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Editorial

Mobility in ever-growing urban areas is associated with several key urban development challenges, such as equal access to services and income opportunities. Urban Public Transport stretches, therefore, far beyond just transportation and traffic management and also includes such topics as an inclusive city for all residents, spatial segregation, land-use planning, and accessibility not only in technical terms but also in social terms.

This TRIALOG issue on Urban Public Transport examines projects in cities in Latin America, Africa and Asia, how they address mobility problems, and the lessons learned. In some cases, specifically in Jakarta and Bogotá, the contributions in this issue return to cases that were the focus of the TRIALOG issue on Urban Mobility from almost 10 years ago (TRIALOG No. 82). For these cases, the articles offer a deeper and longer-term analysis of the effects that followed implementation.

Anke Schwarz analyses the mobility pattern of the urban poor in Mexico City and discusses the impacts of immobility or limited mobility and social segregation based on case study settlements and individuals. She highlights the impact of restricted mobility on the livelihood of the residents.

The next set of articles addresses different aspects of public transport.

Jean-Marc Mirailles explores the question of which criteria should be applied to select the most suitable technical solution for mass urban transport. Using Bogotá as example, he compares a metro system, a bus rapid transit system (BRT), a light rail system, and a tram-and-bus system. He highlights the problems in planning for mass urban transit that arise primarily from a lack of dialogue between technicians, urban planners and politicians and their diverging strategies. He discusses the advantages and disadvantages in transport planning between a BRT and metro in view of financial aspects (investments costs and operating costs), flexibility and capacity limits.

Carolín Höhnke and **Regina Witter** both study the reorganisation of the public transport system Transantiago in Santiago de Chile. **Carolín** looks at the planning and implementation problems and opportunities in the development of the Transantiago with an emphasis on the role of the different actors and institutions involved. She concludes with lessons learnt for other cities. **Regina** analyses the Transantiago from the user perspective and analyses the situation before and after the introduction of the Transantiago. Her particular focus is on residents living in disadvantaged communities and the difficulties they face following the reorganisation.

*The influence of a BRT system on urban traffic conditions is discussed by **Sunghyun Jang** taking Jakarta, Indonesia, as a case. He focuses on the changes in mode choice after the introduction of the TransJakarta system. He specifically examines the impacts on the mobility of the urban poor, who cannot all take advantages of the system, and how congestions on the road have remained due to the limited capacities of the system.*

Lisa Reudenbach and **Wolfgang Scholz** study the mobility patterns and residential location of middle class households in Dar es Salaam, Tanzania. Increasing car ownership allows this growing group to build homes at the periphery, where land is available at lower prices, and to compromise the disadvantages of a longer commuting distance and time. The article uncovers the selection criteria of the middle class for their residential location and choice of transport mode, and provides implications for land-use and transport planning. **Stefanie Holzwarth** picks up the idea of a BRT and studies various BRT projects in Africa. From the different cities at different stages of BRT implementation, lessons can be learnt for the planning and implementation of new BRT systems in African cities.

*The next two articles discuss other technical solutions that have moved into focus more recently: aerial cable cars and urban ropeways, which can provide accessibility to topographically restricted areas. **Dirk Heinrichs** and **Judith S. Bernet** look at the impact of introducing a cable car in Medellín, Colombia, where it is part of an integrated urban planning project designed to improve overall conditions in informally built neighbourhoods. They explore to what extent this 'transport innovation' modifies accessibility and inclusion into urban life and urban economy. **Joachim Bergerhoff** and **Jürgen Perschon** conclude this issue with an analysis of urban ropeways from a technical and financial perspective. The authors highlight their efficiency and their potential to complement metropolitan transport systems.*

Overall, the collection of articles leads to the observation that a wide range of novel approaches is being used to improve access to mass transport in large and growing agglomerations around the world. At the same time, the articles illustrate the strong role that transport has in shaping the social and spatial conditions of cities.

