IDENTIFICATION OF KEY FACTORS IN THE DESIGN AND IMPLEMENTATION OF BRT SYSTEMS IN DEVELOPING COUNTRIES

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ABSTRACT

Industrialization and urban growth have forced developing countries to face unprecedented transport challenges as well as bigger institutional requirements. For the last 20 years developing countries have chosen Bus Rapid Transit (BRT) systems as a cost effective way to answer to these ever increasing demands. Despite the wide existence of literature reviewing the experiences in BRTs of the last 20 years, it is possible to find new BRT systems that face the same design flaws or difficulties already reported in past projects. This proves the existence of the huge gap between transport technicians and policy makers and the need of pulling them together.

Filipe & Macário (2012) proposed a model for public transport projects where they identify six spheres which may guide policy makers in the design and implementation of new public transport projects. In this work we have applied this model to already working BRT projects, especially those in developing countries to identify key factors for the system's success in this context. Although developing countries have higher probabilities of developing new BRT projects, they also face higher institutional challenges than developed countries.

By doing this we have been able to identify a number of key issues that have been crucial to BRT system's success or that have been the main cause of some serious difficulties for projects located in Asia, Africa, and Latin America. Case studies are presented for each key factors identified, as well as some general observations on the outcomes reached by each project in their local context. We also propose general observations on the key factors for assisting decisions makers in their policies.

Further work is needed in order to foster environmental friendly transportation policies in the developing world. We have also found that a critical issue, which is hardly covered by academic research: public participation and engagement in the process of designing and implementing BRT projects. Proposals of methodologies and a formal discussion about the real objectives around the subject are needed in order to help the development of future transport policies.

Keywords: Key Factors, BRT, Transportation, Planning, Implementation

1. INTRODUCTION

Industrialization and the increasing urban growth that developing countries have shown in the last twenty years have made Bus Rapid Transit (BRTs) a viable alternative for attending citizen's mobility and connectivity needs. BRTs present great advantages that make them and excellent option for the social and economic context of this kind of countries. And although there have been efforts to help these countries in the process of designing and developing new BRTs such as the creation of specialized research centres (eg: ALC-BRT, ITDP, EMBARQ) or case to case studies, we still find recent systems in America, Asia, and Africa with not so successful implementations. This suggests that there is still a huge gap between international experience and policy makers which complicates the accomplishment of a successful BRT for these countries and their people.

Between the advantages that make BRT systems a superior alternative for massive urban transportation we found that these systems present a small cost in relation the similar alternatives like a Tramway or a Metro. According to Hidalgo, Graftieaux, & Custodio (2007) the cost per kilometre for a BRT system are about US$1.35mm in Jakarta and US$8.2mm in Bogotá's Transmilenio. BRTs also permit a gradual implementation through time which help to reduce the capital requirements and to reduce the systems risk (Filipe & Macário, 2012). BRTs, when done correctly, present a high mobilization capacity with a good operational speed and reliability (Dario Hidalgo et al., 2007). This increased service quality in relation to informal bus services should increase the passenger patronage, benefiting more from the economies of scale present in transport services. Finally BRTs can be used to introduce new policies such as changes in land use around the systems corridors or new regulations and better governance for public transport (Muñoz & Gschwender, 2008).

In this work we will use the BRT definition by the Institute for Transportation & Development Policy (Wright & Hook, 2007) understanding a BRT system as "a high-quality bus based transit system that delivers fast, comfortable and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service". This makes a BRT system something much more complex than a conventional bus service. BRT systems require a higher level of coordination and collaboration between many different actors and agents than other kind of systems. The degree in which this coordination is accomplished to provide segregated right-of-way for system's buses and a real identity for the system will give origin to different types of bus services. As Levinson *et al.* (2003) define, there are six different types of bus public transport systems (Fig 1), starting for simple and almost deregulate informal bus service to a highly complex full BRT system with segregated corridors and pre-board fare collection mechanism.

