidence of the need of restructuring the operational model of the public transportation service of Porto Alegre. And as time went by the inefficiencies of the system kept increasing. With no trunk and feeder operation, the number and frequencies of urban and metropolitan bus lines reaching the city centre grew dramatically.

Nowadays, bus corridors like Farrapos, Assis Brasil and Protasio Alves are frequently operating at the peak hours with long lines of buses moving at slow speeds. The overlapping of supply that characterizes the irrationality of the bus system is also marked by the contrast between empty buses and a high number of passengers waiting long periods at the bus corridor stations. Furthermore, waiting passengers are usually exposed to an environment with high concentration of pollutants derived from the combustion of the vehicular fossil fuels.

The Public Transportation Plan of Porto Alegre conducted in the late 1990s (PSTC-PA, 2000) revealed the unbalance between supply and demand in the central area of Porto Alegre: while 78% of the municipal lines had an end terminal at the city centre, only 26% of the passengers had their final destinations at the city centre. An evidence of this problem is the number of less than half full buses reaching or leaving the city centre. More recent data points out that the average loading of these buses is only 25 passengers (Zamin, 2004).

PSTC-PA also stresses: "... it is necessary to cut down bus frequencies reaching the city centre as to reduce operational costs and the impact of the circulation of the heavy flow of buses in the region. It is also important to improve conditions for the users that have to transfer between lines as to achieve more comfort and reductions in travel time...". PSTC-PA evaluated different operational scenarios for 2013. The scenarios contemplating fare integration and trunk and feeder operation with the implementation of several terminals (as shown in Figure 2) indicated net gains of up to 11% in travel time when compared to a future scenario based on the current configuration of the system, in addition to reductions of: (i) 22% in bus fleet; (ii) 20% in bus-km supplied; (iii) 18% in operational costs; and (iv) 37% in bus flows in the central area.

PSTC-PA was one amongst other public transportation studies, projects and plans conducted over the last decade in Porto Alegre, totalling more than 5 million dollars (Maia, 2004). Very little of what was planned was actually implemented and the public transportation system maintains basically the same configuration it had at the end of the 1990s. Figure 3 confronts data from the period PSTC-PA was done with current data (i.e. 1998 with 2006). There is a noticeable drop of 22% in passengers (EPTC, 2007) while the total production (bus.km/month) has not been proportionately reduced. As result, the IPK, i.e. the number of paying passengers boarding per bus.km, kept falling over time.

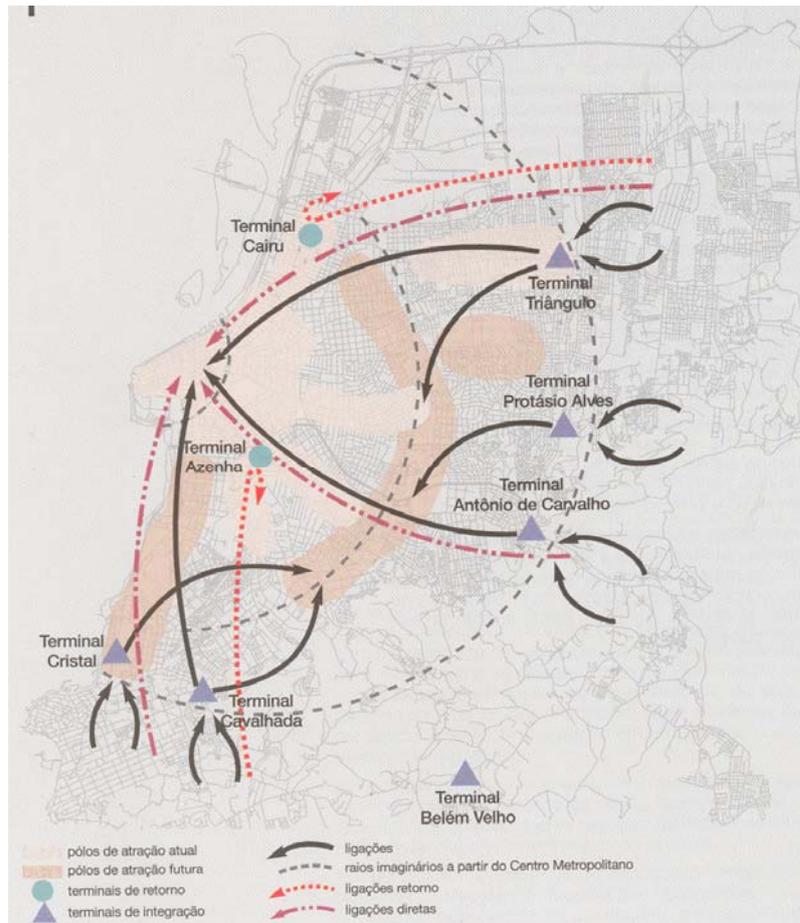


Figure 2: Operational scenario for 2013 - trunk and feeder with terminals (PSTC-PA, 2000)

Today the central area of Porto Alegre could be best defined as a big open bus terminal. The environmental conditions in the city centre as well as the value of its assets and properties were seriously affected by the heavy flow of buses and by the bus terminals. Central avenues such as Salgado Filho, once presenting a pleasant combination of shops and residential flats, are now filled with bus stops. Large bus terminals now take entire blocks, former plazas and other important spaces for social gathering of people that used to have the city centre as their second neighborhood.

The first bus corridors of Porto Alegre are now 30 years old and require urgent renovation. During this period, few improvements were introduced. The deterioration of these corridors is made visible by the inadequacy of: (i) the bus stations; (ii) the information to passengers; (iii) the condition of the pavement that is, in many cases, more deteriorated than in the parallel lanes used by the other vehicles, mainly cars; (iv) the buses that do not run either on cleaner than 500 ppm diesel (not yet available in Brazil, by the way) or on any other less pollutant alternative fuel.

