



Workshop 2: Bus rapid transit as part of enhanced service provision

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ABSTRACT

Workshop 2 focused on the role of BRT as part of enhanced public transport service provision. Discussion topics included case studies around the world; improved performance and operations; and better contracts, institutional settings and enhanced policies. BRT was identified as a vital component of modern public transport systems due to its ability to provide high performance and rapid implementation at a lower cost than comparable rail transit. The participants concluded that on top of improving trunk transit corridors, it is important to look to the first and last kilometers and the connections among transport modes. In addition, it is important to consider all dimensions, not just the technical issues. The workshop identified the desirable ingredients for BRT success, created a table of bus based options for different applications and a list of research topics.

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1. Introduction

Cities around the world urgently need mobility improvements to face the increasing challenges of congestion, air pollution, climate change, injuries and deaths from traffic incidents, negative health impacts and social exclusion. Bus Rapid Transit (BRT) systems are fast becoming public transport systems of choice on high density urban corridors in developed and developing countries to help address these urgent needs. BRT systems are not only relatively easier to implement and more flexible than light rail/tram systems, but are often less expensive to implement and operate.

This report summarizes the discussions of Workshop 2 “Bus Rapid Transit as part of Enhanced Service Provision”, conducted during the THREDBO 12 Conference in Durban, South Africa, from 11 to 15 September 2011. The workshop focused on the role of BRTs as part of enhanced public transport service provision. The workshop key questions were:

- Are these systems delivering on expectations of enhanced service provision?
- When do we consider BRT systems as opposed to conventional public bus systems and other options including light and heavy rail?
- What are the lessons that we can learn from the design, contracting, implementation, performance measurement and monitoring of BRT systems in developed and developing countries?

- Are these lessons equally applicable between developed and developing countries?

Participants of this workshop included 25 researchers and practitioners from around the world. The workshop was divided into three parts, in which 13 papers were presented followed by focused discussions. The topics were: 1. Case studies around the world; 2. Improved performance and operations; 3. Better contracts and institutional settings and enhanced policies. The following sections summarize the findings of the four parts in which the workshop was divided.

2. Case studies around the world

Case studies presented included Johannesburg (Venter, 2011), Cape-town (Salazar Ferro, Behrens, & Wilikinson, 2011), Bogotá (Hidalgo, Pereira, Estupinan, & Jimenez, 2011), Brazil (Pereira do Nascimento et al., 2011), Beijing (Deng and Nelson, 2011), and Cambridge (Hodgson, Potter, Warren, & Gillingwater, 2011), followed by a lively discussion.

The case of Johannesburg focused on the integration of existing informal taxi operators on the new BRT system and the difficulties thereof. It showed the use of a BRT project to modernize and reform the taxi operators using the theory of technical innovation (life-cycle).

The case of Cape Town presented the portents and prospects of hybrid urban public transport systems in developing countries. The case showed the difficulties of implementing a network of BRT corridors, the pressure inflicted by incumbent operators and how

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the authority tended to postpone the more complicated but also the most promising corridors; and ends with a discussion on implementing the less conflicting corridors.

The case of Bogotá presented a cost-benefit analysis (CBA) of the interventions in the first two phases of the TransMilenio BRT system, as well as other impacts not included in the CBA (impacts on crime, job creation, land values, and tax revenues). The study shows a positive evaluation, but also highlights the declining image of the system and the need for improved service quality.

The case of Brazil focused on the history of BRT in this country, the cradle of the concept, and the opportunities it has in the near future, as the cities prepare to host the FIFA World Cup in 2014. The study shows the importance of BRT in structuring and developing the urban environment, and the need for an integrated approach involving industry suppliers, operators, customers and authorities.

The case of Beijing focuses on the performance and impacts of the three BRT corridors implemented in the city. It considers operational efficiency, technical performance, and cost issues, as well as impacts regarding travel behavior change, traffic environment and property development.

The case of Cambridge, UK, showed a very high standard BRT service operating between Huntingdon and Cambridge at very high speeds. This experience shows that very high quality BRT can attract demand at a commercial fare in the developed world.

These successful examples of BRT implementation around the world are vital as inspiration. They show BRT's ability to provide high capacity and high quality services, at a competitive cost and with rapid implementation, making it an attractive option for transport planners and decision makers worldwide. However, they also show that each context is different, and BRT components need to be customized to the particular transport needs in each application and consider carefully the city context.