As we see in Fig 1, bus services evolve as they provide better quality solutions for Runways, Stations, Vehicle Quality, Services Provided, Route Structure, Pre-board Fare Collection and the last step in its evolution is accomplishing a total integration of the system making the BRT an Intelligent Transportation System (ITS).

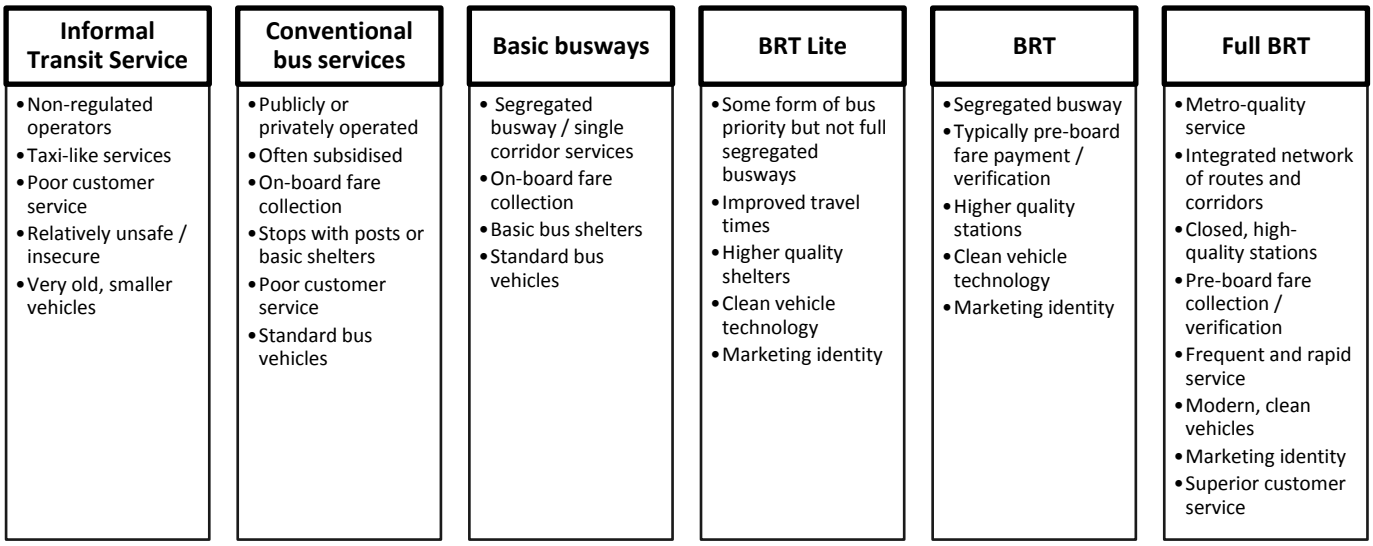

Figure 1- Types of bus-based public transport systems (ITDP, 2007)

This huge diversity on BRT quality and service provided took (Filipe & Macário, 2012) to propose a model for the design and implementation of public transportation policies. They define six spheres where technician and decision-makers should work in order to develop a new BRT system. These spheres are: Integration or as we define it, how the systems take charge of the urban context in which it's located; Funding and Financing which covers the management and provision of resources needed for the systems operation; Public Acceptance measures to reduce opposition and provide information to the stakeholders.;Service Business Model and Physical Settings and, finally, Energy and Environmental issues the system should take care of.

We have applied this theoretical model to existing systems in different developing countries in the regions previously mentioned in order to analyze these systems and identify the key issues that have been crucial to the systems success or source of various difficulties. With this we pretend to reduce the existing gap between international experience and policy makers by guiding the last ones into these crucial matters for the development of BRT systems

It is important to clarify that it is not our intention with this work to suggest a particular course of action for the topics here described. We reinforce the idea that any public transportation system needs to adapt to the local context and the people who will use it. This makes impossible for us to give a priori solutions for any case.

