

INTERMODAL TRANSPORT CENTRES: TOWARDS ESTABLISHING CRITERIA

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Abstract

Increasing importance has been placed on the development of intermodal transport centres. Planning for these facilities could prove especially useful in middle-income countries, such as South Africa or Chile, where a sizeable proportion of the urban population depends on public transport; indeed, an effective network of transfer centres could provide better access to many working class residents living on the urban periphery. Many issues central to the development of these centres are discussed in the paper: definition of a transport centre; government's role in establishing a network of centres; operational concerns; and impacts on surrounding land uses. In San Francisco, local transport policy has identified issues central to the establishment of a centre (e.g., safety, comfort, reliability, connectivity, access to other modes); however, planners there have only recently come to realize the role that transport centres can play in facilitating economic growth and providing better access to non-motorised modes, such as walking and bicycling. This paper concludes that many cities in middle-income countries are in a position to establish effective transport centre criteria, based on local transport objectives, needs and resources. At a minimum, these transport centres should improve interchange, shorten travel times and expand service coverage. In addition, they should strategically encourage the desirable development of surrounding land uses.

INTRODUCTION

In recent years, increasing emphasis has been placed on the development of intermodal transport centres as tools with which to improve urban mobility. Nowhere is this activity as critical as in the developing countries, where a majority of residents use transit and where an effective system of transfer centres could improve intraurban mobility and give low-income residents better access to economic opportunities.

While many cities have sought to establish or improve transport integration, implementation costs are often prohibitive. For this reason, it is important that planners make the best use of available resources to design centres that satisfy the transport needs and reflect the social values of the community. In San Francisco, transport policy addresses the role of intermodal transport centres in urban development. Planners have identified the importance of such issues as safety and comfort, convenience, reliability, ridership and land use.

In some developing world cities, transport authorities have identified the need to expand and strengthen the existing network of intermodal transport centres. However, while some of these centres already play an important role in the transfer of passengers, many of them are informal hubs that lack the resources necessary to accommodate large volumes of bus and rail passengers, or generate the development of compatible land uses in these areas. Many of these cities do not have a metropolitan transport authority or regulator that can evaluate regional mobility needs and establish policies for improving intermodal integration. Certainly, transport centre planning requires the coordination of sub-regional agencies and interest groups.

This paper considers the establishment of transport centres in major cities of middle-income countries where there is a high demand for transfers. It begins with an overview of transport centres and their traditional role as facilitators of multi-operator journeys. Next, it reviews past criteria employed in the San Francisco Bay Area to establish a set of transport centres. Finally, this paper reviews the potential benefits of and barriers to developing transport centres in cities of middle-income countries, and identifies potential strategies for widespread implementation.

AN OVERVIEW OF TRANSPORT CENTRES

Public transport interchange is a key element in any urban transport system. While many systems strive to serve a comprehensive set of origins and destinations, it is unrealistic to contemplate providing through services between all points and some interchange is inevitable (1). In order to adequately serve a high volume of transferring passengers, pedestrians and cyclists passing through points of interchange, it is important to provide attractive and convenient transfer facilities.

A transport centre is an established point of interchange between two or more public transport lines serving an urban area. Some of these centres are intermodal, featuring physical integration between bus, rail and other modes, while others are unimodal and may serve numerous operators in a region. There are many types of intermodal transport centres, depending on the level of passenger need and capital investment available. Alternatives range from designated stops and lighted shelters to off-street facilities with passenger information and separate ticketing areas. Each centre should be designed to serve the diverse needs of public transport passengers and to be consistent with the nature of the surrounding urban fabric.

Transport centres are normally established at convenient urban locations where numerous services converge, and not merely at all points of interchange. According to the results of a survey of selected public transport systems in Canada and the United States, the two most common factors involved in the location of a transfer facility at a particular site are the total volume of passengers transferring at the site and its proximity to nearby activity centres (2).