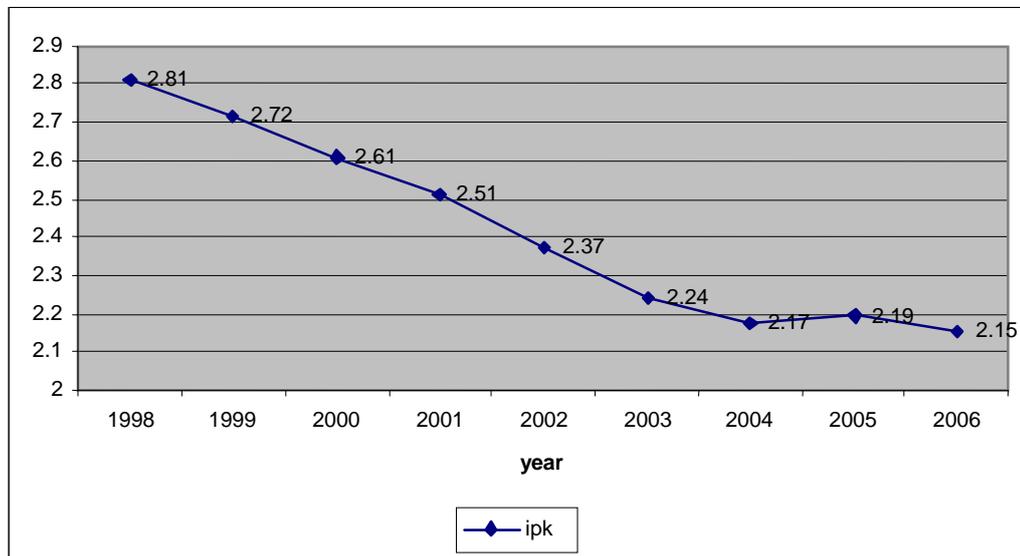
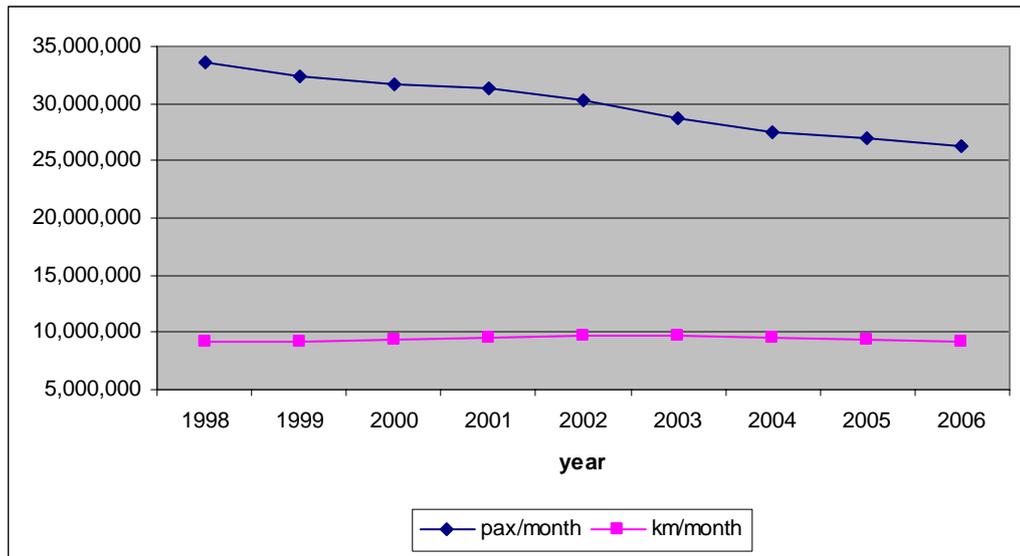


Figure 3: Number of users (pax/month), bus production (km/month) and boardings per km (ipk)

From Busways To BRT In Porto Alegre

Over the years, the relatively high capacity busways of Porto Alegre allowed the diversification of services through the creation of many lines and the insertion of several new terminals in the central area of the city. Some terminals were located on areas reclaimed from roads, sidewalks and plazas, transforming innermost sectors of the city centre into large open bus terminals, contributing to the deterioration and loss in property values of a formerly valuable and historical area.

Most of the buses enter or leave the city centre with reduced passenger loadings, causing unnecessary pollution and traffic conflicts. The current city administration of Porto Alegre, with the support of EMBARQ, the World Resources Institute (WRI) Center for Sustainable Transport, and with the help of CTS-Brasil, decided to revitalize both its city centre and its bus public transportation system by upgrading some busway radial corridors into a BRT diametral system that incorporates most of the features of a modern BRT system such as high-

level passenger platforms, off-board electronic ticketing and trunk-and-feeder operation. The revitalization of the city centre has also been an objective of previous administrations but it is yet to attain success.

Project Portais da Cidade

The so-called Portais da Cidade (City Gateways) project comprises a BRT system that will run on top of renovated existing busway facilities and will be complemented by interchange terminals and segments with special structures such as tunnels and viaducts. Its first stage of implementation consists of the linking of the north/northeast sector to the south/southeast sector of Porto Alegre crossing its city centre as depicted in Figure 4.

The gateway concept aggregates new functions to a terminal. In addition to the usual integration of the BRT to feeding bus services and other transportation modes (mini-buses, cars, bicycles and taxis), it will house services and retail activities. Car and bicycle parking facilities provided within the terminal building will enable the integration of the BRT services to private transportation modes. The retail and service areas located in the terminals will provide facilities to both transportation users and population living in the neighborhood.

