Metrobus in separated corridors as an optimal public transport system

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Abstract One of the factors in the worsening of the quality of transport services is traffic delays which caused by constant and numerous congestion. In this article analyzed need of BRT-Bus Rapid Transit system which is serving in separated corridors for optimizing passenger turnover. Metrobus is a modern type of optimal public transport system, which is developed such cities Berlin, Curitiba, Ahmadabad, Istanbul, Seoul and etc. According to the above researches, the construction of a reliable transport system will allow increasing the level of transport accessibility, reducing the level of transport discrimination of the population, increasing the transport mobility of the population and improving other indicators characterizing the effective work of public transport in the city as a whole.

1. Introduction
Industrialization produced the massive arrival of workers to the cities and the size that these acquired made it necessary to develop means of public transportation because the citizens did not have possibilities to have their transportation system.
The demand for mobility was initially met by carriages, derived from the stagecoaches but similar to trams, pulled by mules or horses, and later (1830) by similar steam-powered vehicles.
Later, the electric motor and the explosion engine appeared and consequently the first trams, trolleybuses and buses moved by them. The tram became established as a hybrid between the bus and the train. This situation was maintained until the 50s of the last century in which the trams were retired of enough cities by the discomfort that supposed for the already multitudinous traffic of private vehicles.
On the other hand, in the great conurbations such as London, New York and Paris, the first Metro lines were developed at the beginning of the 19th century that offered fast transit through the city because they enjoyed exclusive lines, some of the underground. These Metro lines were implemented in the large cities of the rest of the world from the beginning of the 20th century and were successively extended to form large networks. The implementation of a long-range plan in a land transport company for passengers, for the period 2021-2030 allows us to improve the economic profitability and market positioning of the public transport sector. The present investigation is practical character; it has a purpose to implement in a company of native transport of passengers the enterprise techniques of long term planning. This fact will contribute to improving the position and profitability of the transport company, which generates employment and good service offered in its different concessions to the users of the company [1].
In this context, relevant cities developed transport networks based on radial metro typologies, complemented by bus lines that covered the rest of the metropolitan area and took passengers to the stops. BRT is a flexible, rubber-tired rapid transit mode that combines stations, vehicles, services, running way, and ITS elements into an integrated system with a strong positive image and identity. BRT applications are designed to be appropriate to the market they serve and their physical surroundings and can be incrementally implemented in a variety of environments [2]. Certain cities kept their trams in the centre to save the cost of tunnelling in densely built areas. Bus transport took over a large part of the market because of its low cost compared to trams, metros and suburban trains and also because of the flexibility provided by the fact that it does not have to run on rails and can be diverted when the streets are closed for construction work. Buses also travel on urban roadways, so infrastructure investments can be substantially lower than the capital costs required for rail systems. As a result, bus service can be implemented cost-effectively on many routes. Yet, despite the inherent advantages of a bus service, conventional urban buses inching their way through congested streets don’t win much political support. The essence of a Bus Rapid Transit is to improve bus operating speed and reliability on arterial streets by reducing or eliminating the various types of delay [3].

There is some difficulties in applying marketing instruments to public transport due to the specific features of this service such as the BRT system in Tashkent. Since resources of transport systems are limited, strategies that aim to largely increase the number of clients can lead to a situation when public transport will not be able to handle properly fast and sharp increase, especially in rush-hours and in this scenario marketing strategy can harm the perception of the service [4].

2. Research

Bus rapid transit (BRT), also called a busway or transitway, is a bus-based public transport system designed to improve capacity and reliability relative to a conventional bus system. The expression "BRT" is mainly used in the Americas and China; in India, it is called "BRTS" (BRT System); in Europe and Indonesia, it is often called a "busway"; while in the British Isles, it may be called a "quality bus" [5]. These BRT Systems incorporate most of the subway's components without the high costs they have. This is why they are also called "surface meters". Its main features include:

- Separated bus lanes
- Differentiated and easily accessible terminals and stops
- Payment or validation of the pass when entering the station, before boarding the bus.
- Adequate signalling and general information in real-time.
- Priority for buses at intersections with other roads.
- Modal integration with feeder lines and trains, intercity buses and subways
- Advanced collection and access technologies.