We have divided this paper into two sections. The first one presents our findings and key issues identified for each sphere with a brief explanation of the difficulties they may carry with them. The second section gives examples from the international experience over these issues, their solutions and their consequences in the service provided.

2 ISSUES ON THE DESIGN AND IMPLEMENTATION OF PUBLIC TRANSPORTATION POLICIES FOR BRTS

Filipe & Macário (2012) originally defined six spheres where decision-makers and technicians should work together in order to enhance the design and implementation of BRT systems. We have inspired our analysis by these spheres and analyse the main areas behind them. Here we present our findings and key issues in their implementation.

2.1 Integration

BRT systems usually constitute a major disturbance in the cities in where they operate, especially during the implementation stage. The need to build long and high quality bus corridors and special passenger's shelters in the main arteries of the city make a huge impact not only in the road conditions but also in almost every other aspect in the vicinity of the corridors and even in the whole city.

Some developing countries have considered this issue as an opportunity to improve the city itself by offering a better vial infrastructure not just the ones using the bus system. Policies like installing new luminary, the construction of bike or pedestrians paths along the corridors or providing an enhanced urban landscape can be done while the construction of the corridors and shelters takes place. This way, the implementation of the system can be used as a way to give a facelift to the main arteries of the city and incentive habits as cycling, walking and the use of public transport. These measures help people recognize the benefits of the system and understand the change it means for them and the city. Helping to improve the system's acceptance in the community and easing the implementation process. In order to succeed at these objectives, civic engagement plays a crucial role in knowing the community needs and concerns.

A second important integration issue for BRTs is how people can get to the corridors and trunk lines. BRTs are not supposed to be a stand-alone solution for urban mass mobilization as they only provide services in the main lines of the city. They require a secondary system to move people to and from the main roads to their final destination, so this is a matter policy-makers shall include in the design. So far, there have been different approaches on the secondary system used and the level of integration they have with the BRT. Experience has shown that this has much to do with the current bus services operators and their political strength. So far studied countries have ventured in different ways to this matter but we have simplified their approaches into two different cases. The approaches go from letting old services compete against the BRT to completely replace old operators and bus lines with new operators and services after an open tendering process.

Our first case is where the old services are allowed to keep operating side by side with the new BRT. Depending on the time for the expiration of the previous contracts, this situation completely overcomes the need for a secondary system to connect commuters to the corridors with previously existing lines. On the other hand, letting the previous operators

continue their services does not guarantee their support nor help to the new system. After all, the BRT will compete against them and bus operator's competition practices have been proved to be non desirable at all (Díaz, Gómez-Lobo, & Velasco, 2004). Although none of these practices have been reported to have been used against BRTs, the possibility of it remains open and it is an issue that needs to be taken care of. The experience shows that a good practice has been to make operators compete "for the market" instead of "in the market" by public tenders.

Our second case is when old operators and/or their services are immediately or incrementally replaced by the operators and services of the new system. This usually is done with a change into a feeder and trunk scheme for public transport in the city. When the new operators do not include the previous incumbents they may raise as a strong opposition against the BRT.

Another important consideration when systems get replace like this in a short period of time is information. A well planned campaign must be done to inform users about the new tours and new bus stops so they are well prepared for the BRT and associated changes like integrated payments and vial changes. Failing to do this correctly can permanently affect the system's image as users get a bad first impression and correcting this impression can result quite expensive.

2.2 Finance and risk sharing

As any major public policy, BRT systems need to balance their generated incomes and their expenses in order to be sustainable in the long run. Even when a subsidy is planned from the beginning of the design process, a balance is still needed in order to keep the subsidy at the planned levels. This issue has pushed many of the studied cities in the hands of private operators or public-private joint ventures. And this is not the only area of BRTs that governments have learned that they can improve by partnering with the private sector. Also, governments have been able to inject new resources and get a greater efficiency in their investments.