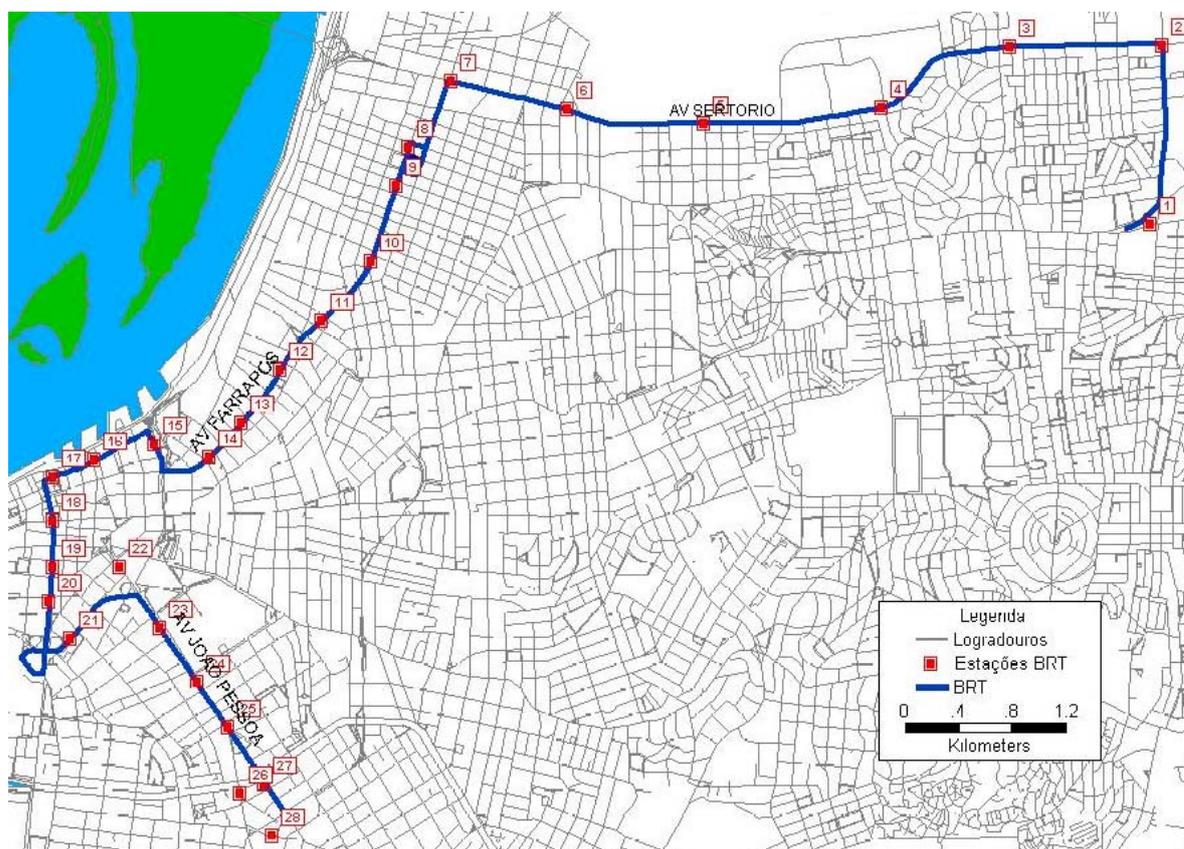
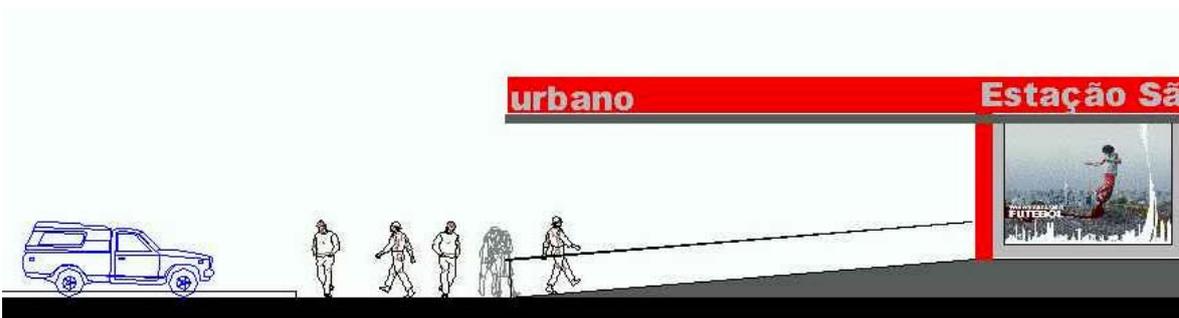
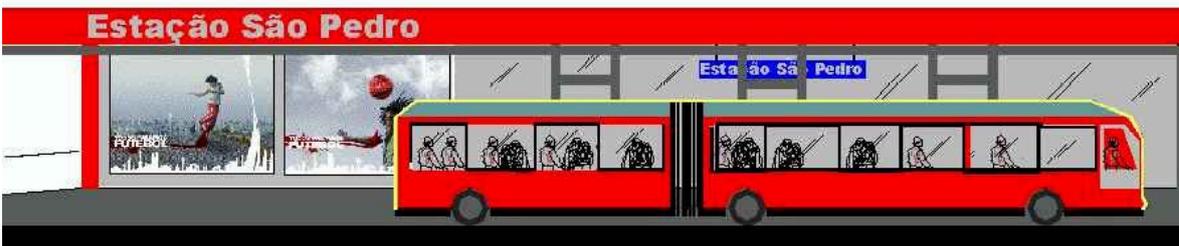
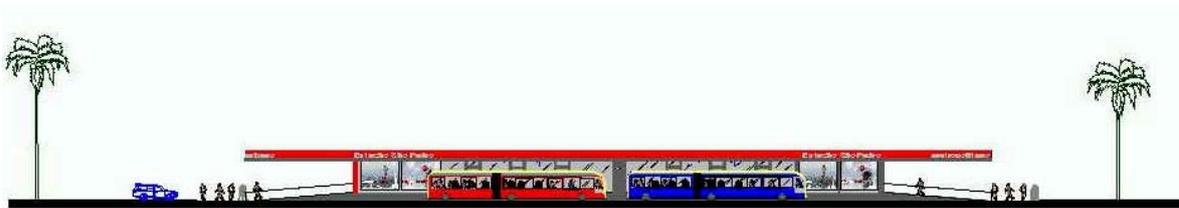