It is important to note that often, the ability to finance a transport centre depends on the size of operators using it and the level of government support for its development. In the developing world, where financial resources are scarce and many public transport services are privately operated, the development of a transfer centre normally requires substantial investment in infrastructure (e.g., shelters, informational displays, bus bays, restrooms), and often, the acquisition of private property. In addition, the specific characteristics and conditions of an area often make it difficult to provide intermodal facilities that adequately serve the passenger. The geographic extension of transport systems, the location of stations, and the placement of rail and bus lines can create crowded points of interchange and local vehicle gridlock in surrounding areas. Often, informal centres spontaneously form at these critical points of interchange, causing facility deficiencies that can adversely impact public transport passengers and create traffic conflicts. Inadequate planning where there is proven demand for coordination can produce serious negative impacts to surrounding areas. For this reason, local and regional authorities must work with operators, passengers, architects and community groups to strategically plan for transport centres at key points of interchange. These transport investments have the potential to not only improve the

overall quality of the system and access to economic opportunities, but also encourage the development of desirable land uses in surrounding areas.

THE CASE OF SAN FRANCISCO

The Greater San Francisco Bay Area is one of a number of urban regions that have attempted to develop a comprehensive network of transport centres to facilitate passenger interchange and promote land use coordination. This section briefly describes the region, its public transport network and some of the transport centre criteria that were established at the municipal level.

Urban Setting

The nine-county, San Francisco Bay Area is located 560 kilometres north of Los Angeles. Currently, it is the fourth largest urban region in the U.S., with over six million inhabitants. It encompasses an area of approximately 18,500 square kilometres, only 14 percent of which is urbanised (3).

The Bay Area is a diverse region of urban communities. San Francisco, Oakland and San José are the primary centres of the region, however, recent growth has taken place in the suburbs, where 67 percent of the area's population now lives (3, 4). The City of San Francisco is the financial and cultural centre of the Bay Area, however the rest of the region has witnessed significant growth in the past three decades, primarily in low-density communities, where new centres of economic activity have emerged (e.g., the Silicon Valley). This suburban-based growth has altered regional travel patterns and prompted the construction of roads and the establishment of suburban bus systems. Still, more than two-thirds of all Bay Area commute trips are by single-occupant vehicle (3). While public transport is often used for short trips, the automobile is favoured for commute trips of more than 10 kilometres in length. See Table 1 (5).

TABLE 1 Commute Mode Share (%) by Trip Distance, S.F. Bay Area, 1999 (5)

Mode	Under 8 k.	8 - 16 k.	17 - 32 k.	33 - 64 k.	Over 64 k.
Drive Alone	59.3	72.7	70.3	69.8	67.8
Carpool	13.0	14.4	16.3	16.2	18.7
Public Transport (PT)	14.7	11.4	13.0	13.1	12.7
Other	13.0	1.4	0.4	0.9	0.7

Source: Rides for Bay Area Commuters 1999.

Despite regionwide growth in motorisation rates, the Bay Area still boasts one of the most comprehensive public transport networks in the Western United States. While the bus still carries over two-thirds of all public transport trips in the region, both heavy and light rail systems have experienced recent increases in mode share (see Figure 1). Currently, the network features a wide variety of public transport modes including bus, heavy rail (metro), light rail, regional rail, cable car and ferry (6).

More than 25 public sector operators currently serve the Bay Area, not one of them carrying more than 50 percent of all riders. While most provide bus or rail service only, a few of the larger operators, such as Muni, Golden Gate and Valley Transportation Authority are multimodal. Due to its importance as a regional centre of economic and cultural activities, San Francisco still serves as the primary hub for the Bay Area region. Indeed, many operators still provide basic and commute service to the city's greater downtown area, where a major intermodal terminal has operated since the 1930s.

