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Developments in public-transport systems in the cities of Latin America

One of the issues of interest for the Natural Resources and Infrastructure Division of ECLAC, in the area of transport and infrastructure, is urban mobility.
This edition of the FAL Bulletin looks at public-transport systems developed and proposed in Latin America in recent years, and seeks to conduct a critical analysis of the policies underlying those activities and their implications for urban development in Latin America.
The aspects to be taken into account include the impact of such projects on economic, social and environmental conditions in each city and their possible replication in other cities in the world.
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1. Introduction

For a number of reasons, public transport is a vital tool for an efficient and equitable city. It is more efficient than private motorized transport in terms of passengers transported per unit of space, energy consumption and environmental impact. Account must also be taken of its characteristics in terms of social equity and efficient use of public resources. Investment in public transport affects larger and more needy population groups than other transport investments. On that basis, improving public-transport systems is crucial for the sustainable development of cities in social, environmental, economic, political and town-planning terms.

Comprehensive public-transport policies are complemented by those which act specifically upon demand for infrastructure and travel in a city. These strategies are known as transport demand management, and include establishing appropriate charges or taxes for ownership and use of private vehicles, a policy for car parking based on efficient use of and demand for space, and appropriate fuel taxation.

This article takes a critical and analytical look at public transport in Latin America, including the progress achieved, the improvements and innovations which have been observed, the predominance of bus rapid transit (BRT) systems and the reasons why the situation has evolved as it has.

2. Public transport in Latin America and the BRT boom

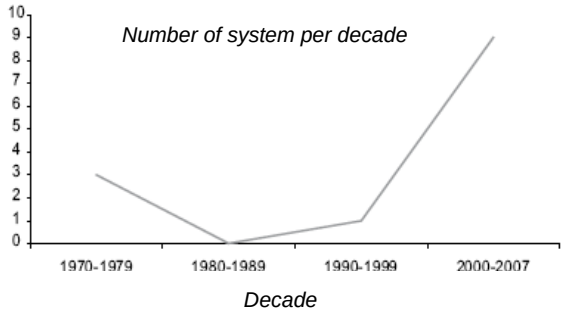
Public transport has shown a number of characteristics in Latin America. Efforts to improve the situation have been seen in some places, and throughout the twentieth century a number of Latin American cities made significant attempts at constructing rail systems, with varying outcomes. These efforts have included several attempts to improve the "traditional" public-transport sector, where a fragmented structure of owners and companies providing public-transport services was responsible for the largest proportion of public-transport journeys in those cities.

A solution which began to mature in the 1970s is the bus rapid transit (BRT) system. It was initially implemented 30 years ago in Curitiba, Brazil, and a second such attempt was made in Quito, Ecuador, in the 1990s. It was not until 2000 that Bogotá, Colombia, designed and constructed a large-scale BRT system, with passenger handling capacities well above those of other options.

What is bus rapid transit?

Bus rapid transit (BRT) systems involve exclusive bus lanes, together with reorganization of the contractual and service-provision system and harmonizing the characteristics of rail-based transport with a system based on buses (for example, payment of fares in stations, programming of services through a control centre, and using stations as the central components of the system). Beginning with the system constructed in Bogotá, TransMilenio, there has been a boom in Latin America and the rest of the world. A number of publications have argued that the BRT option is a very efficient way to improve public-transport systems in the developing countries, on the basis of parameters such as capacity, cost and construction time.

Figure 1: Trends in construction of BRT-type systems in Latin America



Source: Author, based on data from Wright and Hook, 2007

The main characteristics of such systems are their exclusive infrastructure, large-capacity vehicles (at least 160 passengers), institutional reorganization and appropriate operational management. There is a major transformation from informal public transport, towards market competition systems. Earlier, the provision of public-transport services was characterized by competition within the market (with bus drivers fighting to be the first to pick up passengers, a practice commonly known as "fare wars"). The most significant BRT systems in Latin America are briefly outlined below.

The system in Curitiba has been called Latin America's first BRT (or first full BRT) system. It was initially set up in 1972 as part of a broader town planning policy, and the mayor of the time, Jaime Lemer, is always credited for its successful implementation, which was complemented by traffic development schemes along the BRT corridors.

The system comprises 64.6 kilometres of bus routes and carries 560,000 passengers per day. This translates as a value of 20,000 passenger-hours per direction, double the maximum normally expected for a bus-based system. Although various types of buses are used, the best known are the bi-articulated vehicles which were built in a Volvo plant that developed in Curitiba, growing out of the BRT initiative. The cost of constructing the system was between US$ 1 million and US$ 6 million per kilometre.