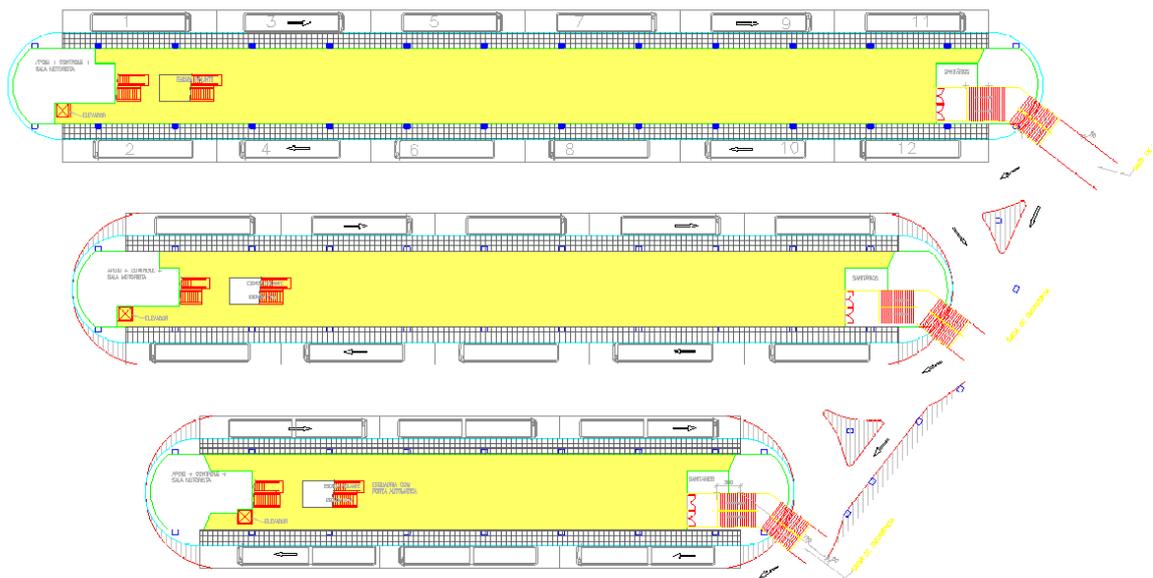
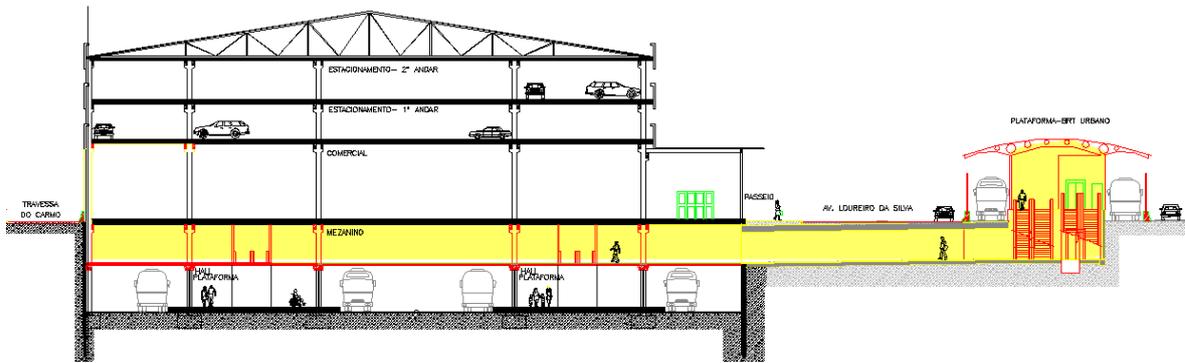
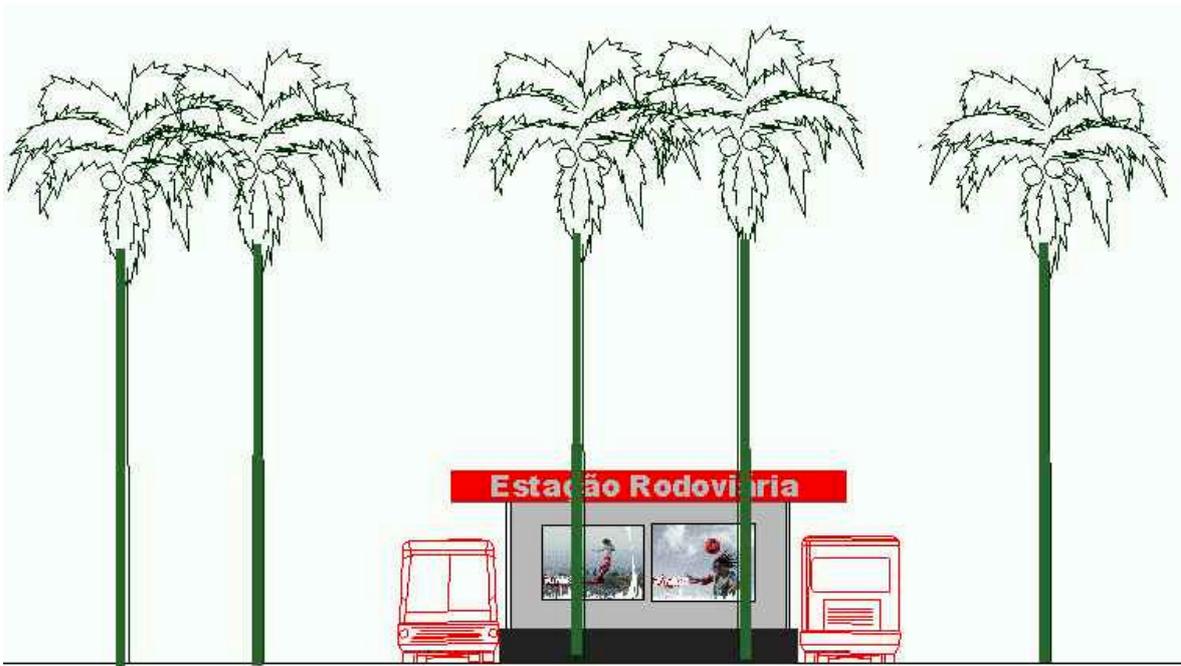