Wolfgang Scholz, Dirk Heinrichs

Urban Public Transport

Volume Editors: Dirk Heinrichs, Wolfgang Scholz

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Out All Day or Stay at Home: Mobility Patterns of the Urban Poor in Mexico City

Anke Schwarz

Dauernd unterwegs oder immer daheim - Mobilitätsmuster in Armenvierteln von Mexiko-Stadt

In Mexiko-Stadt leben heutzutage mehr als die Hälfte der Bewohner_innen in ehemals irregulären bzw. informellen Siedlungen. Da der Zugang zum Wohnungsmarkt für Haushalte mit geringem sozio-ökonomischen Status begrenzt war (und es bis heute ist), stellte der informelle Landerwerb die einzige Möglichkeit zur Befriedigung des Bedürfnisses nach einer Unterkunft. Das Ergebnis dieses Prozesses, die so genannten colonias populares, zeichnen sich u.a. durch ihre sehr geringe Ausstattung mit öffentlicher Verkehrsinfrastruktur und ein stark eingeschränktes Mobilitätsangebot aus. Aber auch die spezifische Situation der Bewohner_innen, ein sehr geringes Einkommen sowie die hohe Eigentumsquote wirken sich einschränkend auf alltägliche und auch längerfristige Mobilitätsentscheidungen aus. Die Autorin beschreibt in ihrem Beitrag auf der Basis von Interviews, wie der sozio-ökonomische Status die täglichen Mobilitätsentscheidungen und -muster von Frauen in einer colonia popular im Stadtteil Iztapalapa prägt. Sie hinterfragt dabei auch die Rolle der Stadt- und Verkehrsplanung.

Introduction

In Latin America, rapid urban growth based on informal urbanisation may not be a trend proceeding at the same scale as it did two or three decades ago, but the continent's cities of today are the product of these historical processes: today, over half of Mexico City's inhabitants live in former irregular settlements.

As access to housing markets was (and often still is) limited for residents of the lower socio-economic strata, informal purchase of land was their means to meet the need. In Mexico City, this type of housing is referred to as *colonias populares*¹, neighbourhoods which, by nature of their development, have limited access to public infrastructure, including transportation (Ward 1998).

Moreover, self-constructed housing in Mexico creates high rates of homeownership in particular amongst the lower class. This has strong implications for the population's mobility in the long- and short-term, affecting both their daily travel and their residential mobility. Focussing on the mobility patterns of the urban poor, especially women, this study addresses the ways in which everyday mobility is influenced by social status in Mexico City.

This paper draws attention to the ways women with low socio-economic status in urban areas of Mexico experience everyday mobility. It also highlights the importance of everyday mobility patterns in research on social inequalities as well as in urban and transport planning. In order to achieve this, I draw on semi-structured household interviews with 14 female residents of a *colonia popular* in the district of Iztapalapa to explore how social status and mobility interplay in a relatively poor neighbourhood in Mexico City (Schwarz 2009).

Mobility and social status

Understanding mobility as the "actual social practice of moving through space-time" (Jirón 2010: 66), it can be

termed one of the most crucial everyday experiences of city dwellers, as it relates to the provision of basic needs within or outside their neighbourhood. Thus, the place of residence is linked to several other locations within the city: the places of productive work, education, consumption, culture, leisure and health services, amongst others. As it is precisely the concept of everyday life which links individual practices to social structures (Salazar Cruz 1999), studying everyday mobility implies handling two scales of mobility. The place of residence (as a kind of spatial frame) has the effect of strongly shaping the residents' everyday mobility on the individual scale.

As research has shown, urban mobility – in the sense of residential as well as everyday mobility – is an issue strongly influenced by differences along categories of class and gender (Jirón 2007; Ward et al. 2007). In the Latin American context, persistent patterns of social polarisation and considerable processes of urban socio-spatial differentiation highlight a particular need to relate research on mobility to social questions.

Jirón (2007) found, for instance, that the female urban poor of Santiago de Chile were subject to a dual type of exclusion: simultaneously being confined to the urban periphery, and being excluded from many benefits cities have to offer. As gender still makes a huge difference in Mexico, and roughly 50% of all Mexican women (vs. 20% of men) are not involved in the formal labour market (CEPAL 2008), female residents and their specific mobility patterns are of particular interest.