In addition, the case studies show that the transition to BRT can be difficult due to institutional and financial barriers. BRT planning and implementation usually involves several government agencies and private providers, which make coordination and decision making processes cumbersome. Moreover, BRT projects are often asked to solve problems beyond the technical dimension, like the formalization of para-transit services in developing cities, or the reconstruction of utility networks in the corridors where they are implemented. This creates additional challenges, and in some cases delays and cost escalation. As a result, the scope of some BRT projects tend to be scaled down to a point where their impact is shrunk.

The workshop participants indicated that BRT is a transit option with great attractiveness, but not a magic wand. Still the basic principles of good transport planning apply. To address the mobility challenges using BRT, there is a need to understand transportation needs, define clearly the policy objectives, and consider the constraints and opportunities, especially regarding the institutional, urban, social, cultural, economic and political contexts. Timing limitations are also important.

In addition BRT needs to win the heart of the citizens, to assure adequate implementation and sustained performance over time, and to facilitate the acceptance of assigning general traffic lanes to bus services.

3. Improved performance and operations

This section included presentations on BRT capacity (Hidalgo, Lleras, & Hernandez, 2011), express service design (Larrain, Muñoz, & Giesen, 2011), control strategies (Delgado, Muñoz, & Giesen, 2011), and performance (Lindau, Medeiros Pereira, de Castilho, Chagas Diógenes, & Herrera, 2011), followed by an animated debate.

The paper by Hidalgo, Lleras, et al. (2011) develops formulas for the estimation of BRT capacity. The study shows that the systematic

combination of multiple platforms at stations, overtaking lanes, level boarding, prepayment, large buses with multiple doors, express and local services and traffic engineering measures at intersections, allow for very large passenger throughput. The application of the formulas to the TransMilenio BRT system in Bogotá, Colombia, shows that the capacity can reach 48,000 passengers per hour per direction (given an occupancy level of 150 passengers per bus) which is only around 10% over its current output.

The paper by Larrain et al. (2011), shows the opportunity of enhanced service provision by using express services in combination with local services, and develops a systematic analysis tool for such express service optimization. The application of the tool to a particular corridor in Santiago, Chile, indicates that the higher the demand, the longer the trips, and the more concentrated the demand among few OD pairs, the higher the social outcomes achieved by using express services.

The paper by Delgado et al. (2011) focuses on the opportunities provided by information technologies to reduce bunching in bus systems. The study develops a real time control strategies algorithm, which is tested with a simulation tool. The study shows the great potential real time control strategies have in reducing bunching, improving reliability, reducing waiting times, distributing evenly passenger demand across buses (and therefore improving comfort) and even reducing the cycle time and therefore the required bus fleet for a given frequency. On the contrary, in an uncontrolled system, too many passengers wait too much for a crowded bus putting pressure on the authority to add more buses that may not be strictly needed.

The paper by Lindau et al. (2011), explores the performance of BRT systems in terms of capacity and operating speed using a simulation tool. The study shows the opportunity to achieve large performance by combining different BRT elements: spacing of stations, vehicle loadings, quantity of berths, and traffic light positioning in relation to stations, for different demand levels and boarding/alighting rates. The results indicate that it is possible to achieve 15,000 passengers per hour per direction in a single lane.

The workshop presentations indicate that there is a wide range of opportunities for enhance transit service provision with BRT. Some important findings arose in the discussion by the workshop participants:

- Stations usually become bottlenecks first. Similar to rail systems, the stations are the crucial element in defining system capacity.
- Stations and intersections need to be properly engineered. As these elements are the critical components of system performance, adequate care is required.
- Express services are crucial to improve capacity. They also improve quality of the travel experience and reduce costs. Express services clearly differentiate bus systems from rail systems, where the opportunity for skipping stops is limited.
- Real time headway control is crucial in the performance of BRT corridors in terms of waiting time, travel time, reliability and comfort. Lack of real time control puts pressure on the authority for buying more buses.
- Some of these tools should be microsimulated to validate the results obtained with analytical tools or with traditional simulation.

The discussion on performance and operations indicates that there is a need to think beyond conventional wisdom, and use both the intrinsic flexibility of buses and information technologies (ITS) in the most productive way to improve performance. The discussion also highlighted the importance to balance the operational

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