Figure 4: Proposed BRT of Porto Alegre (PMPA, 2007)

BRT lines will mostly operate along renovated busways using high capacity articulated buses. Bus doors will provide multiple channels to cater for simultaneous passenger boarding and alighting movements at the platforms. Along the BRT corridor, closed stations will allow pre-boarding fare control and leveling of stations to bus platforms. The facilities for transferring between buses at the gateways shall provide comfort and personal security to users. Figure 5

presents a series of drawings showing envisaged features being proposed for the system, varying from bus stations at different zooming and angles to different views of one of the terminals.





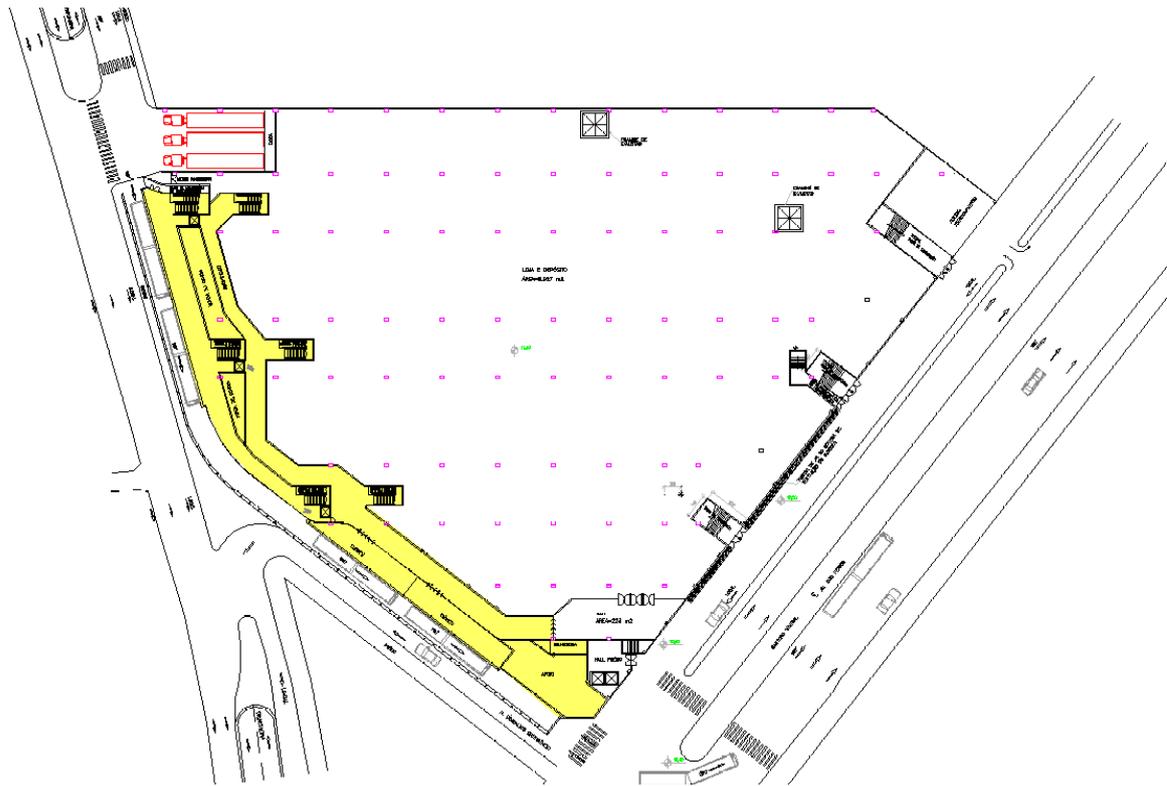


Figure 5: Envisaged features of the BRT project (PMPA, 2007)

Financing model

A city mission of observers to Bogota noticed that Colombian private investors materialized the opportunities for commerce and services around the large feeder terminals of TransMilenio and that these opportunities, as in the case of the BRT of Curitiba, did not contribute to cover the costs of the BRT system. Portais da Cidade is an innovative project in the field of urban bus transportation in Brazil as it is being conceived to attract private investors, other than bus operators, through a PPP.

Porto Alegre authorities failed in their initial attempts to obtain access to financing mechanisms to provide additional infrastructure to the city. Brazilian laws require the endorsement of the Federal Government to any refundable funding contracted by a city and the Federal Government did not grant the go-ahead for the mayor of Porto Alegre. The PPP model was devised as an alternative to the more conventional financing scheme where a municipality signs a loan contract with a national or international multilateral organization. The PPP scheme is being envisaged as to allow the private sector to fund the implementation of a road based urban transportation project by offering the possibility to explore the potential of additional commercial opportunities it generates.

Within Project Portais da Cidade, trunk and feeder interchange terminals are being devised to accommodate areas dedicated to commerce and services. It is expected that these areas shall generate enough revenues to pay private investors for the construction of the terminals and most of the construction work required to upgrade some sections of the existing busways of Porto Alegre to BRT standards. Revenue risks are associated to the ability of the investors in exploring the commercial potential of the available areas. A successful balanced mix of commercial activities will depend not only on a proper evaluation of the needs of the clients of the BRT services but also of those living and working in the vicinity of the terminals.

The winner of the bidding for the Project Portais da Cidade will be the private group requesting the least amount of public investment or that proposing the higher remuneration to the public sector. The commercial mix to be adopted will be the one being proposed by the winning group, which must assure it will not compromise the operation of the terminals in terms of their transportation needs as defined by the public sector.

The vehicles to be used in the operation of the BRT corridor will be acquired by the current bus transport operators. However, these new vehicles will not generate an increase in the fare being paid by the passengers given that they will be replacing older units that would be naturally renovated due to age retirement.

The required investments for the Project Portais da Cidade include (PMPA, 2007): (i) the construction of 3 terminals; (ii) retrofitting sections of the existing busway corridors; (iii) building the BRT stations along the route; (iv) constructing tunnels and viaducts; (v) implementing ITS devices (user's information, automatic fare collection, controlling traffic signals, BRT centralized operational control and dispatching); (vi) implementing a personal security monitoring system; (vii) maintaining the terminals and the BRT stations.