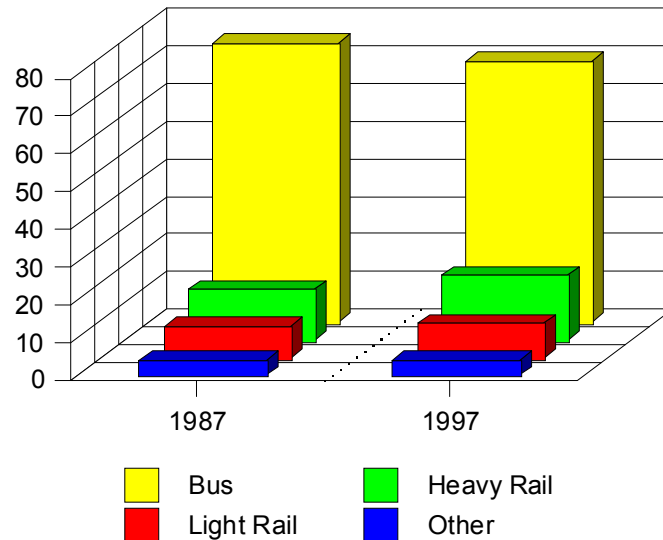


FIGURE 1 PT Mode Split (%) in the San Francisco Bay Area, 1987 and 1997 (6)

Intermodal Transport Centre Schemes

Public transport still plays an important role in the movement of passengers. In an attempt to provide connections and ensure a “seamless” exchange of passengers between regional operators, the Metropolitan Transportation Commission (MTC), primary transport planning organisation for the Bay Area, developed a network of “regional connections” at key rail stations and bus hubs in the region (7). While most of these facilities were already in existence when the network was established, the MTC helped coordinate transfer information and eventually, acquired funding to upgrade certain locations. Regional operators have been supportive of these initiatives and in a few cases, commercial and residential projects have been built in close proximity to these centres (8).

One of the most successful components of this program has been the provision of information on available public transport services and schedules at each centre. In addition, bus bay and sidewalk treatments have improved passenger access to connecting services. On the other hand, due to past financial constraints, the program has taken a long time to develop and often, operators have had to attend to more pressing needs, in some cases, temporarily abandoning integration efforts. In an effort to improve customer convenience, in 1996, the California State Senate passed the Transit Coordination Bill (SB 1474), directing operators and the MTC to work toward enhancing public transport service integration and effectiveness, primarily in areas of regional significance (4).

In the City of San Francisco, where average densities have exceeded 65 persons per hectare for decades, public transport trips represent over one-third of all journeys to work (9). In an attempt to preserve this pattern, the San Francisco Board of Supervisors adopted a “Transit First” resolution in 1973. This policy effectively gives “priority to public transport investments,” discouraging future road and freeway development (10). More recently, it has been strengthened by public transport-related standards incorporated in the *San Francisco Planning Code* and *General Plan*. In addition, the Transit Preferential Streets (TPS) program has been developed to accommodate higher volumes of bus traffic on major streets, significantly increasing passenger throughput in key urban corridors.

One of the principal questions surrounding implementation of the Transit First policy has been how to adapt street and land use conditions to improve public transport operation and enhance the surrounding environment. In an attempt to strengthen the bond between public transport services and community activities, the TPS program has established a set of criteria for designating 22 transport centres at key locations throughout the city. While most of these centres have previously served as transport nodes, the idea of developing a network of centres is fairly new. The following set of minimum levels of interchange were used to establish this network (11):

1. A point of interchange between public transport lines;
2. A public transport station or a regional terminal;
3. The intersection of two or more rail lines;
4. The intersection of a rail line and a TPS;
5. The intersection of two or more primary routes, one of which carries regional transport.

A principal reason for limiting the number of transport centres is to focus efforts on high-volume nodes with development potential so that each centre is “as prominent and distinctive as the high level of public transport service that it handles.” Guidelines call for design treatments, construction standards and information services that orient passengers, facilitate transfers and promote public transport use in and around these centres (11). They seek to satisfy the following needs:

1. Safety and comfort: lighting, seating, visibility, shelter, telephones, cleanliness;
2. Convenience: ease of fare purchase, ease of orientation, physical ease of transfer, service information, accessible features, lockers, clock, taxi and shuttle services;
3. Reliability: prominence, clarity of purpose, access and loading, passenger feedback;
4. Land use: pedestrian-friendly facilities, bicycle access and storage, incentives for taking public transport, street design, removal of auto-oriented conflicts, housing and mixed-use support.