The traditional approach on risk sharing is based on the World Bank's report on best practices in Public Private Partnerships (PPPs) where the risk over a certain matter is allocated to the party with more capacity to respond over it. And in case of no or similar reaction capacity, the risks should be allocated to the one more capable to bear it. The application of these principles in transportation PPPs has resulted in allocation in the government of the full underlying price risk and the private operators being responsible for volume risks. Making the government responsible for risk factors that it can control better than the private operators and those than the private operators could handle better but which the operators could not bear. (Barlow, 2013)

In a response to this situation, the consulting firm Deloitte (Barlow, 2013) has recently studied these partnerships and compared it with the *alliancing* contracts present in the construction industry for specially complex and risky projects in order to learn from their risk

sharing techniques and financing structures as a complement to the World Bank principles (Iossa, Spagnolo, & Vellez, 2007). They have found many valuable lessons which could be applied in transportation PPPs in order to reduce the whole system's risk and maximizing its responsiveness. The most important one is that seeing tendering process shall as the beginning of a long term relationship between the operators and the regulators where some risks and responsibilities can be shared and others should be individually assigned.

For this relationship to be sustainable, Deloitte (Barlow, 2012) has suggested the following seven principles from the *alliancing* contracts that both regulators and operators must follow in every situation.

Joint management structure where both, regulators and operators, have voice over the future of the project.

Risk and opportunity sharing which helps to align individual incentives with the BRT needs. This way the total risk is reduced for the system and this way for every part of it. Also it helps to increase the system's flexibility by keeping incentives to look for opportunities for improvements.

"No disputes" policy in which both parties agree not to appeal to a higher instance like courts or external agents for solving their differences. System's institutionality should be able to handle the differences and have ways to promote consensus between parts.

"Best for Project" basis for both parties. This requires that every part of the project has and understands his best interest aligned with the project outcomes. This can be achieved with a clear and correct incentives scheme.

"No fault – no blame" culture in which both parties focus on solving problems and not on finding the one responsible of them. Accountability it is still important but no more than keeping the system working correctly.

"Good faith" based in trust. Each part must trust the others to be working by these principles in order to follow them itself.

Transparency and Open Book Documentation (OBD) it is the most complicated principle to follow and it has not been tried in the studied cases. But it is very important as it can be the only way to build the needed trust between regulators and private operators.

By following these principles in the implementation and operation of the BRT, the funding and risk allocation should be easier than before. This way capital should come from the party or parties covering the associated risks within each area.

Following the Best for the Project basis described above allows for important synergies to emerge in the relationship between regulators and operators in the way of additional

measures for financing? the system and reducing their costs. Some measures we have found in the studied countries are the following although many more may exist:

Soft Credits - One of the main initial difficulties for the operators is making potential investors trust their paying capacity and that the BRT will work out as expected. This usually results in very high rates for loans that unnecessarily increase the system total costs. One way to deal with this problem has been for the regulators to provide loans at below market interest rate to operators for acquiring their first batch of buses. As the system works out the renewal of the fleet can be done by the operators themselves and the initial loan can be fully repaid (Hook, 2005).

Reducing In-Market Competition – Some countries have taken the implementation of the BRT as a way to partially or completely reform the city urban mobilization system. This can also be done as a way to assure patronage for the new BRT lines. Although not always easy, removing old incumbents from the BRT lines may be the necessary step in order to achieve financial sustainability for the system.

Changing bus plan scheme – By transforming the bus routes into a Trunk & Feeder system with the BRT lines as Trunk lines, regulators are able to significantly increase patronage for the BRT and this way help it achieve its goals.

2.3 Public Acceptance

Public acceptance and participation is an area where research has just begun. Most available literature describing BRT implementation processes completely omit the information processes to the general citizenship and other stakeholders. The main issue attended by researchers is the importance of a marketing identity for the system (Wright & Hook, 2007) and a corresponding media campaign before the implementation starts.

We found necessary to open the discussion in this matter and start discussing the optimum ways for informing the citizenship and getting them into the BRT planning stage so as to start making new transportation systems a lot more city and people friendly.