The residential immobility of self-builders

There were two main drivers of informal urbanisation in 20th century Mexico: the hegemonic model of economic development and a lack of appropriate housing policies for the urban poor (Ward 1998; Connolly 2004). On the backdrop of import-substituting industrialisation, Mexican development policies triggered rural-urban migration and led to a rapid urban growth in the capital of Mexico,

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Colonia popular is the Mexican term for an informal or initially informal lower-class settlement. These neighbourhoods are typically informalised through the extra-legal sale of plots in protected areas and on *ejidal* land, but there have also been cases of land occupation by settlers' movements. However, the conversion of agricultural land with collective, unmarketable land titles (*ejido* – a Mexican peculiarity dating back to the 1910 revolution) into building ground has been the main source for informal urban development in the last 50 years. In order to avoid social tensions due to lacking housing policies especially for the urban poor, Mexican authorities have tolerated this type of housing provision via self-help, implementing an institution for their ex-post legalisation. In 1992, the Mexican government finally legalised the conversion of *ejidal* land through a major legal reform, thus opening it up for formal urban development.

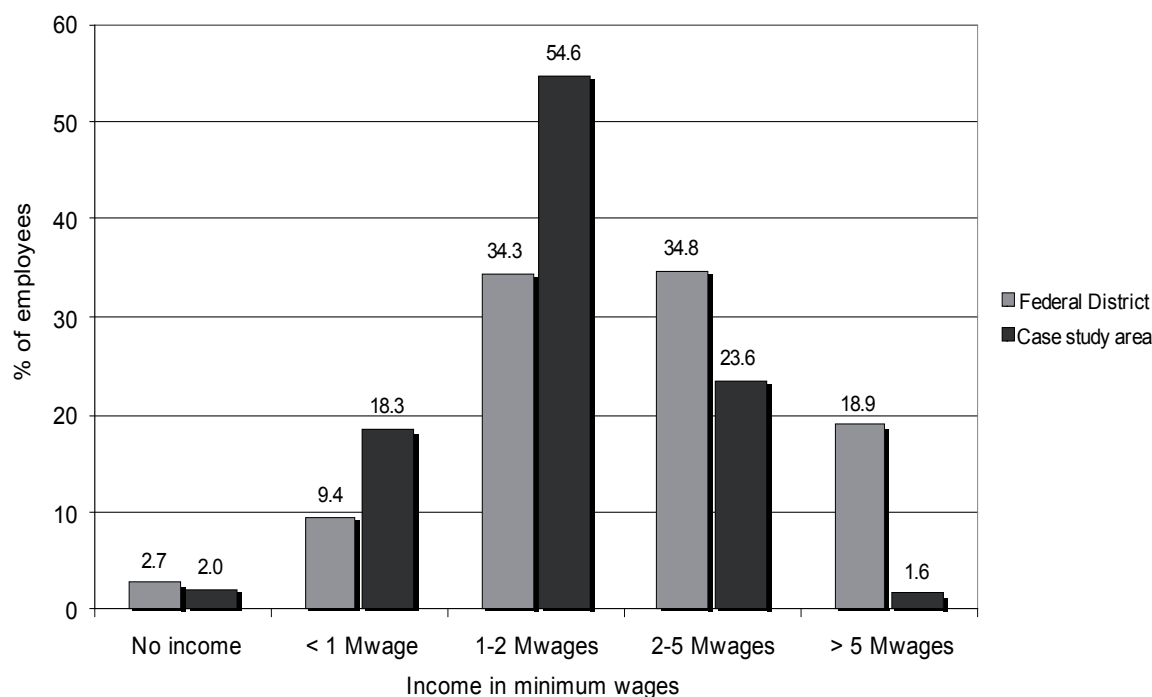


Figure 1: Comparison of income distribution amongst the economically active population, Federal District and case study area, year 2000. Source: Instituto Nacional de Estadística y Geografía (INEGI): Censo de Población y Vivienda, 2000

particularly during the decades of 1950–1980 (Parnreiter 2007). As a result, 50% of today's inhabitants of Mexico City live in structures created through informal urbanisation (Duhau 2008: 128). This has two implications for mobility: limited access to transport infrastructure and residential immobility.

On one hand, Mexico City's *colonias populares* show a characteristic process of inversed urbanisation. The settlements literally evolve from the individual plot, and public infrastructure is implemented afterwards in a lengthy, often disputed process. Depending on the level of consolidation and the location within the city, public transport in these areas is therefore largely insufficient.