The establishment of this network of centres has permitted the city to channel its efforts toward improving key public transport nodes and identifying future land development opportunities in adjacent communities. While these strategies are still in the process of being developed, they have received widespread support from operators, advocates and local community groups.

ESTABLISHING INTERMODAL TRANSPORT CENTERS

The development of intermodal transport centres may also be an attractive option to local governments and operators in some cities of the developing world. In those countries where increased auto ownership has generated serious congestion and air quality problems, these centres may serve to improve the ability of public transport to move large volumes of passengers and increase access to major activity nodes. Currently, many middle and lower-income residents living on the urban periphery of these cities have poor access to urban activities and spend a substantial amount of their monthly incomes on public transport or a private auto. As a result, a significant proportion of the urban population in these cities has effectively been isolated from mainstream society and has experienced a reduction in mobility.

In these cities, despite a rise in auto ownership, public transport still plays an important role in the movement of local residents, as shown in Table 2 (12, 13, 14, 15). In most of these cities, bus is the predominant mode, however significant investment has been made in rail systems. Government policy has tended to favour rail over bus and has provided almost no incentive or guidance for facilitating intermodal integration -- see Table 3 (16).

TABLE 2 Middle-income Cities: Size and PT Ridership, 1990s (12, 13, 14, 15)

City	Country	Population	PT Journeys/Day	Principal Modes ^a
São Paulo	Brazil	16,420,000	11,280,000	B, M
Mexico City	Mexico	15,640,000	32,950,000	B, M, L
Buenos Aires	Argentina	10,990,000	10,820,000	B, R, M
Santiago	Chile	4,600,000	4,700,000	B, M, T
Cape Town	South Africa	2,200,000	1,020,000	R, B, T
Tunis	Tunisia	1,910,000	1,560,000	B, L

^aP.T. Modes: B=Bus, R=Regional Rail, M=Metro, L=Light Rail, T=Shared Taxi.

Sources: Figueroa 1996, U.N. 1995, C.M.C. 1998, Zhiri-Oualalou et al. 1998

TABLE 3 Latin American Metro Systems: Forms of Integration, 1993^b (16)

Metro System	Metro-Bus	Metro-Rail	Metro-Taxi	Metro-Auto	Metro-NMT
São Paulo	P, O, F	P, O, F	P	P	N
Mexico City	P, F	P, F	P	N	N
Buenos Aires	P	P	P	N	N
Santiago	P, F	P, O, F	P	N	N
Caracas	P, O, F	n.a.	P	N	N
Guadalajara	P	P	P	P	N

^b Integration: P=Physical, O=Operational, F=Fare, N=None, n.a.=Not Applicable

Source: Cedano et al. 1994

While public transport also provides a key urban service in the numerous medium-sized cities of the region (e.g., San Jose, Cordoba), it is in the largest cities that congestion and air pollution levels are most critical and average trip distances are the longest. For example, in Greater Buenos Aires, urban dwellers living in the urbanised area of the periphery (“Provincia”) often require as many as four transfers to reach their destinations in the central city (17). In addition, many suburban operators follow circuitous routes that add to travel time and discourage widespread access to other areas of the region.

Therefore, wherever intermodal connections are facilitated through route and fare integration, it is advisable that provisions are made to accommodate not only large volumes of passengers, but also other users of the facility. It is important that intermodal transport centres provide adequate space for passenger interchange between vehicles; clear signage to orient users; safety and security; and good access to outside, non-motorised modes. For example, while bicycle ownership is known to be high in many low-income communities of Latin America, bicycle storage is not normally provided at points of interchange. Better facilities and the accommodation of bicycles on trains and buses could improve the mobility of this significant sector of the population.