Following the Curitiba experience, Quito constructed a similar system but on a smaller scale, mainly because the object was low cost and high performance. Construction began in 1995 on a network of bus routes for the city's BRT systems, of which there are currently three. In all, the system comprises 37 kilometres of routes and carries 400,000 passengers per day. It is run by one public and one private operator, and a negative aspect is the lack of physical or fare integration between the two operators. This, unfortunately, is most unhelpful for attempts to increase demand and the numbers of journeys provided by public transport in Quito. The cost of the system has varied between US$ 0.5 million and US$ 5 million per kilometre. The wide variation is due to differences in the scale and magnitude between the city's three "subsystems".

The system in Bogotá has been called the only real BRT, or full BRT, system in existence, owing to its wide coverage and service characteristics. TransMilenio currently has 84 kilometres in operation and carries about 1.4 million passengers per day. Its capacity has reached as high as 40,000 passenger-hours per seat, higher than many of the world's rail systems, although like them, it has achieved this through vehicle occupancy rates of six persons per square metre. This system has been closely associated with the mayor who oversaw its initial design and construction, Enrique Peñalosa, who complemented it with other developments such as park construction, infrastructure for bicycles and pedestrians, and other large-scale projects. Phase 3 of TransMilenio is now being planned, and the capital cost of the system (including land expropriations) has ranged from US$ 5.3 million to US$ 13.3 million per kilometre. These figures are similar to those for some medium-capacity rail systems such as light railways, but more thorough analysis is needed for such comparisons.

Based on the success of TransMilenio in Bogotá, Colombia has developed a plan to introduce BRT-type systems in seven additional cities. The one in Pereira was the first to begin operating, in 2006, with 15 kilometres of routes being served during the first year, and demand of 100,000 journeys per day. Since Pereira is a medium-sized city, its BRT system is not on the same scale as in Bogotá. The cost of this system has been US$ 1.7 million per kilometre.

The other Colombian cities where systems of this type are being or will be constructed (Barranquilla, Bucaramanga, Cali, Cartagena, Medellín and Soacha) have reached differing levels of development. Some of the systems are expected to begin operating in 2008.

A number of projects in Brazil have followed the example of Curitiba. The most representative for the purposes of this analysis is the one in São Paulo, which has developed a system of exclusive bus lanes, having more in common with an improved bus system and covering an extensive network of 129.5 kilometres. It should be noted that São Paulo is one of the few cities in Latin America (if not the only one) with a fare structure integrated with the metro (an "interlinked" system), which has generated greater benefits for users thanks to its improved connectivity. The level of demand in the bus system stands at 140,000 trips per day.

Mexico City has also developed a system, known as Metrobus, built as a complement to the city's extensive metro network. Some 20 kilometres of bus lanes have been constructed, recording a demand of 260,000 trips per day. This is another example with two operators, one public and one private, and it is the only BRT system to date whose fares are subsidized as a matter of government policy rather than because the subsidy is needed to cover operating costs. The index of passengers per kilometre (IPK) for this system is the highest of all BRT systems, at about 10. The cost of constructing the bus lanes averaged US$ 1.5 million per kilometre.

Replicating the experience of Quito, Guayaquil (also in Ecuador) took the opportunity to construct a BRT system. In this case, 15.5 kilometres of bus lanes were created, and the system, Metrovía, carries 100,000 passengers per day. The system is controlled by a Foundation which subcontracts the various services, functioning with a staff of 12 persons, which is very small for organizing such a system. This modest administrative structure covers its operating costs by means of revenue from advertisements within the system. The construction cost was US$ 1.4 million per kilometre.

The case of TranSantiago (Chile) is well known around the world, particularly because of the difficulties it has encountered since the inauguration of the system in February 2007. It is noteworthy that this new system involved a complete reorganization of the city's public transport "overnight", which made comprehensive coordination of the change very difficult to achieve. More importantly, the users had no opportunity to understand the complexities of the new system before it was implemented. This, together with other problems with estimating demand and technological issues, meant that implementation far exceeded the difficulties typically encountered in reorganizing a public-transport system. The entire system was affected, particularly the Santiago metro system — which had always provided an excellent service— owing to the excess demand resulting from the defects of TranSantiago. To date, specific data are not available or have not been found.