On the other hand, many inhabitants of *colonias populares* demonstrate a striking residential immobility. Several reasons explain why selling the consolidated self-built dwelling and moving within the city would not be a feasible option for these settlers. First, the structure of the Mexican housing market still has its limitations especially for those working in the informal sector or households with low income. As a result, homeownership rates tend to be the higher the lower the socio-economic status – with 63% of the highest and 78% of the lowest socio-economic strata being homeowners (Rubalcava and Schteingart 2012: 90). Second, the exchange value for a self-built dwelling does not equal the use value. This accounts in particular to the amount of time invested in construction. Third, there tends to be a strong identification with the neighbourhood and the individual dwelling, which is a product of long-term social struggle:

"It has already taken me so much work to live here from the very beginning, since the settlement started – I suffered at lot. As now there is more or less everything we need, I want to enjoy the fruits of my previous suffering. (...) Would I move out to another neighbourhood now? The truth is: no. I want to stay here, until the end." (Author's interview with Ana², 2009)

In order to understand the everyday mobility patterns of lower-class residents of Mexico City, it is therefore crucial to keep in mind that the residential location is permanently fixed. Poor homeowners are unlikely to change their place of residence within the city, which makes daily travel (e.g. to the job location) mandatory, irrespective of travel distances.

Everyday mobility in Mexico City

Private car ownership is not widespread in Mexico City's lower socio-economic strata, which makes public mass transport a key factor for mobility. Mexico City's metro system, however, mainly covers central districts while an expansion to the periphery (in particular the State of Mexico) is only slowly being implemented³. Consequently, marginal and peripheral locations in particular are highly dependent on private minibuses run under a public license, which are crowded, unsafe and often more expensive than other public transport options. These minibuses alone made up 54% of the modal split of the Federal District in the year 2000 (GDF 2010: 40).

Accordingly, transport in the case study area is provided by two microbus lines, taxis and private cars. The case study area is a typical *colonia popular*, located in the district of Iztapalapa in the south-eastern part of the Federal District. Iztapalapa today is one of the poorest and most densely populated districts of Mexico City. The case study area consequently features a comparably low socio-economic status with employee incomes lower than the Federal District average (see figure 1). 75% of employees from the case study area earn an income of up to two minimum wages (totalling about €239 per month) – that is, just below the official marginality line (as defined by CONAPO). The neighbourhood lacks infrastructure, such as higher public education, health care and, most obviously, income-generating jobs (Schwarz 2009). All 14 female interviewees are living in owner-occupied self-built dwellings and most of them earn a regular income below two minimum wages.

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Here and throughout the text, pseudonyms are used to identify the informants.