Typically, BRT systems have been built at quite low costs: between 2 and 4 million euros per kilometre, much less than the 60 to 150 million euros per kilometre of underground metro systems. BST suffers from the poor image of buses, although it is essentially a different mode. BST systems vary widely in terms of its infrastructure and operational offerings. The main characteristics that differentiate BST from regular bus services are: physically separated bus lanes, off-board fare collection, uniform vehicle image, traffic signal priority, and modern bus stops [6]. In Figure 1, it is expected that a dedicated BRT line (bus rapid transit - high-speed bus) will stretch from the Tashkent ring road to the Malaya ring road. The total length of this section is 6.6 km. A. Temur Avenue - Experimental project of the bus route "BRT" (Bus Real Transit) with a separate corridor in the direction of the shopping center "Kompass" (via the streets of Istiqlol, Fergana road) implementation, construction of a separate corridor and reconstruction of the relevant areas of the road.
They are also capable of carrying more passengers per unit of time than trams, and have similar capacity to separated rail systems. With these technologies, certain cities have managed to be in the region of 30,000 passengers per hour in each direction.

Until now, cars were on the increase in the big cities. As incomes rise in developing countries, private car users are growing and demand for public transport is falling, so in the world’s largest cities they are losing about 1 per cent of passengers to public transport each year.

The economic, environmental and social benefits generated by BRTs are very important arguments for getting cities to implement this type of system. However, as it is still a novel concept, there are many impediments to its implementation. In general, the barriers are usually of the following type:

- Lack of political will
- Lack of technical capacity of municipalities
- Lack of resources for funding
- Limitations on track width and/or track layout

Before launching a BRT implementation plan, you should have some background information that will provide a solid basis for starting your decision making.

The type of basic information needed to initiate an implementation plan for a BRT is next:

- Study of the situation
- Distribution of the population and travellers between the different modes of transport
- Expenditure and tariff system
- Environmental analysis
- Trams
- Light rails
- Urban Train
- BRT
- Meters

In a second phase of the process, the general objectives, the organizational structure of the proposed system and the financial feasibility of the system are determined through a cost and revenue analysis and in particular the social cost-benefit analysis of the system.

Some of the aspects to be analysed are listed below:
• Important influences
  • Economic - Influence on improving mobility, on the economy and on employment generation
  • About the environment - Air quality and noise generated
  • Social - Possible cross-subsidies between different users of the system
  • In the urban structure - Changes in the shape, density and size of the city, influence on land
    use Regulatory and legal aspects Administrative and business structure
  • Dimensioning the public part of the system
  • Definition of the obligations and remuneration of private operators and concessionaires
  • Operation with or without public contributions
  • Revenue distribution options
  • Fare types
  • Planning costs
  • Infrastructure costs
  • Operating expenses

Despite the growing popularity of the concept, BRT implementation faces several obstacles. Since
few high quality applications of BRT exist, there remains a lack of widespread familiarity with the
concept. BRT typically uses existing road infrastructure which reduces road capacity for vehicular
traffic. Finally, planning and implementing BRT requires the coordination of several agencies and
appropriate funding levels. EMBARQ, the World Resources Institute Center for Sustainable
Transport, works to catalyze environmentally and financially sustainable transport solutions to
improve quality of life in cities. To that end, EMBARQ has supported the planning,
implementation and evaluation of BRT systems in at least 14 cities [7].

3. Social Influence
In developing countries, buses operate as taxis rather than as structured lines. The incentives that
drivers receive depend on the number of passengers, so they compete for customers against other
drivers, stop wherever they are called, drive dangerously, and work very long hours, greatly
increasing the risk of accidents. With a BRT they can earn more with 8-hour shifts, as the
operators' earnings are according to a formula based on kilometres driven and the regularity of
their journeys. The number of kilometers depends on the service schedule and as a result, operators
do not have to exceed speed limits or drive dangerously.
Bus rapid transit systems also provide valuable public health benefits by reducing road fatalities,
crashes and injuries; reducing personal exposure to harmful air pollutants; and increasing physical
activity for BRT users [8].