The latest BRT system to have been implemented in Latin America is that of Guatemala City, opened in late 2007. The system has 11 kilometres of bus lanes and is part of a comprehensive city improvement plan, Plan Guatemala 2020. Its small initial network has carried up to 143,000 passengers per day. No more data are currently available.

A system which has been planned for several years and is slowly gaining in strength is that of Lima, Peru, which received support from the World Bank at the design stage. The system has been held back by the lack of political commitment; priorities have changed between the BRT system and the existing electric train system, which is not currently operating. The planned BRT system would comprise 32 kilometres of bus lanes; the infrastructure is currently under construction.

Based on the relative success of BRT-type systems in Latin America, similar systems are being implemented in cities around the world, which include Adelaide, Beijing, Brisbane, Jakarta, Kunming, Nagoya, Paris (the Mobilien system), Seoul and Taipei.

It has sometimes been argued that such systems are appropriate only for medium-size cities, and that in cities with over two million inhabitants they are used as a stepping-stone towards the construction of an underground or elevated heavy rail system. There has been much debate on this subject, but it should be noted that the BRT concept can adapt to a variety of circumstances, as can rail systems.

3. BRT versus rail systems?

One of the main areas of debate among public-transport professionals is the relative merits of one technology over another, in particular those of rail systems and rapid bus systems. The arguments include both technical and ideological arguments, and the technical arguments often show a touch of partiality towards the apparently favourable characteristics of one system or another. The arguments include system capacity (passenger-hours per direction) and efficiency, long-term sustainability, construction time, development costs, the need for operating subsidies, local or foreign work in the development and operation of the system, and integration of existing operators into new systems. These debates have escalated into something like a battle between the two types of public transport, under the leadership sometimes of academics, or consultants, or the developers of one technology or the other, and in some cases of politicians (who may or may not have a thorough knowledge of the system they are promoting).

What is more important is the fact that this battle between the two public-transport systems is not fruitful for the sector. It dilutes the importance of improving public transport and focuses attention on the disagreements between professionals as to which system is more efficient, cleaner, less costly, or has other characteristics which favour one system over another, depending on who is presenting the argument.

A possible solution to this problem would be to conduct prefeasibility studies and to analyse alternatives using complete project assessment methods, as an impartial instrument which could produce solutions. It should also be noted that such studies must be carried out by persons or organizations who are not actively supporting one side or the other. In many cases it is those

promoting one technology who "prove" that it is more feasible to implement in a city. This contradiction should be resolved by having the studies carried out by other bodies which are not involved in the sale or purchase of the systems. The data and conclusions reached in the studies, and the financial and political situation of the city, will determine the system which is most appropriate in each case.

4. Integrated policies and political will

Following the analysis and comparison of specific modes of transport, there is a clear need for cities to have integrated transport policies which take account of economic, social and environmental factors in a city and look for sustainability in those same dimensions and in the long term, always seeking improved quality of life for the population.

Political will is vitally important as a complement to technical capacity in specific public-transport policies and projects. They need to have shared goals and agreement on a number of basic points on what public policies aim to achieve in a city's transport system.

Another important aspect is integration with urban policies in general, in areas such as land use, town-planning rules, city design and core policies, and in overall city planning. This integration is of key importance for long-term improvement of public-transport systems.

Public-transport policies also have to be integrated with specific programmes and instruments for demand management, as has been done in London and Singapore, where demand management leads to a situation which is much more favourable for public transport and more equitable for all citizens in terms of the use of their resources.

Integrating public transport with non-motorized transport (cyclists, pedestrians) and the necessary harmonization with individual modes of transport are crucial aspects which have been neglected in a number of cities when public-transport systems were being implemented.

The problems described above, among other things, draw attention to the need for comprehensive assessment of urban-mobility policies in the cities of the region.

5. Challenges and conclusions

On the basis of this brief review of significant cases and aspects in the development of public transport in Latin America, there are clearly a number of challenges to be dealt with by the cities, both those which have already developed a public-transport system (BRT or another type), and those which still lack an organized system. These challenges relate to integration and coherence with other forms of public and individual transport, with non-motorized transport and pedestrians, road safety and urban policies; and most of all to investments in private and public transport and the government's priorities in relation to them. Another challenge is to reconcile the lead times for implementation with the duration of political cycles. For cities which are about to implement projects to improve their public-transport systems, the most important of all is planning and decision-making in the field of urban mobility, using project evaluation methods and objective and comprehensive analysis of alternatives, for the implementation of successful projects in the medium and long terms.