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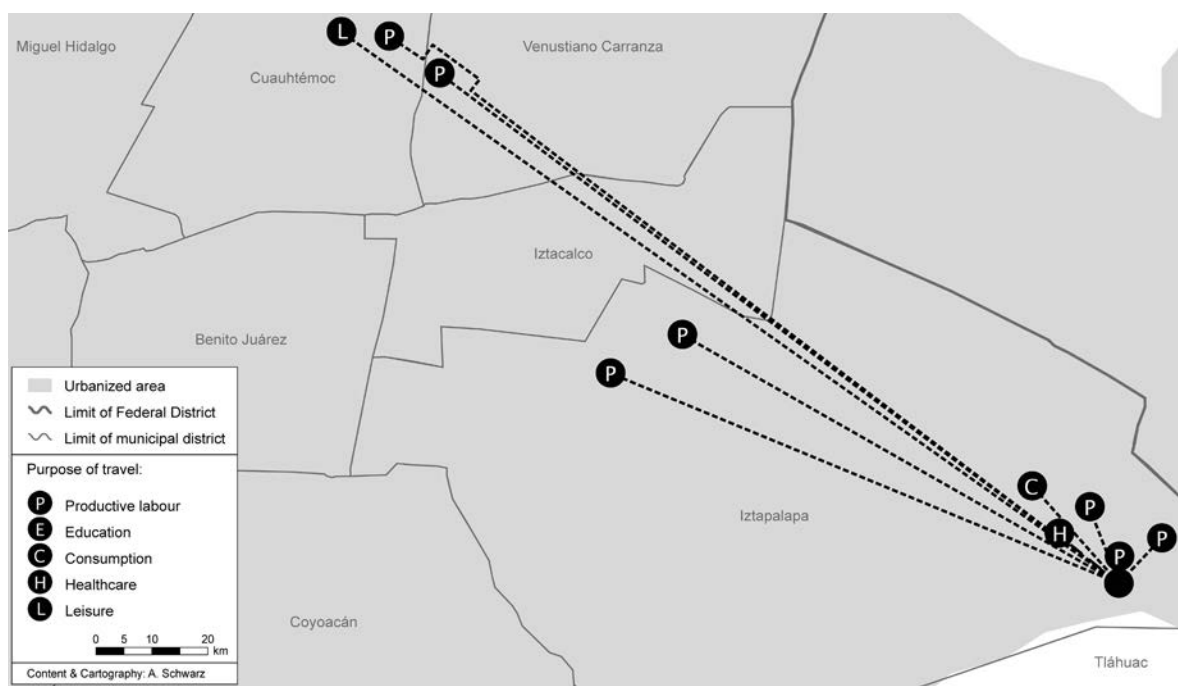
Mexico City spreads out to the Distrito Federal (Federal District) and the State of Mexico, with its population of 21 million being split almost half-and-half between these entities. Similar as with other integrative approaches in the metropolitan region, collaboration in the field of public transport is hindered in part by political tensions between the *Partido de la Revolución Democrática* (PRD) governing the Federal District and the *Partido Revolucionario Institucional* (PRI) governing the State of Mexico.

Figure 2: “Absent” mobility pattern of Marta, displaying all destinations outside the neighbourhood visited at least on a weekly basis, distinguished by purpose. Source: Author’s survey 2009

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Figure 3: “Locked in” mobility pattern of Guadalupe, displaying all destinations outside the neighbourhood visited at least on a weekly basis, distinguished by purpose. Source: Author’s survey 2009.



Two mobility types could be identified amongst these interviewees: the absent and the locked-in. The absent are a group with long distances travelled daily, which is made up by employees and street vendors. 59-year-old Ana is a typical representative: for two decades, she has worked as a cleaner in an office building in the city centre, earning 2 minimum wages and spending the majority of her day outside the neighbourhood: “I work from 6:30 am to 4:30 pm and come home at 7:30 pm. Sometimes I do a second job afterwards.”

Ana leaves her neighbourhood with the first microbus at 4:45 am, then continues her trip by metro and finally another microbus. On weekdays she spends about 18 pesos (€0.96) daily on transport. The overall trip takes 2 hours in the morning and, depending on traffic conditions, up to 3 hours in the afternoon. As a result, her everyday mobility is characterised by long distances travelled daily but includes very few destinations.

Unsurprisingly, street vendors and other traders, such as 51-year-old Marta, demonstrate a large range of different destinations visited within the city on a regular basis (see figure 2). Marta and other members of her family sell textiles and notions door-to-door, covering different neighbourhoods in Iztapalapa each day of the week.

Marta walks to the nearby neighbourhoods and takes the microbus on her way back home. Twice a week, she visits La Merced Market in the city centre in order to restock goods. Every once in a while, Marta combines this with a visit to her sister who lives near the historic centre. These restocking trips take 90 to 120 minutes one way, depending on traffic conditions. Marta spends about 14 peso (€0.75) on the round trip by microbus, changing lines once.

The locked-in, in contrast, are a group with a severely restricted mobility (see figure 3). These women gain the



lowest incomes, mostly through low-paid home manufacturing or shop keeping. They fulfil most purposes, including income generation, within their home or in the neighbourhood. Guadalupe, 53 years old, for instance, conducts home manufacturing while attending her own poorly stocked convenience store, and leaves the house only to go to the hospital and to buy food, mostly in the local stores (see figure 3). She sees mobility is an unaffordable luxury: "As there is no money, one doesn't leave." Economic pressures and the need to contribute to the family budget also result in a lack of time for leisure, be it in- or outside of the individual dwelling. As Teresa states: "If I go take a stroll there will be no food." The 47-year-old conducts domestic work and home manufacturing, earning below 2 minimum wages. Once a week, she leaves the neighbourhood and travels to the *Central de Abastos* to buy food staples en gross. On the way back, she takes a (more costly) taxi, as microbus drivers do not permit the transport of large luggage items.