When transport centers are allowed to evolve with little or no planning, the following negative impacts often result:

1. The makeshift use of space surrounding stations for unregulated bus or jitney service;
2. Weak connections between vehicles and modes, where the passenger is often exposed to inclement weather conditions;
3. A general lack of pedestrian safety;
4. An increase in traffic volumes on surrounding streets, causing severe congestion, particularly during peak hours;
5. Inadequate space for operators to efficiently provide service and circulate; and
6. The illegal sale of goods/services in areas adjacent to stops, impeding pedestrian circulation, delaying the transfer of passengers and adversely impacting the local environment (18).

Thus, planning and coordination are key to the success of transport centres. The following sections present some of the potential benefits of these centres and the potential barriers to developing them.

Potential Benefits

A number of regionwide benefits can result from the establishment of transport centres. Where supported by local residents, jurisdictions and operators, a transport centre can provide for an effective system of routing and circulation that reduces the number of transfers required; can ensure a higher level of passenger safety; can promote the use of public transport and non-motorised modes; and can encourage the coordinated development of surrounding land uses. Additionally, it can improve service integration, reducing the time and distance penalties of rail to rail and rail to bus interchanges (1).

Currently, middle-income residents in cities such as Mexico City and Buenos Aires, have abandoned public transport in favour of the private automobile. While auto ownership has been on the rise in past decades, the economic boom of the early 1990s has brought a dramatic rise in the number of auto-oriented trips. The prospect of an integrated system of transport centres and accompanying land uses can persuade many of these residents to rely on public transport for most trips, effectively lessening the negative impacts of auto use (e.g., urban congestion, inefficient use of resources and poor air quality). For example, the location of commercial activities near centres seeks to address the growing trend toward “trip chaining” between home and work.

Another potential benefit of upgrading transport centres is an improvement in the quality of public transport services feeding into these sites. Forward-thinking operators will see the advantages of serving the upgraded centres and may restructure routes to provide more direct service. In turn, these changes can result in safer, more efficient, off-street boarding and alighting; and in better travel times, particularly during peak periods. If bus priority can improve the speed and reliability of bus services, it will offer opportunities to extend the catchment area of rail stations and increase the importance of bus feeder systems. For example, in Caracas and Santiago, in an attempt to expand ridership, heavy rail metro authorities have developed bus-rail interchange centres adjacent to existing stations. This sort of planning needs to be encouraged by central and metropolitan governments and extended to include the participation of all relevant players.

In addition, government and community participation in facility planning can help secure the necessary land to attract all of the operators serving principal corridors in the area. A spacious, well organised facility can allow for the safe operation of public transport services according to an established set of operational guidelines; and adjacent mixed-use development can further add to the attractiveness of these sites. For example, in Santiago, a large shopping mall and intermodal transport facility were developed next to the Metro’s new Line 5 terminal station.

Potential Barriers

Despite some of the possible benefits listed in the previous subsection, there are also numerous barriers inherent in developing world systems that can complicate the implementation of transport centres. First, most public transport markets in middle income countries are served by a multitude of private bus companies. Despite government support, the transport centre concept will have to be accepted by the principal route associations in each city, addressing the internal concerns of participating operators. Facility planners will need to develop an outreach program that informs residents, operators and local businesses of the costs and benefits of developing such a centre, and seeks to involve the numerous informal operators that serve these areas.

In addition, if planners truly want these centres to be multimodal, they will need to change the image of walking and cycling. In many Latin American and African cities, these modes are generally given a low level of priority in transport planning. The provision of access to these modes at transport centres will need to be coordinated with a program of facility improvements and operator tolerance of these non-motorised modes. Clearly, this type of project will have to include an educational component that clearly explains the role of the bicycle in promoting a sustainable transport system.

