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BUSES OR TRAMS FOR LATIN AMERICA'S CITIES?

There was a time when tram services were critical to public transport in many of the largest cities of Latin America; however, trams disappeared about fifty years ago, for a number of reasons. They are back now, especially in the cities of the more developed world, in a modern version usually known as *light rail transit*.

Latin America has developed its own concept of urban mass transit, namely, high-capacity buses operating in special lanes as an integral component of the overall mass transit system. As a general rule, this Latin American solution seems to be the best suited to the needs of the region, given its flexibility, cost and capacity. Each situation must be assessed separately, however, and in some cases, a modernized version of the tramway may be the best solution.

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Trams disappear from Latin America. The first Latin Americans to have an opportunity to travel by tram— in 1858 – were the residents of Havana, Mexico City and Santiago. Other than an international tramway line between Mexico and the United States and some tests of battery-powered vehicles, the first electric tram to operate in the region made its debut in Rio de Janeiro in 1892. [See Allen Morrison: <http://www.tramz.com/index.html>].

Within a few years, electric tram (streetcars) were the most important mass transit vehicles in the main cities of the region. Their reign began to totter around 1925, with the appearance of buses and shared taxis, which had certain advantages over trams. For one thing, they used public streets that were maintained (and eventually paved) by the city government, whereas companies operating streetcars had to use their own resources to finance the maintenance of tracks, substations and other infrastructure. Buses and other vehicles used for group transport were able to move easily into new neighbourhoods as they sprang up and into the side streets of existing neighbourhoods, whereas trams could only move on tracks. Another advantage of buses was that anybody who had a little bit of money, education and entrepreneurship could start a bus line, while trams could only be operated by companies having the necessary structure and organization.

As tramway companies profitability declined, they found themselves in an untenable position, with no incentive to invest the amounts needed to maintain a long-term presence on the market. However, since they still played an important role from the socio-economic standpoint, local governments could not simply let them go bankrupt. Thus, ownership of these companies was often transferred to local, provincial or national governments, which sometimes, at least initially, showed some enthusiasm for their new acquisition. As a general rule, however, having the public sector take over streetcar operations did not save them; rather, such measures only postponed their disappearance, except in a very few cases where trams were important for more than transport as such, having become a tourist attraction. In other regions, trams suffered a fate similar to that experienced in Latin America, although they continued to maintain a strong presence in some cities, especially in central Europe.

Trams make a comeback in developed countries. In recent decades, the fortune of streetcars has taken a turn for the better, and they have reappeared in a number of cities in developed countries, including the United States, France and England, usually in a modernized form known as **Light Rail Transit** (LRT). In such systems, the streetcars move on tracks signalized in a separate lane from the rest of traffic. This solves the problems created by the friction that occurs when track-guided vehicles have to share space with vehicles on tyres. Regular railway lines have sometimes been adapted for use by streetcars, e.g., in Manchester, United Kingdom, or the metropolitan area of Karlsruhe, Germany.

South America prefers its own solution. South America has chosen to develop its own solution, which consists of high-capacity bus lines operating on exclusive lanes in traffic. The first city to adopt this technology as the key to its mass-transit system was Curitiba, Brazil, in 1974. In the capital of Paraná state, high-capacity bus lines operating on special lanes are fully integrated, physically and in terms of fares, with local lines using smaller vehicles. Curitiba has become a model city thanks to its integrated mass-transit system and urban development in general. Over time, other Brazilian cities adapted the Curitiba model to their own needs, but in special corridors rather than the whole urban area. An interesting variation, which has been applied in Sao Paulo and Porto Alegre, is CONOMOR. This plan, involving the use of organized convoys of buses, has made it possible to achieve very high productivity levels, previously associated mostly with metro systems. Porto Alegre, for example, moves around 20,000 passengers per direction per hour at speeds of 20 km/hr.

The Brazilian experience was later exported to Quito, Ecuador, where tram buses began to replace diesel buses. The most recent application of the Curitiba model is the famous *Transmilenio* operated in Bogotá. This is the most sophisticated variation, in terms of technology and capacity, that has been developed to date; for long routes, the system has been reinforced by setting aside two lanes for each direction of traffic, instead of one as in previous cases. In the case of Lima, Peru, a system of express buses was set up in 1974 on the Paseo de la República. These buses travel on a right of way that had originally been reserved for a metro line which was not built because of a shortage of financial resources. Lima is now considering modernizing and expanding this system more or less along the lines of the *Transmilenio*.

South America's preference seems to be justified. European cities, in particular, and some North American cities, tend to prefer modern light rail transit (LRT) systems. So far, however, South America has opted for buses operating on reserved lanes. This difference can be explained by the socio-economic differences between the different regions.

Compared with buses, LRT is more expensive to get started and to operate, and it has a

lower potential capacity. A study conducted by Halcrow, Fox for the World Bank estimated the initial cost of the LRT option at US\$ 10 to 30 million per kilometre, compared with US\$ 1 to 5 million for buses operating on separated lanes. LRT can transport between 10 000 and 12 000 persons per hour in each direction at a speed of approximately 20 km/hr, while buses can transport between 10 000 and 20 000 at speeds of 17-20 km/hr. [*Mass Rapid Transit in Developing Countries*, Halcrow, Fox, London, July 2000]. Bus systems are also more flexible, given that buses are able to leave their special lanes and continue their route on other city streets, sharing space with the rest of the traffic, whereas a tram or LRT vehicle can only operate on tracks.