2.3 Business Plan

In order to improve the alliancing model it is necessary to understand the business model for a BRT project in order to recognize all the involved stakeholders and the value propositions given for each of them (Freeman, 2008) Moreover, a BRT should be able to generate value to each and every part of the value chain of the mass transportation system (Porter, 2011).

We have identified six stakeholders for a regular BRT system and we suggest that a value proposition is explicitly given for each of them in order to increase the potential of the system.

2.3.1 Passengers

The most sensitive and involved group, they are the clients for the service provided and will receive all the operational improvements from the BRT, such as travel time reductions or fare cuts. And with possible subsidies, they are the system's main source of capital by the payment of the fare.

Also, it is important to make an effort to explicitly communicate any identifiable improvement to the population as they are not always obvious and these advances may pass unnoticed to them. This also helps to improve patronage and to improve the systems efficiency.

2.3.2 New Operators

The new operators are those enterprises that might enter the local transportation business through the implementation of the BRT. As they lack experience in the local market, they are less faithful and tend to overestimate financial and operative risks (Barlow, 2013). Special efforts shall be done to convince them to trust in the system's success.

2.3.3 Incumbents

These are the operators who run the previous mass transportation system. They have all the previous experience and knowledge of the market and their collaboration can greatly improve the design and implementation of the BRT. Moreover, depending on the degree of organization in the trade, they can become a very important political and social actor against the new system. In all cases decision regarding their future must be made, such as if they are allowed to join the new tendering process or if they will have a privileged space in it. There also may be legal obligations with them that hinder the system implementation

2.3.4 General citizenship

Not only passenger's lives will be affected by the BRT. The whole city will suffer from noises from the construction of the required infrastructure, expropriations, changes the land usage, etc. These changes and externalities must be taken into account by policy makers in order to correctly design the BRT's implementation.

Experience has shown that public participation processes and information campaigns can greatly reduce their resistance against the system (Kristijo, Piya, Susetyo, Utama, & Chikaraishi, 2011).

2.3.5 Government and authorities

The state and authorities usually benefit from the institutional and regulatory changes that BRTs bring along with their implementation. These benefits come from greater attributions for planning, supervising and penalizing contracts breaches.

2.3.6 Drivers and other employees

Drivers and employees from the studied cities usually improved their working conditions as a result of the implementation of their BRT. The most common areas for these improvements are driver's safety with the reduction in the number of accidents and improvements in their payments schemes with the formalization and regulations that seek to avoid risky behaviors such as competing for passengers in the streets by overtaking other buses.

These many stakeholders may have very different levels of organization or atomization, which can make the communication with them difficult and complicate the process of correctly identifying their needs. Moreover, it makes less obvious the point from where to start in order to begin answering so many different needs and interests.

We have found that value propositions should emerge from the BRT's main objective, which should always be achieving financial sustainability for the system (Hook, 2005). This not only helps to build credibility in the new transportation system but it is crucial to get operators and suppliers to act as expected. Thus, this condition becomes an active restriction for every possible value proposition the system may offer to any stakeholder.

As a second order objective, a BRT must maximize the service level given to passengers (Wright & Hook, 2007). This objective comes from the BRT's definition as a high quality bus service and that the complexity of this kind of system does not justify itself without it. This maximization shall be done in a cost effective way and minimizing costs by looking for synergies and possible integrations between the previously isolated parts of the systems.

Other second order objectives for BRTs are getting the highest amount of private investment in the development and implementation of the BRT and the maximization of the social return of public investment. These objectives are highly dependent on the relationship the public sectors builds with the private operators. As general guidelines, this relationship should give offer the authorities some influence on the quality of the service provided and offer operators stable operation conditions through the project life cycle.

Finally, BRTs have been used as a way to introduce additional regulations to the urban transportation industry. These regulations can be from higher green standards like adopting a EURO norm for buses to completely new institutionalities.

2.4 Infrastructure provision

BRTs are known by their low capital investments in relation to other alternatives and the possibility of having a continuous and incremental implementation through time. Nevertheless, a full BRT requires basic infrastructure, which allows it to take full advantage of the system's capabilities. We will describe the three most important infrastructure needs for implementing a BRT.