The cost of developing and maintaining a transport centre can also prove to be a formidable barrier to implementation. Depending on the size of the proposed centres, construction costs can entail a significant investment on the part of government agencies, bus and rail operators. There are many possible improvements that can be made; however, without government support, increased revenues, or reduced operating costs, capital costs may have to be passed on to the passenger. City and regional government as well as local neighbourhood and commercial groups will need to play a key role in the planning and implementation of such a centre.

In response to this need to establish better facilities in areas of proven demand, there are, however, multi-jurisdictional considerations that must be taken into account. Participants in the transport centre planning process can potentially include bus and rail operators from the public sector and/or private sector, informal operators (e.g., “por puestos” in Caracas), taxi operators, traffic police, local planning authorities, local merchants, commuters and local residents.

Each of these stakeholder groups has a primary set of reasons for developing a transport centre, and consequently, has a set of objectives that may conflict with those of other groups. For example, urban planners may be interested in improving passenger transfer services and in maximising the potential for adjacent land development, while environmental planners may be more concerned with reducing air and noise pollution. In contrast, operators may focus on such operational issues as commercial speeds, passenger volumes, farebox recovery, passenger boarding/alighting, and direct access to other services; while local residents may be concerned with reducing the negative effects of local traffic congestion and noise pollution. Local merchants may focus on attracting clients and eliminating clandestine businesses, while commuters often focus on trip cost, service convenience and travel time issues. Clearly, a common set of objectives and project features will need to be agreed upon by these groups.

Potential Strategies for Implementation

One strategy would be to establish a network of centres that can be phased in as financial resources become available. Ease of implementation may ultimately depend on the level of investment in each centre and the extent of local “ownership” of the project. A pilot program incorporating a limited number of transport centres will have to be coordinated by an independent, public sector agency with some regional transport and land use authority. Similarly, a transport agency or joint powers authority will need to assume long-term responsibility for managing the facility.

Together with private operators, and passenger groups, authorities will need to determine cost sharing for development of these centres, since social benefits (reduced congestion and

environmental degradation), public transport operator benefits (reduced operating costs and higher speeds), and passenger benefits (increased reliability, comfort, and time savings) are likely to be realised. Financial support for the construction and maintenance of these centres can also come from private sector commercial interests through advertising at these sites. Given the costs of construction, the need to include operators with low discount rates, and the land use impacts of centres, it is important that the pilot program be carefully coordinated with other local and regional development opportunities. A clearly-defined financial plan for implementation and management must be secured early in the planning process.

CONCLUSION

Each city must define its long-term transport objectives and if appropriate, establish its own set of criteria for developing a network of intermodal transport centers. At a minimum, these facilities should facilitate intermodal and intramodal transfers, improve links between the centre and the periphery, and promote the development of complementary land uses in the surrounding area. In addition, they should provide adequate access, safety and security to all transferring passengers.

In the past few decades, urban access has become a subject of great concern to urban planners throughout the world. In many large and medium-size urban areas, demographic growth and its impacts have placed a great deal of pressure on existing infrastructures, prompting the need to increase the capacity and quality of urban services where feasible.

Some urban areas, such as San Francisco and London, have sought ways to improve transport accessibility to all sectors of the population. In large cities, it is essential that transport services be improved, especially those that bring the greatest benefit to the most needy. The development of a system of intermodal transport centres offers the opportunity to improve the quality of many long-distance trips and encourage non-motorised transport for short trips. Unfortunately, in many cities of Latin America and Africa, this latter form of transport has been left out of intermodal planning. New policies should focus on the environmental advantages of encouraging greater pedestrian and bicycle use.

Due to severe financial constraints and multi-jurisdictional conflicts, it is important that comprehensive transport plans propose innovative design, land use arrangements and sound financial strategies for transport centres; that regional authorities recognise the role of these centres in providing regional access to a vital sector of the urban population; and that facility planning incorporate the needs of passengers, operators and local communities. The development of these transport centres will require a solid commitment on the part of government and greater stakeholder involvement in the planning process.

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