4. Rates
The rates can be flat, depending on the distance travelled, or mixed. In most cities, rates are flat.
There are many reasons for this choice. Firstly, a flat rate simplifies collection, and reduces
investment and operating costs. Flat rates, with a single ticket, involve simple technologies. For
distance-based systems, more expensive equipment must be used. In addition, a flat fee system
offers a cross-subsidy to the poorer people who tend to live far from the centre by the richer people
who make shorter journeys.
The development of new technologies, such as electronic ticketing, causes companies to move to a
different stage of the use of technology with greater transparency of information. This new stage is
a completely new challenge in the modernization of companies. At this point, it is observed that the use of a new technology reflects an innovation [9].

The calculation of the system’s operating costs is of great importance for the determination of tariffs and for the definition of incentives and benefits for private operators.

There are two types of fees for the calculation process:

The Technical Fare that reflects the real cost per passenger, plus any benefits that may come from compensating the actors in the system. The User Fee, which is paid by the passengers, is the result of increasing the Technical Fee in order to create Special Funds for certain contingency fixed costs. This fund is for unexpected events, such as a drop in demand to exceptionally low levels, extended operating hours, terrorism, vandalism, etc.

The Technical Tariff serves to distribute the funds to the concessionaires of the different operating components of the system, according to the following formula:

\[ \text{Tickets sold} \times \text{Technical Fee} = \text{Remuneration of the system's agents} \]

In general, the technical fee should provide sufficient income to remunerate:

- Controlling Public Administration
- Transport operators
- Collection Companies
- Financial Administration Company
- Capital Loans
- Contingency Reservations

A contractual mechanism must be defined to recalculate the Technical Tariff periodically according to the variation of costs and productivity of the system. System designers must be aware of the value of the operating costs at all times in order to determine the tariffs fairly. Otherwise private operators would have no incentive to increase their productivity.

Tashshahartrans will create an opportunity to pay directly for travel by cards not only Humo, but also Uzcard - through NFC within the project of Metrobus in Tashkent. It will also be possible to pay by phone - via the same NFC or QR.

It is planned to integrate international payment systems to the transport payment system. By September 2020, there will be 15 automated points of sale of travel cards and the possibility to pay with smart clocks, bracelets. By December 2020, there should be a system of information about bus stops in the bus salons, and on large bus stops - a scoreboard with a schedule. In October, they want to launch the Mening Yonalishim system (My Direction), which should become an analogue of Yandex.Transport [10].

5. Initial phase

The planning stage of a BRT should discuss methods to involve citizens in the design process and define key variables to provide a quality service to the passenger. The aspects to be discussed should be:

- Public participation processes
- Approach to existing carriers
- Service safety plan
- On the buses
- At stops and terminals
- Marketing Plan
- Identification of the user base
- Selecting an appropriate and different name for the system
- Selecting an appropriate logo
- Brand positioning
- Advertising strategies
- Media advertising campaigns
From an engineering point of view, the design of BRT corridors should be the result of the Origin and Destination Travel Study, and the contributions of key stakeholders, especially users. Firstly, proper corridor selection not only influences whether a significant proportion of the population uses the BRT system but also the future development of the city. The starting point for making decisions on the location of corridors is the origin-destination matrix, which helps to identify daily travel patterns in spatial and temporal terms. In general, the most it is important to minimize the distances and travel times for the highest possible number of people in the city. This objective is generally achieved by placing the corridor in the vicinity of areas that generate and attract travel, such as areas of concentration of companies and large educational and commercial centres.

BRTs can influence the value of land and the shape of the city. Separated corridors can play a catalytic role in sustainable economic development. For example, stations can be hubs, which act to attract commercial and residential activity.

BRT systems are usually developed in phases. Local administrations are encouraged to gain experience with the early demonstration stages before embarking on a larger network. Implementing the phased system is consistent with economic reality, as it is unlikely to obtain funding to provide BRT for the entire city at once. However, the initial planning of the corridors must include the entire final system, which goes beyond the first phase of implementation. The plans for each corridor evolve as experience is gained, but it is always advisable to initially design a city-wide plan that will encourage public support from all citizens even if they do not benefit from the first corridors.