The most basic piece of infrastructure for a BRT is, of course, the rolling stock. The BRT lines can be combined or complement existing metro lines or feeder services in order to increase patronage and connectivity. Normally, BRTs have been also used to improve the quality of the buses used inside a city by imposing operators to a stricter regulation.

Buses are also the main short-run investment for operator, requiring a high volume of capital which may be hard to find. It has been reported than operators my find difficulties to get initial financing, especially if the market or banks have doubts of the system's viability. Although experience shows that private operators are usually able to pay their credits once the system is running in a stable way, the initial financing can be quite hard to achieve. In order to help the system implementation, governments have assisted operators by providing them credits with a lower interest rate. This has also been done with good results in order to push for further fleet renovations with higher quality and green standards such as cleaner fuels or adapting a newer EURO emission norm (Deng & Nelson, 2011). Some governments have decided to be themselves the ones to buy buses and rent them to operators. This has been proved to have negative results in the buses maintenance when incentives and regulations are not clearly aligned as in Jakarta's BRT.

Segregated lanes or corridors are also another fundamental pillar for a BRT. They grant buses a hopefully exclusive or at least preferential right-of way, thus allowing system's buses to bypass traffic and congestion. This is an important contribution to achieve high operational speeds and regular bus frequencies.

In all of our studied cases, the construction, adaptation and maintenance of these corridors has been in charge of the authorities and regulators. Moreover, local authorities have found in the construction of these corridors a valuable opportunity to provide important improvements to the vial infrastructure available not just for the buses but for pedestrian, bikes, and even private vehicles. By building new parks, bike paths or footpaths, authorities have managed to increase the public acceptance for the construction works in exchange for urban renovations for the affected neighborhoods. One good example is Delhi's BRT, were the construction of the corridors brought new footpaths and special lanes for non motorized vehicles. In order to achieve these goals, authorities must provide a clear and previously informed public participation program to ascertain the main issues which might arise once the construction of the BRT takes place or if the land use change because of the BRT project.

Another important part of a BRT are the shelters for passengers waiting for their buses in the improved bus stops. Shelters have been proved as an important part of the perceived service level by passengers (Steer Davies Gleave, 1996). Even small improvements such as displaying real time information in shelters can dramatically reduce the perceived travel and waiting conditions for travelers (Dziekan & Kottenhoff, 2007). Some countries have made passengers pre-pay when entering the shelters and instead that when they are getting into the bus, improving operational speeds by reducing the time the bus waits in each stop because passengers are able to ride the bus using all the available doors and eliminating reducing the delay of waiting that each passenger to pay/taps their ride.

2.5 Energy and Environmental Issues??

Energy and environmental issues in developing countries are not so studied and addressed as in the developed countries. Developing countries have usually taken the approach of forcing the usage of cleaner buses and fuels or helping the renewal of the rolling stock. But today research has started to take in consideration the complete BRT as a way to reduce emissions and congestion. One good example is Sweden (Lidestam, 2012) were they have started studying operational modifications in order to achieve green objectives.

3 CASE ANALYSIS

Here we provide some brief words for our studied cities and their BRT systems with their most remarkable facts in our analysis model.

3.1 Curitiba, Brazil

Curitiba was the first city in the world to implement a complete BRT system in 1974 and it is one of the most successful BRT in operation nowadays (Deng & Nelson, 2011).

In the beginning there were no demand studies nor flow predictions for Curitiba travels. As a consequence of this, local authorities worked with the old operators and had to take their word for the costs and revenues in order to design the new system. To achieve their collaboration, old operators were granted the monopoly on the operation of the BRT without any tendering processes or similar competitive entry mechanism. As operators were the responsible for charging the fare, authorities had no way to get financial information of the system besides of what operators reported. The later implementation of an integrated payment system and a state ran fund to handle the money partly fixed this problem providing some additional information. Regulation is achieved by comparison of operator's performance and mutual work with authorities (Dario Hidalgo et al., 2007).