Discussion

The results presented here indicate that poor women in Mexico City are either highly mobile or significantly restricted in their everyday mobility. The non-availability of time engrained in both mobility types coincides with Boltvinik, who defines a lack of time as a dimension of poverty, as time for education, leisure and recreation are sources of wellbeing necessary to fulfil basic needs – along with access to transport infrastructure and other public services (Boltvinik 1997: 384). The evident lack of mobility of the locked-in as shown in this case study area is consistent with female "spatial entrapment" (Hanson and Pratt 1995) linked to productive and reproductive tasks (Jirón 2007). Another interesting finding is the absence of employees commuting long distances on a day-to-day basis, which coincides with the desperate everyday mobility covering multiple destinations Boschmann (2011) identified amongst the working poor in Columbus, US. What impacts the long daily hours of absence of the employed, and the lack of leisure time for all, bear upon personal well-being, family life and social engagement remains to be studied.

As for residential mobility, it can be stated that in the context of Mexico City, those residents possessing low levels of capital (in an economic as well as cultural and social sense) tend to be confined to a place of residence. Moreover, female residents employ a key position in consolidating informal settlements and are thus highly active in "fixing" their own and their family's location in the urban space. Interestingly, this contrasts with findings on the working poor in the US, where neither employment nor housing are permanent. As a result of this spatially transitory nature of the working poor's lives, their residential choice rests more upon mobility options than upon proximity to the work place (Boschmann 2011).

Limited access to collective infrastructures indicates that the observed mobility patterns of Mexico City's urban poor are compulsory rather than voluntary. There is a strong need for daily commuting towards the work location, as the place of residence is spatially fixed through self-help, and often offers few local employment opportunities. The example of a *colonia popular* in Mexico City illustrates that access restrictions, as given in the case

study area in regard to higher education and employment, are likely to increase the need for daily travel. It in turn also requires time, money and efforts which residents could otherwise spend on other activities – and therefore deprives those without these capitals of even more access options. In this sense, "self-help is a response to poverty, but it may also reproduce it" (Ward 1998: 245). The fixed place of residence in an urban context underprovided with infrastructures deprives residents of access options and time. This comes along with other indirect costs of informal urbanisation, such as introducing public infrastructure ex-post.

Need for research and action

The findings suggest that a range of policies are required to overcome exclusionary effects in socially and spatially peripheral neighbourhoods in Mexico City. In order to move towards an equalisation of urban living conditions in the realm of mobility, there is a need to improve access to employment, higher education, health care, leisure and recreation by implementing it locally, thus decreasing the need for outbound travel. Despite its neoliberal competitiveness, the Federal District's *Programa Comunitario de Mejoramiento Barrial* is one step in this direction. Simultaneously, improving access to public transport would improve travel conditions and travel times, thus increasing the potential mobility. The Federal District's government has already implemented several progressive projects in this realm over the last years, the most prominent being the rapid bus transit scheme (Metrobus).

Despite being rather successful and widely accepted by the population, these projects mainly cover the more centrally located districts of Mexico City, and it is precisely the most marginalised areas that are still lacking an improved access through public transport systems. This holds especially true for transport in the State of Mexico and between the latter and the Federal District, whereas in the Federal District itself, a new Metro line opened in late 2012, bringing a much needed connection between western and eastern parts of the city. For future mobility research, there is a need to explore interrelations between spatial and social mobility limits more deeply. As mobility is about meanings as well as mappable movements (Cresswell 2010), mobility research essentially requires a spatial approach rather than a purely territorial one. Simultaneously, everyday mobility patterns can be used as an indicator for social inequalities along categories such as gender and class.