When designing the system it is necessary to decide where trunk corridors and feed lines will go. Factors to determine route structure, in addition to users’ travel forecasts, are station and road capacities as well as bus specifications, service frequencies and costs.

### 6. Separated Lanes

Concerning to separated corridors it is important to determine whether they are "level" or "different level". Those designed at level must cross intersections using traffic lights, which can reduce the potential capacity of the system. Separated corridors at different levels avoid such conflicts by being constructed in such a way that they are completely separate from traffic. Overpasses, underpasses and tunnels are some of the options used to create separation between flows. Given the time savings and reduced congestion achieved at these intersections by these works, the payback period can be considerably reduced (depending on the level of occupancy).

At a general level, the following aspects should be taken into account in the implementation of a BRT:

- Means of payment
- Pre-payment or payment on board
- Without ticket, with magnetic stripe, or with contactless smart cards
- Operational Management Centres
- GPS
- Communications between the control and the drivers
- Intelligent Transport Systems (ITS)
- Real-time information panels
- Cameras
- Priority systems for intersections
- Bus technology
- Engine and fuel
- Size: bi-articulated, articulated, conventional
- Guided
- Vehicle interior design
7. Means of Payment
As far as the collection and payment check is concerned, the method chosen influences the travel times and the impression customers get from the system. If we pay before entering the buses, the long waits involved in payment on board are reduced. When the number of passengers reaches a certain number, the waiting times due to on-board payment systems become a serious problem. Some studies estimate that the turning point is reached when the number of passengers is 2,500 - 3,000 per hour and direction.
Prepaid adds another benefit, transporting and handling cash increases the chances of theft, decreasing the chances of internal fraud.
There are several technologies and mechanisms that facilitate the prepayment of trips, such as:
- Systems based on physical assets
- Magnetic stripe tickets
- Contact and contactless smart cards
- Proof of payment systems
Selecting the optimal collection system involves balancing costs, simplicity and administrative workload. In Quito, a simple, coin-based system meets the needs of the city, avoiding the need to print paper bills while eliminating long lines of people wanting to buy bills.
Magnetic stripe technology also has a long and successful history. These systems involve the pre-purchase of magnetic tickets, which are checked at the entrance. The investment costs are significant, both for the purchase of the selling machines and the magnetic stripe readers at the entrances. However, the advantage of the magnetic strip is that it is relatively low cost, in relation to the value of the ticket, 1500 to 3000 sums per ticket. Tickets can be valid for several trips and allow for distance-based fares. They also serve to offer discounts for those who purchase multi-trip tickets.
Smart card technology is the latest advancement in collection systems. These cards have an electronic chip that can store a lot of information about the areas for which it is valid, the times it is recharged, the trips made, etc. This information helps in the planning of the system and the distribution of income among the operators.
The main disadvantages of smart card technology are its cost and complexity. Vending machines and verification equipment have to be installed at the entrance (and at the exit, if distance-based tariffs are used). In addition to the equipment costs, each card is relatively expensive, with current costs ranging from SUM 15000 to SUM 50000 per card. However, unlike magnetic stripe tickets, smart cards have a long life and can be reused.
Currently, when this system is used in a BRT, a Mifare type contactless card is used.
Finally, some systems in Europe and America have payment before boarding, but users enter directly to the vehicles without any verification or passing through a turnstile, making controls penalizing and fining offenders. Compliance with the payment obligation is maintained through the goodwill of passengers and controlled through random checks by inspectors. Those who do not show proof of payment of the ticket are fined. The advantage of these systems is that there is no need to build closed stations which helps to reduce construction costs. The disadvantage is that it cannot be applied everywhere, only in places where public awareness and honesty are very high.
Thus, this article presents a study of multiple cases that sought to analyze the management of innovation in services, from the perspective of the implementation of electronic ticketing among the associated companies [9].