Structuring the PPP

Brazilian and Porto Alegre laws detail the PPP and all the aspects that regulate the partnership between private and public interests. Key aspects include the need for: (i) a bidding process to define the private partner and, (ii) establishing a management committee, a PPP unit and a Special Purpose Entity (SPE). The management committee is in charge of assuring that the PPP for the BRT follows the minimum requirement established in the terms of reference for the Project Portais da Cidade. The PPP unit is the entity conceived to oversee the formulation of technical studies required by the PPP project and to establish the interface with several public entities directly or indirectly related to the project.

The SPE is the entity in charge of: (i) implementing the infrastructure of the BRT project, (ii) exploring the commercial potential of the terminals and stations along the line, (iii) operating and maintaining the infrastructure of the terminals and the BRT system. The SPE is composed by the public and the private sectors.

The SPE will open a trust fund where all revenues raised from commercial activities will be credited and where, eventually, sanctions will be debited. On the other hand, the public partner will have to create and maintain a guaranteeing fund that will be accessible to the private investor in case the public partner fails to accomplish its part in the project.

A Proposal for the Celso Garcia Ave. BRT in São Paulo

A different approach for the participation of the private sector in the financing of a BRT corridor has been proposed in São Paulo, using some of the value capture mechanisms established in recent urban legislation, in particular the Statute of the Cities, enacted in 2001 (BRASIL, 2001). With the support of the Hewlett Foundation, a complex urban redevelopment proposal has been formulated for the largely populated East-Northeast zone of the city of São Paulo, centering on the implementation of a high capacity and high performance BRT system.

Public Transport in the Metropolitan Region and the East-Northeast zone of the city of São Paulo

The Metropolitan Region of São Paulo is the largest urban area in Brazil and the fifth largest in the world, with almost 20 million inhabitants. It is composed of 39 municipalities, totalling an area of approximately 8,000 km². The city of São Paulo is at the core of the region, with 11 million people in an area of 1,523 km².

Total daily trips in the region were estimated at 40 million (24 million motorized) in the latest OD survey (2002). The bus system in the city of São Paulo alone carries approximately 240 million passengers per month, in 15,000 buses – from mini-buses to articulated buses - operating almost 1,000 regular lines. There is approximately 100 km of exclusive median bus lanes, with stops located on the central island. The network of bus exclusive lanes operates as an open system, since any regular route can use the infrastructure (segregated lanes and stops).

Close to three million people live in the East zone of the city of São Paulo, about half of them within the area of influence of the proposed BRT system. Currently, more than 200 bus lines serve the area, with itineraries overlapping along different sections of the major roads penetrating the region. The Metro and railway lines serving the area are overcrowded. Most of the area is constrained by the Tiete river to the North and the metro and railway lines to the South. The road network within the area lacks continuity, hampering accessibility within and to the area.

The proposed BRT system

The proposed bus corridor leaves the central area towards the East by Celso Garcia Avenue, crosses a decaying urban region as it leaves the central area, and then proceeds to the Northeast to reach some of the lowest-income residential sectors in the distant periphery of the city (Figure 6). The project is based on the implementation of an exclusive median bus lane, with overtaking lanes at bus stops, which are located on the central island (Figure 7). Stations and surrounding areas would be treated to improve conditions for cyclists and pedestrians (Figure 8). The existing 200 or more bus lines would be reorganized into a feeder system (to the BRT system and the metro) with approximately 50 lines.

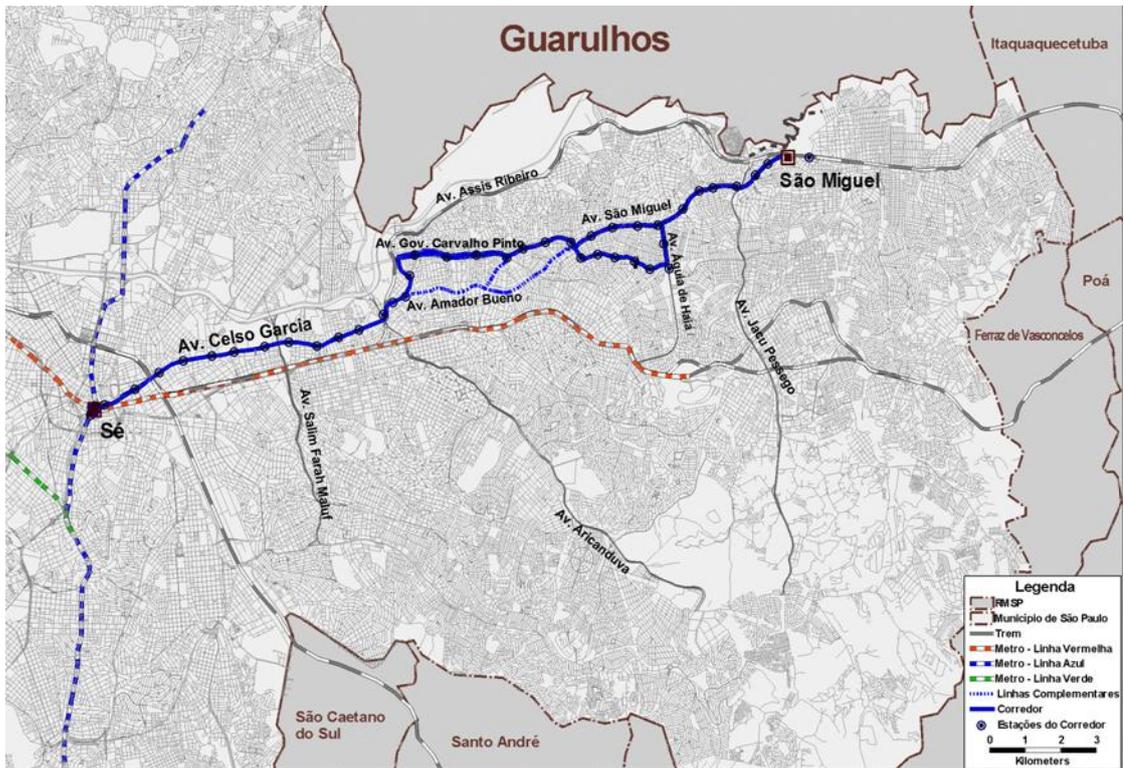


Figure 6: The East-Northeast zone of São Paulo and the proposed BRT



Figure 7: Celso Garcia Ave.: current conditions (left) and proposed bus station (right)