The fact that the operators running the new BRT lanes were the existing incumbents gave banks enough confidence to provide operators with financing for acquiring the new buses the system required. These loans were completely paid and operators haven't reported problems for acquiring new ones. The only financial assistance given by Curitiba authorities to operators was in 1989 to incentive operators to acquire more efficient and cleaner buses.

3.2 Bogotá, Colombia

Transmilenio it is one of the most famous and successful BRT in Latin America. It has one of the highest operational speeds for BRT and carries over 45.000 passengers per day. Transmilenio is an example of a well-planned BRT (Dario Hidalgo et al., 2007). The design process started with a high investment in demand and traffic studies that offered enough

confidence in the system to attract operators to a competitive tendering process in order to gain the monopoly in a trunk line and associated feeder services. The BRT changed the whole transportation scheme in Bogotá as it gradually implemented a trunk & feeder scheme from a previously conventional system.

Bogotá's tendering process was a great innovation, as it not only was used to minimize the amount of money the government would have to pay to operators but also to force the renewal of the rolling stock and other policy goals. So far a tender like this have not been seen on any other studied system.(Hook, 2005)

Contracts stated that operators would assume part of the risk over the demand on the system as a way to keep their incentives aligned with the objectives of the BRT. But this condition made it difficult for operators who won the tender to find the initial financing they needed in order to acquire new buses in Colombia. This was because the banks were not so confident in the success of the BRT and saw it as a too risky investment. The government did not offer any financial assistance neither, so operators had to look for loans in Brazil where the fact that the buses where being made in the country helped them find financing there. These loans were completely repaid and operators have not again found problems in getting financing for renewing the fleet as the system has proved itself successful.

In order to keep a high quality service, authorities can fine operators with up to ten percent (10%) of their monthly income for service failures. As operators are paid by kilometer driven, fines are applied by modifying the weekly schedule for buses which establishes the number of buses and their daily schedule. This simple mechanism has allowed Transmilenio to achieve a good quality service with high operational speed and regular frequencies in an efficient way (Darío Hidalgo, Pereira, Estupiñán, & Jiménez, 2013).

3.3 Santiago, Chile

Transantiago was a big change for Santiago's transportation system as it completely modified the transportation scheme for the whole city from one day to another. Nowadays Transantiago has good operational speeds with irregular frequencies and more reforms are to come soon (Muñoz & Gschwender, 2008).

Before Transantiago bus services were controlled by a cartel of small private operators that worked in an almost unregulated market. So, when the new system went into planning stage, authorities set the goal of breaking this cartel and bring foreign investors as operators. And in order to achieve this goal, policy makers decided that individual operators would be responsible for only a small percentage of the risk of the system, guaranteeing up to 90% of the estimated income. This ended up with operators having no incentives for taking the buses to the streets or picking up passengers, which caused many problems when the new system started on February of 2007. These problems were greatly amplified by the fact that Transantiago changed from one day to another the complete public transport system, passing from a conventional one to a feeder and trunk system with completely new services and routes. In the months before the Transantiago's implementation, free maps were given,

information centers were installed, and a TV marketing campaign was ran; but these efforts were not enough to inform everybody about how to make their regular trips.

After intense negotiations with operators guarantees were reduced and new performance indicators came into effect that affected the operator's income. Beltrán, Gschwender, & Palma (2011) have done a great job describing the evolution of compliance indicators in Santiago.

Although the previously described guarantees, the contracts established certain fines in case operators did not accomplished their operational goals. Once an operator summed a certain amount in cumulative fines, he would automatically lose his concession and a new tendering process would be called for his area. But when Transantiago started, there were so many difficulties and problems that almost all operators would have lost their concession only months after the start of the system. As it was impossible for the authorities to simultaneously change all operators, negotiations had to be done in order to guarantee public transportation in Santiago.