8. Fleet Management
Fleet Management Centers allow a high level of management and control of the system that adds many advantages. They must identify and correct the accumulation of buses, and maintain
regularity and frequency. In addition, if a vehicle has mechanical problems, the control centre can apply corrective actions, such as choosing between sending mechanical assistance or a crane to take it away immediately. Similarly, if there is a safety problem, a safety team can be sent to the site of the emergency.

The Platform Screen Doors (PSDs) system is an important component at BRT stations, and it not only screens platform from bus lane to offer a safe and comfortable environment for passengers, but also can offer bus position information to Bus Fleet Management System (BFMS) which manage operating bus fleet. Compared with the traditional BFMS based on GPS (Global Position System), this system locates bus position of arrival/departure at station platform based on signpost technology which is similar to the Platform Screen Doors (PSDs) system [11]. There are many ways to keep the buses located from the management center. A radio or mobile phone may be sufficient, but a system that includes a Global Positioning Satellite (GPS)-GLONASS can also be installed to increase control effectively. This technology allows us to have real time information of the location and status of the bus.

The integration of these systems with others generates the concept of "Intelligent Transport Systems" (ITS). Within this concept there is also a set of other options that can provide added value, comfort and safety to public transport trips.

Real-time information panels add great value to systems where the separation between buses is only a few minutes. If users know the time of expected arrival of a bus, they can do another activity, making the best use of the time they are waiting.

Security cameras at stations and on buses are another alternative for monitoring the system. Cameras are a visible sign to users of the security system and can help reduce the fear of being assaulted on the bus [13].

The main objective of this work was to study, through description and analysis, the model used in the strategic planning process of an urban public transportation company in Tashkent [12].

9. Traffic Light Priority

Priority Traffic Light gives preference to buses at intersections where the separated corridor intersects other traffic, for example, the Los Angeles BRT system successfully uses this system. When a bus approaches a traffic light intersection, an electronic device in the vehicle communicates with another on the roadway and the traffic light controller gives a green light to the approaching bus. Priority Traffic Light works properly when the interval between buses is between 4 and 5 minutes.

In general, intelligent transport systems (ITS) can significantly improve system efficiency. Bus rapid transit (BRT) is an effective way to improve urban traffic status. Traffic signal priority is an important technique to increase the efficiency of BRT. In view of complexity of coordinated control with signal priority, this paper presents a strategy of key parameters selection, a control method of signal priority based on fixed period and a priority appraising system. Optimization of signal control parameters and bus dispatch parameters is realized using genetic arithmetic for different periods to obtain general control effect of BRT and other vehicles [14].

Today, all BRTs that are built use ITS systems that provide high-value services to the citizen, keeping real frequencies very close to the theoretical ones.

In the public transport market, competition is increasingly developing. Therefore, the role of marketing as a tool to increase the income of urban passenger transport enterprises is becoming very important [15].

10. Bus Technology

The technology chosen for the bus influences operational costs and other factors such as the environment. Some cities dictate the power and emission characteristics of buses, but leave the final choice of propulsion technology and supplier to the operators. For example, some BRT specifies that buses must be CNG-powered.
The propulsion systems and fuel options are
- Diesel (EURO IV, EURO V)
- Compressed natural gas (CNG)-Methane
- Liquefied petroleum gas (LPG)-Propane
- Bioethanol
Among all of them and what BRT refers to the Diesel EURO IV and CNG are the reference points of the sector.

Some aspects of bus design must be well established in the definition process. System designers must determine, among other things, the size of the buses and the width and number of doors.

The options of existing vehicle sizes are:
- Minibuses (30 passengers)
- 12-meter buses (70 passengers)
- Articulated buses of 18 meters (160 passengers)
- Bi-articulated buses (270 passengers)

The actual loading capacity of the buses depends on the seating arrangement and the number of passengers to be accommodated standing up.

The size of the vehicle should be defined by the expected demand so that the frequency of service is as high as possible. High volume passenger systems require large (articulated or bi-articulated) vehicles and high frequencies. Smaller systems must also have high frequencies, and for this they must use smaller vehicles.