Figure 8: Architectonic perspective of proposed stop and its surroundings

The urban operation

The BRT project is the central element of what is called an “urban operation”. The Statute of the Cities defines an urban operation as a set of interrelated urbanistic interventions and projects within a delimited perimeter. An urban operation requires a specific law to be enacted defining goals for the urban, social and environmental improvement of the area as well as incentive mechanisms to attract private investment.

In the case of the East-Northeast zone, in addition to the Celso Garcia Ave. BRT, the proposal for the urban operation considers other types of intervention in the area:

- development of new urban centralities, with some selected public investment acting as a catalyst for further private investment; some of the new centralities will explore existing characteristics of the areas (wholesale, retail and health), while others will build on the strategic location of important transportation foci;
- rehabilitation of public space through the creation of linear and pocket parks, bicycle paths, pedestrianized areas and other traffic calming measures;
- improved accessibility within and to the area, by upgrading some 80 km of roads and construction of 5 km, aiming to eliminate bottlenecks and to create alternative routes parallel to the BRT corridor, where capacity for general traffic would be reduced.

The set of interventions that constitute the complete proposal aims at revitalizing a considerably large part of the city, boost the real estate sector in the area and improve

transportation and quality of life of its inhabitants. Financing mechanisms for these interventions are based on the expected increase in real estate prices. Different mechanisms for value capture were made legal in the Statute of the Cities.

A particularly important mechanism is the establishment of flexible building limits, originally set at low levels, in line with the city Master Plan; additional building rights can then be bought by the private developers, generating revenues that must be used for public investment in the area.

In association with flexible urbanistic parameters, a specific mechanism – CEPAC (certificate of potential additional building rights) – is devised for raising revenues. CEPAC are issued by the City administration and can be purchased by interested private developers. They can also be used by the government as payment means for land acquisition. CEPACs can be traded in the financial market – specifically in the São Paulo Stock Exchange – or used to grant the possibility of building beyond normal limits. With CEPACs, the financial resources needed for making the investments expected to increase property values can be obtained in advance, and avoiding the restrictions associated with usual borrowing processes.

This is, though, an indirect form of involving the private sector in an urban transportation project and the associated urban redevelopment. An additional mechanism of the Statute of the Cities – the urbanistic concession – was also proposed to characterize the whole project as a form of PPP.

The urbanistic concession

The urbanistic concession allows the public administration to transfer to a private company, through a bidding process, the responsibility for executing the actions included in an urban operation. The concessionary obtains its remuneration from the rent of land and use of buildings located within the delimited perimeter. It shall be entitled to proceed with land acquisition and the commercialization of CEPACs issued for the project.

The BRT project included a proposal for an urbanistic concession to be granted concerning the area affected by the bus corridor. The winning part would be responsible for developing detailed projects, executing required works – including land acquisition, the construction of the BRT and other infrastructure – and manage all aspects relating to the projects.

Preliminary estimates of the necessary investments indicate an amount of U\$50 million during the first 2 years of the project, reaching some U\$160 million after 10 years. On the other hand, estimates of the impact on property values suggest that the total revenue obtainable with commercialization of CEPACs can reach U\$300 million in 20 years. The project is economically and financially feasible, including the specific analysis of the operation of the BRT.

CONCLUSION

In Brazil, the prevailing concept is that the State should provide only infrastructure services that are essential and when no other source is available. The participation of the private sector is thus seen as fundamental in increasing the capacity of the State to invest in projects capable of improving the quality of life of the population. Bus operations are already mostly provided by the private sector. In general terms, fares tend to cover both operational and capital costs of

the services while the infrastructure (e.g., road pavement, bus stops and terminals) is supplied by the public sector.

The objective of this paper is to explore new dimensions for the participation of the private sector in the provision of infrastructure for urban public transportation. BRT systems have the potential to attract private investors not only to operate them but also to finance their implementation.

BRT systems offer important gains in terms of sustainability over more conventional bus systems. There is evidence indicating they also contribute for increasing the capacity of transit systems under an investment context that is compatible to the budgetary and financial constraints of cities in the developing world.

The two cases described in this paper reveal the potential for developing innovative BRT projects capable of attracting private investments. The PPP format in Porto Alegre offers a cross-subsidy mechanism where investments from other sectors introduce improvements for the users of transit systems. The participation of the private sector in the proposed BRT project in São Paulo is based on the use of value capture mechanisms made legal by the Statute of the Cities, enacted in 2001.

PPP and other forms of public-private partnerships represent an advance as they introduce economical and financial sustainability elements to the BRT projects. Thus they offer the possibility of reducing the dependency of scarce public budgets to implement projects of public interest. The experiences described in this paper can be transferred to realities prevailing in other countries and can boost the qualification of urban public transportation. However, apart from an appropriate legal-regulatory framework, the requirements to take an urban transportation PPP to a successful completion include political leadership, technical assistance, local capacity, international financial support and an appropriate political time-window of opportunity.

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REFERENCES

- ANTP (2007). Sistema de informação de transporte e trânsito. Associação Nacional de Transportes Públicos. São Paulo, Brasil. Available in: <http://portal.antp.org.br/>
- Aragão J. and A. Brasileiro (1999): The Brazilian Urban Bus Industry: Present Challenges and Future Perspectives. 6th International Conference on Competition and Ownership in Land Passenger Transport (Thredbo 6). Cape Town.
- BRASIL (2001). Lei 10.257/2001. Presidência da República. Brasília, DF.