In conclusion, the present study demonstrates how a lack of capital is coupled with the experience of spatial constraints (Bourdieu 1991). In the case of Mexico City, such immobility holds true for women with a low socio-economic status in a dual sense: they are constrained in their choice of residential location, and some of them are also strikingly immobile in their everyday life. Their mobility experiences also depict a lack of time for leisure and recreation which Boltvinik (1997) has defined as a dimension of poverty. Hence, mobility is essentially a spatial as well as social question, to be analysed beyond the realm of territorial distribution and the engineers' technical perspective on physical infrastructure. It is at and through the place of residence, and through everyday mobility, that urban residents experience their social status.

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Mass Transit Modes Relevance in Developing Countries.

The Case of Bogotá

Jean-Marc Mirailles

Die Angemessenheit verschiedener Massentransportsysteme in Entwicklungsländern am Beispiel von Bogotá

Der Artikel setzt sich mit der Frage auseinander, welche öffentlichen Transportsysteme für schnell wachsende Städte in Entwicklungs- und Schwellenländer am besten geeignet sind. Über die rein technische Frage eines schienen- oder straßengebundenen Transports hinaus, zeigt der Autor Kriterien zur Bewertung auf, die individuell für Städte eine Entscheidungsgrundlage bilden können. Anhand des Beispiels Bogotá wird der Planungs- und Entscheidungsprozess zur Einführung des Transmilenio BRT (Bus Rapid Transport Systems) nachgezeichnet. Dabei spielten neben technischen auch finanzielle Aspekte eine wichtige Rolle. Der Autor zeigt aber auch die Bedeutung der verschiedenen Beteiligten im Planungsprozess auf, die eigene strategische und politische Ziele verfolgen und technische Fragen hinten anstellen. Er schließt mit der Feststellung, dass eine Entscheidung zugunsten eines BRT kurzfristig die leichtere, weil günstigere und flexiblere Lösung sein mag, auf lange Sicht wäre aber durchaus eine Metro die bessere Entscheidung gewesen.

Introduction

Urban growth in developing countries, the increase in use of private motor vehicles and correlated negative externalities are essential concerns for urban managers. In large cities, mass transit is currently one of the priorities of urban agendas. The debate is often dominated by a dispute over which type of public transport systems should be implemented. Particularly over the last decade, the successful introduction of high-capacity bus systems, so-called bus rapid transit systems (BRT) like the Transmilenio in Bogotá, has challenged the supremacy of metro systems.

In the light of recent controversies, this article offers a review of the arguments used in the debates about the choice between road and rail-bound modes of mass rapid transit. The arguments are viewed within a global decision-making framework dissociating the planning and project levels.

This article first introduces the current discussion and the main technical criteria that are used by transport specialists to determine which mode is the most appropriate to meet specific objectives. Secondly, it illustrates the discussion and the arguments for the case of Bogotá, where the dispute is on-going over the costs and benefits of a new rail-bound metro system. The article concludes with some recommendations for local decision-makers.

The article is based on a literature review as well as interviews with influential decision-makers and transport professionals conducted in July 2012.

Choosing between mass transit modes: a review of the technical criteria

To begin, it is essential to specify that technical criteria for the selection of a transportation mode should be used at the project stage. Indeed, fundamental principles

theoretically differentiate two stages in the decision-making processes: a planning stage, the purpose of which is to define a global strategy transcribed into specific objectives for one or more projects, and a project stage dedicated to the transcribing of objectives into reality.

When initiating the project stage, a widespread approach among transport specialists consists of relying on the concepts of "system capacity" and "level of service" to classify the existing transport systems. Basically, the "system capacity" is related to the ability of the transport system to fully cover the demand, whereas the notion of "level of service" introduces the idea of perceived quality from the user (commercial speed, number of stops, density of passengers etc.).

Correspondingly, in terms of "system capacity", this article refers to mass transit modes aiming to cope with high demand corridors of over 20,000 passengers/direction/hour (pphpd). In regards to urban services, two systems qualify for high capacity: High-capacity BRT (HBRT) of which the main feature is to route through roadways that have 2 traffic lanes in each direction and that are segregated from the roads (2x2 lanes as per figure 1); and metro systems (light rail or high capacity as per figure 1).