For example, the system currently under construction in Tashkent defines:
- CNG buses of 18 meters for trunk lines-Mercedes-Benz Low Floor buses
- CNG buses of 12 and 8.5 meters for feeding lines

System designers must also establish the maximum life of the vehicles. Putting a maximum on the age of buses helps to maintain the quality of service when it comes to an end and to ensure that operators compete on a level playing field. Normally this life is set at around 12 years.

Another technical element of possible use is mechanical guidance. Systems such as the O-Bahn in Essen, Germany, and Adelaide, Australia, use automatic guidance to improve speed and reliability. These systems use high kerb tracks that guide the vehicle as it leans on them with horizontal side wheels. It has the advantage of increasing average speed and reducing the size of roadway required. However, the construction of the lanes can be twice as expensive as a normal exclusive lane. If stations are less than 700 metres apart, as in high volume systems in developing countries, the advantage of higher speed is lost and only the smaller size of track remains.

While these guidelines may make sense in certain circumstances, the reality is that most BRTs do not incorporate them.

11. Integration Plans
Passengers identify the driver as a necessary and important element of the trip, and they note that not only safety but also comfort depends on him. Permanent residents of Tashkent do not positively recognize drivers - emigrants. In the course of focus groups the following negative moments in the work of drivers were noted: sharp style of driving, knocking down passengers in the cabin, ignorance of the route and stops in the course of the journey, not always include audio-notification of the names of stops, ignorance of the dialect language, rudeness and aggression towards passengers, phone conversations while driving, the inability to obtain clarification of information about the route from the driver due to his inaccessibility[16].
Most of the time, the planners of a system think of the other modes of transport as competitors, not as complementary. Maximizing the interconnections of the BRT system with other modes will increase the potential user base.
Furthermore, BRTs do not end at the exit door of stations, but have an area of influence.
Well-designed pedestrian access plans succeed in increasing the number of passengers who are willing to use the BRT. Pedestrian access routes should be studied within a radius of at least 500 meters around the stations.

In some places the integration of the bicycle with the BRT is also a way to increase the volume of customers. Many people may be willing to travel on the BRT if the station has parking facilities for them.

If taxi ranks are located in the vicinity of BRT stations, advantages can be gained for taxi drivers, public administrations and citizens. Designers gain by adding another food service to their service structure and taxi drivers by reducing their passenger search costs. BRT stations provide taxi drivers with a high number of passengers, without the need to drive around consuming large amounts of fuel. The city's public administrators gain by reducing the congestion caused by unnecessary taxi driving, and the citizenry gains by having a more comfortable public transportation system that reduces overall pollution.

Owners of private vehicles can also be integrated into the system by providing integrated parking facilities. These car parks should be placed at the end of the BRT lines. The users of these parking lots finish their journey more quickly if they use the BRT. Owners of private cars will use public transport if they can use the BRT after driving a long distance, last kilometers, leaving your car well parked near the BRT Terminal and saving time and money. A good marketing strategy is to see the street jammed from a bus moving at high speed through the separated lanes.

BRT systems can also be an ideal complement to other modes of public transport. Cities that already have metro and suburban trains can integrate them with the BRT. Sao Paulo, for example, uses BRT to connect its metro lines to outlying towns. Some cities already have rail lines, but do not have the resources to expand them. In those cases, they can take public transport throughout the city and surrounding areas using the BRT.

The keys to modal integration are the physical connections between the systems, joint marketing and promotion, and the unification of tariff structures. Several systems can be advertised under a joint name and logo, so that they form a unit in the eyes of the passengers. A unified tariff structure allows you to switch from one mode to another without paying an additional fee.

BRT systems must also be integrated with long-distance transport systems such as buses and trains. In these cases physical integration is the key to making this option possible. Passengers on these modes carry luggage, so they must be able to transfer between modes comfortably with this luggage.

12. Demand Management

Part of the strategy to transform a city and its mobility structure is to put in place high quality public transport, such as BRT, and at the same time use mechanisms to discourage the use of private cars. The appropriate use of such mechanisms can improve the demand for passengers on the new transport system, assist in the restructuring of the city, generate economic and environmental gains, and improve overall mobility and accessibility.