3.4 Quito, Ecuador

Quito's BRT currently has a good operational speed system although it has a low ridership level ("Global BRT Data," 2013). BRT buses must share corridors with old buses from the previous system, making them compete for passengers. Operation was given to a consortium of private operators who operate the buses and handle the fares.

When Quito started the implementation process for their BRT, the government gave operators a loan for acquiring new buses with the compromise of repayment once the system had achieved financial stability and profitability. But as fares are handled by the private consortium, authorities have no way to regulate or monitor the financial status of neither the system's nor the operator's. To these days operators argue they have not achieved profits and refuse to repay the loan (Deng & Nelson, 2011).

3.5 Jakarta, Indonesia

Transjakarta BRT today has medium to high operational speeds and a very low patronage, with buses sharing the segregated lines with buses from the previous system and competing for passengers with them. The high number of buses from both, the BRT and the previous buses make the segregated lines sometimes congested affecting operational speed and quality service (Deng & Nelson, 2011).

At the beginning, local authorities decided that it would be the government the one responsible for acquiring the whole fleet of new buses for the system. Operators would then need to rent each day the amount of buses they needed. The authorities' idea was that operators would have to do the maintenance for the buses but this responsibility was not formally written into the contracts signed with them. Since operators are not directly affected

by non-operational buses and not directly benefited by doing the maintenance, they have reduced costs by omitting maintenance almost completely. This has heavily reduced the quality of the service provided, making it difficult to improve ridership levels and offered quality (Dario Hidalgo et al., 2007).

3.6 Delhi, India

Non-motorized transportation in India is still the main way of mobilization and authorities wanted to improve conditions for most of the population while motivating the use of public transport. The government of Delhi took the construction for the BRT as a way to completely renovate the urban landscape (Mohan, 2012). By not only making the segregated lanes for buses, but also building new special lanes for non-motorized vehicles, new footpaths, and improving the city landscape around the main corridors, authorities managed to dramatically improve the public acceptance to the BRT (Tiwari & Jain, 2010). Nevertheless, private car owners opposed heavily against the BRT as their lanes used space previously assigned for mixed traffic. A legal requirement was done by car owners against the authorities in order to allow private cars to use the bus lanes in certain hours (Ponnaluri, 2011). This requirement ended after an eight months legal fight in 2012 by ruling of the High Court of India were it allowed authorities to keep the segregated lanes for buses operational at all hours.

Currently, Delhi's BRT has a good patronage level but it's operational speed is quite slow; This low operational speed is caused by the fact that bus lanes are shared between the BRT buses and older buses from the previous system, these buses not only have lower speeds but also are more common to malfunction or break, causing congestion and slowing bus traffic.

4 CONCLUSIONS

Our study shows the important role of confidence, information, and incentives in the success of a BRT system and how these three elements are present in every important aspect of a mass transportation system. These three key factors would be then the main gap between policy makers and researchers and existing literature as they have important implications in policy. Our findings suggest that regulations in the public transport industry shall be oriented in identifying and aligning every stakeholder goals with the general objective of offering a high quality service to passengers and second order objectives of the BRT instead of relying in fines and other punishment methods.

We are in no way suggesting eliminating control mechanism from contracts as they have proved crucial to achieve the desirable results. Instead, we suggest using them as a way to create incentives and not as a way to punish certain conducts. In a more popular way, we suggest using a more carrots and less sticks approach in BRT regulations. Most problems found in the studied cases are the direct consequence of a failure in the handling of one of these three factors.

We also found an astonishing lack of research or interest in methodologies and best practices used by different cities in order to get other stakeholder apart from operators aligned in the goal of the BRT success. Engaging the general citizenship and actors in the BRT planning and implementation is important as they have different needs and expectations that can determinant in their evaluation of a BRT system.

Finally, we also found that developing countries are still far behind in environmental issues leaving this topic into complying with minimum standards failing to see the BRT as a complete solution to urban contamination. Of course these additional goals are secondary to getting a functional and efficient system running which is still the main issue in these kind of countries.

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