- Burki, S.J.; Perry, G.E.; and W. R. Dillinger (1999). "Beyond the Center: Decentralizing the State". World Bank Latin American and Caribbean Studies. Viewpoints. The World Bank. Washington, D.C.
- Cervero, R. (1998) *The Transit Metropolis: a Global Inquiry*. Island Press.
- Costa, M. B. B, L. A. Lindau, C. T. Nodari, L.A.S. Senna and I. Veiga (1999). Ônibus e lotação, uma experiência de convívio regulamentado em Porto Alegre. In: Henry, E. and A. Brasileiro (Org.). *Viação Ilimitada: Ônibus das Cidades Brasileiras*. São Paulo, Brasil, p. 338-370
- Dominguez, E. M, A.A.D. Lovatto and L.A. Lindau (1999). El modelo consorciado de gestión operacional de transporte público por autobús: las bacias operacionales de Porto Alegre. In: Ocana, R. V., J. Mundo and J. Lusitano (Org.). *Los desafios frente a la congestion y el transporte publico*. Caracas, Venezuela, **I**, p. 402-409
- EBTU (1982). *Tratamento preferencial ao transporte coletivo por ônibus*. Empresa Brasileira de Transportes Urbanos. Brasília, Brasil.
- EBTU (1986). *Programa de Investimentos em Transportes Urbanos – EBTU/BIRD IV. Região Metropolitana de Porto Alegre. Relatório de Avaliação*. Empresa Brasileira de Transportes Urbanos. Brasília, Brasil.
- EDOM (2004). *Pesquisa de Origem e Destino de Porto Alegre*. Consórcio Magna-TIS,PT. Porto Alegre, Brasil.
- EPTC (2007). *Indicadores do Sistema de Transportes*. Empresa Pública de Transportes e Circulação. Porto Alegre, Brasil. Available in: <http://www.eptc.com.br>
- Fouracre, P.R (1975). *The development of public transport in Curitiba, Brazil*. Transport and Road Research Laboratory - TRRL, SR 197, Crowthorne, England.
- Gardner, G., P.R. Cornwell, P.R. and J. A. Cracknel (1991). *The performance of busway transit in developing cities*. Transport and Road Research Laboratory - TRRL, Research Report 329, Crowthorne, England.
- GTZ (2005). *Mass Transit Options. Sustainable Transport: a source book for policy makers in developing countries*. Module 3a. Available in: <http://www2.gtz.de/dokumente/bib/05-0515.pdf>
- Halcrow Fox (2000) *World Bank Urban Transport Strategy Review – Mass Rapid Transit in Developing Countries. Final Report*. Department for International Development. Available in: <http://wbln0018.worldbank.org/transport/utsr.nsf>
- Hensher, D. A. (1999) A bus-based transitway or light rail? Continuing the saga on choice versus blind commitment. *Road & Transport Research*, **8**, 3.
- Hensher, D. A. (2007) Sustainable public transport systems: moving towards a value for money and network-based approach and away from blind commitment. *Transport Policy*, **14**, 98-102.
- Lindau, L. A. and A.B.A. Rosado (1989) *The metropolitan railway transit system of Porto Alegre (Trensurb)*. In: Gutman, J.S. and R.G Scurfield (Org.). *Rail Mass Transit*. London, 1989, p. 145-158.
- Lindau, L. A. and L. A. S. Senna (1993). *The Brazilian experience in planning, implementing and operating public transport on separated road and light rail travelways*. In: HABITAT. *Provision of Travelway Space for Urban Public Transportation in Developing Countries*. Nairobi, Kenya.

- Maia, M (2004). Política da Trensurb e planos de expansão. In: A Expansão do Sistema de Transporte Metroferroviário da RMPA. Relatório Final da Subcomissão Mista sobre a Expansão do Sistema de Transporte Metropolitano de Passageiros. Assembléia Legislativa. Porto Alegre, Brasil.
- Menckhoff, G. (2005). Latin American experience with bus rapid transit. Annual Meeting Institute of Transportation Engineers. Melbourne, Australia.
- Ministério das Cidades (2004). Política Nacional de Mobilidade Urbana Sustentável. Cadernos MCidades 6. Brasília, Brasil. Available in: <http://www.cidades.gov.br/>
- Nodari, C., M.B.B. Costa and L.A. Lindau (1997) Lotação: experiência de duas décadas com o sistema regulamentado de Porto Alegre. Revista de Transportes Públicos da ANTP, **19** 3, p. 77-86.
- Pinheiro, A.C. (2003). Regulatory Reform in Brazilian Infrastructure: Where do We Stand. IPEA. Brasil.
- PMPA (2007). Parcerias Publico-Privadas de Porto Alegre. Prefeitura Municipal de Porto Alegre. Available in: <http://www.ppp.portoalegre.rs.gov.br/>
- SEDU/PR and NTU (2002). Prioridade para o transporte coletivo urbano. Relatório Técnico, Secretaria de Desenvolvimento Urbano da Presidência da República e Associação Nacional das Empresas de Transportes Urbanos. Brasília, Brasil.
- Szasz, P. (1978). COMONOR: Comboio de ônibus ordenado. Companhia de Engenharia de Tráfego, Boletim Técnico no. 9. São Paulo, Brasil.
- PSTC-PA (2000). Plano Diretor Setorial de Transporte Coletivo do Município de Porto Alegre. Prefeitura Municipal de Transportes e Empresa Pública de Transporte e Circulação. Porto Alegre, Brasil.
- World Bank (1987) Staff Appraisal Report: 4th Urban Transport Project - Brazil. Report no 6426a-BR. World Bank, Washington, USA.
- Zamin, T. (2004). O Planejamento do Transporte Metropolitano. In: A Expansão do Sistema de Transporte Metroferroviário da RMPA. Relatório Final da Subcomissão Mista sobre a Expansão do Sistema de Transporte Metropolitano de Passageiros. Assembléia Legislativa. Porto Alegre, Brasil.