Recent experiments in Travel Demand Management, or Mobility Management Techniques in Berlin, show that citizens can be directed towards sustainable transport alternatives. Mechanisms exist to encourage this, such as speed reduction of private vehicles, congestion charges and use of urban roads, as for example in London, parking restrictions in center, and parking payment mechanisms. These measures have achieved important successes in changing the public-private intermodal distribution.

13. Financing

Financing is not normally an impediment to the implementation of a BRT system because of the relatively low investment and operating costs. Some developing cities have found that loans and external funding are not strictly necessary to implement a BRT. Local resources may be sufficient
to cover all infrastructure construction costs, and since BRT systems are economical to operate, they operate without subsidies and no public funding is needed. The processes of innovative modernization and diversification of the economy, in turn, have a tendency to accelerate the growth of services in the social work sharing system in comparison with the real industries, which in a sense is one of the laws of human society development [17]. If funding is needed for any reason, there are bilateral and multilateral agencies that support BRT projects. Unlike metro and light rail, BRTs have low investment costs and payback periods that are considered good by funding agencies. There are international institutions that also support BRTs for the same reasons. The World Bank, in its Urban Transport Policy, has commented very favourably on BRTs. Bilateral agencies and regional development banks have also commented very favourably on the effectiveness and low cost of BRTs. Financing of BRTs is divided into three groups of activities: planning, infrastructure and equipment. Each of these activities is financed by different types of organizations.

Before seeking international funding, local governments should try to obtain local resources. In developing countries (Latin America), external financing is essential, public resources are scarce and infrastructure costs, although lower than in other systems, remain unmanageable for the respective public administrations.

The possible resources of local authorities to finance BRTs are

- Tax Income
- Parking and congestion charges
- Commercial developments in and around the stations
- Bus and station advertising
- BRT Brand Merchandising
- Parking fees, car ownership and circulation taxes, and congestion charges generate a permanent flow of resources for the development and maintenance of BRT infrastructure.

Many developing cities do not currently levy fees for parking private vehicles on public roads. In some cities, the implementation of parking fees and their collection and control through concession has been sufficient to obtain resources for the BRT. Congestion charges have been introduced in Singapore, London, Rome and Stockholm.

BRT systems also have many alternatives for marketing space in and around stations. These have a high value because of the large volume of people that circulate in them. Real estate values soar simply by announcing where a BRT corridor will pass. You can take advantage of this opportunity by buying and selling commercial space and land around the Terminals.

Advertising spaces can also be offered at stations and inside the buses. Advertisements must be discreet on pain of degrading the aesthetics of the system, when there are too many users not distinguishing the signs about the use of the system, moreover the reduction of the aesthetic quality of the system can influence the image received by the customers, reducing their satisfaction and their possible use of the BRT.

Some BRTs have achieved such a level of acceptance in the community that they even generate opportunities to market the brand. The sale of T-shirts, bus models, and other image-related items can become a permanent source of income. The success of the marketing system depends on the good impression generated in the public, giving a high quality service.

In some cases, international funding may be an appropriate addition to the financial plan based on local and national resources. But international organizations want to see a significant allocation of local resources to be sure that the political will exists.

14. Conclusions
- The public passenger transport company under our study and analysis has always operated in a competitive market, which in theory is usually called perfect competition.
- The benchmarking process is cited by as important factors for an organization of BRT system.
Hypothesized technical characteristics that the analyzed BRT systems clearly do not have is the utilization of off-board ticketing facilities. The BRT systems utilize on-board ticketing facilities that allow for a swift passengers boarding, alighting and fare collection, though not as swift as off-board ticketing facilities.

It is increasingly accepted that a full-featured BRT has the potential to offer positive impact on land development. Some existing studies have suggested that the appreciable accessibility benefits, especially travel time savings, conferred by BRT have caused property value uplift [18].

BRT systems can run at a faster speed than conventional buses which enables users to travel further at a given commute time. Households and businesses generally choose where to locate by weighing costs and benefits of alternative sites [19].

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