Trams are more expensive to maintain than diesel buses and much more expensive to buy (see table 1). On the other hand, trams have a longer useful life, sometimes over 50 years, whereas buses can be kept in service for over 20 years only in exceptional cases.

Table 1. COMPARISON BETWEEN INITIAL COST AND MAINTENANCE COST OF STREETCARS, TROLLEYBUSES AND DIESEL BUSES OPERATING IN EUROPE (in Euros)			
	Streetcar	Articulated trolley bus*	Articulated diesel bus*
Initial cost	2 000 000	700 000	300 000
Annual maintenance cost**	19 000	9 800	7 400
Notes: *Initial cost of these buses refers to vehicles having the same transport capacity as streetcars.			
**It is not clear if maintenance costs of buses refer to rigid or articulated vehicles.			
Sources: (i) S. Björklund et al, <i>New concepts for trolleybuses in Sweden</i> , ScanTech Development AB, Sweden, December 2000, and (ii) P. Williams, <i>The electric trolleybus – its role in future transport systems</i> , 1996.			

Experience has shown that LRT operators find it much more difficult to be self-supporting than bus companies. Although preliminary estimates at the time a decision is made to set up an LRT system may appear to indicate that it has the potential to become financially independent, that such hopes are not always fulfilled. This comes to light more readily if the rail system is operated by a concessionaire, as in Australia or England, rather than by a public-sector entity, as in continental Europe. In South London, in early 2003, the concessionaire operating Croydon Tramlink had to ask its bankers to reschedule its financing, even though its passenger volume – over 20 million per year – was steadily increasing, and the line covered suburbs having a population density of about 4 500 per square kilometre. In Melbourne, constant deficits forced the operator of the tram system to turn the line back to state authorities.

At first glance, one would think the choice between buses and trams should be an easy one. However, tram/LRT systems have a better public image; thus, they tend to be built in cities where generous funding is available for such investments and whose inhabitants are able to pay the costs involved, either directly through fares or indirectly through taxes. That is why tram/LRT systems seem

to be more appropriate for European than for Latin American cities. Moreover, tram/LRT systems could help relieve traffic congestion by being more likely to attract people who, in their absence, would continue driving their own cars. Sixteen per cent of the users of the South London system used to drive their own cars.

A recent Anglo-German study analysed factors that contribute to the success of tram/LRT systems, considering ridership as an indicator of success. It was found that the factors which work together best to increase the probability of success were: (i) high rate of usage of fare cards that are valid on all the city's mass-transit services; (ii) fares that are low in terms of per capita GDP; (iii) a large amount of road space reserved for pedestrians in the city centre, and (iv) high population density within 300 metres of tram/LRT lines. [Carmen Hass-Klau and Graham Crompton, "Future of Urban Transport", *Environmental and Transport Planning*, England, January 2002]. Clearly, these conditions are much more likely to exist in Europe than in Latin America.

Application of tram/LRT technology in Latin America. The new-generation tram/LRT option is not entirely unfamiliar to Latin America. There is an LRT line operating in Buenos Aires; the system has been used in Mexico, and a line is being installed in Maracaibo. On different occasions, this option has been proposed in other cities, including Curitiba, where the plan did not materialize because of the high cost involved and the lack of national technology. Instead, bi-articulated buses running on special traffic lanes were chosen.

In Santiago, Chile, the public transport modernization plan put underway by the current administration envisages doubling the coverage of the metro system and, on the two heavy-traffic routes that still do not have metro lines, setting aside exclusive lanes for articulated buses like those used in the *Transmilenio* in Bogotá, Colombia. On one corridor, however, a tram/LRT line is planned, for reasons that are not clear. A European construction and concession company proposed the adoption of tram/LRT technology on about 100 kilometres of the aforementioned routes. The Government rejected that proposal, for a variety of reasons, including the following: the proposal required excessive fare hikes; it would have entailed the granting of a 35-year exclusive concession; it called for State participation in the entity operating the concession; the company failed to produce the collateral guarantee originally offered; and the company required a guaranteed volume of traffic. The Chilean case makes it clear that the tram/LRT option is not financially viable in one of the Latin American cities where conditions more closely approximate to those prevailing in Europe.

Conclusions. Latin America has developed its own urban mass-transit technology on corridors on which demand is not high enough to justify the construction of metro systems. This technology, based on high-capacity buses operating on special traffic lanes as the heart of an integrated transport system, has been highly successful in Curitiba, the city where it was conceived; it has reached its highest level of development in the *Transmilenio* system of Bogotá. Such systems have proven that they can handle large volumes of passengers and operate without public subsidies, other than the initial investment in infrastructure. Except in a few special cases, this Latin American solution seems to be the most appropriate for the region, given the absence of conditions found to be necessary for the success of tram/LRT systems in the cities of the more developed world.