However, capacity reserve offered by metro systems (especially high capacity) substantially confront HBRTs. Whereas metro systems can cope with demands of 60,000 pphpd, the upper range of use for HBRT is generally considered around 35,000 pphpd (refer to figure 1). Lastly, there are arguments developed around the possibility to increase the capacity of HBRT beyond 35,000 pphpd, while maintaining a good "level of service" and preserving their supposed competitive advantage in terms of costs and length of construction

Regarding "level of service", as per figure 2, the range of use of metro systems is also greater than that of BRT: metros can be designed for medium or high

inter-distances in between stations, while high-capacity metros (commonly called MRT) present the highest commercial speeds.

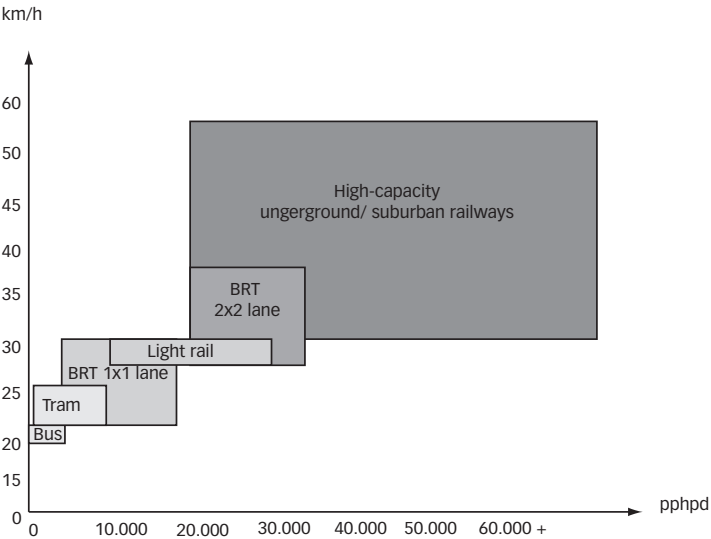
“System capacity” and “level of service” are key criteria in the choice of a transport mode. If a technology cannot meet with forecasted demand and with the level of expectation concerning service, it will lead to a mismatched investment. For this reason, transport specialists consider that a transport mode not able to cope with basic objectives set on “system capacity” and “level of service” should be excluded from the alternatives under consideration. Interestingly, one could notice that BRT, as an alternative to MRT for high demands, emerged only due to the concept of dedicated bus-ways, which provide an increase in speed and capacity of bus systems.

In addition to the system capacity and the level of service indicators, the CERTU guidelines (SYSTRA 2009) add three indicators for the comparison between transport systems of which prioritisation should depend on the local context:

- the initial investment and operation costs ;
- the spatial and construction impact of the project; and
- the existing and required institutional arrangements.

In this regard, the trend of the last decade in a part of the Global South, especially in South America, has been to favour BRT due to its apparent cost effectiveness. Some sources (see Hidalgo 2005) bring forward a large difference in infrastructure costs: “US \$5–20 million for High-capacity BRT, US \$30–160 million per kilometre for metros.” The initial investment in rolling stock is also higher for metros. Such difference could seem a definite advantage for BRT. Nevertheless, this advantage has to be mitigated. Indeed, the difference in cost could be explained by the fact that most of the BRT that have been implemented to date relied on existing road infrastructures, whereas the rail systems were usually developed “from scratch”. Thus, the average costs of BRT as presented by Hidalgo could be distorted and the extension of BRT could present higher costs in the future (see Hensher and Golob 2008: 501–518).

Beyond the initial costs, a life-cycle approach is also often missing in the debate (see Van Wee and Tavasszy 2008: 40–65). Indeed, rail technologies are widely recognised by professionals as less expensive in regards to operation and maintenance, which improves their financial viability in the long term. Moreover, costs of BRT tend to increase faster than for MRT while a country is developing: for example, on the basis of data collected on various projects, figure 3 presents a range of expenses per passenger-distance (unit of transportation measurement corresponding to the distance travelled by passengers on transit vehicles, determined by multiplying the number of unlinked passenger trips by the average length of their trips) offered in regards to GDP/inhabitants and transportation mode. Thus, if the initial investment in rolling stock for a BRT is less important, it should not be overlooked that buses consume more energy, are exposed to more risks of breakdown, and have a shorter life span. Furthermore, more personnel are required to run a BRT. The importance



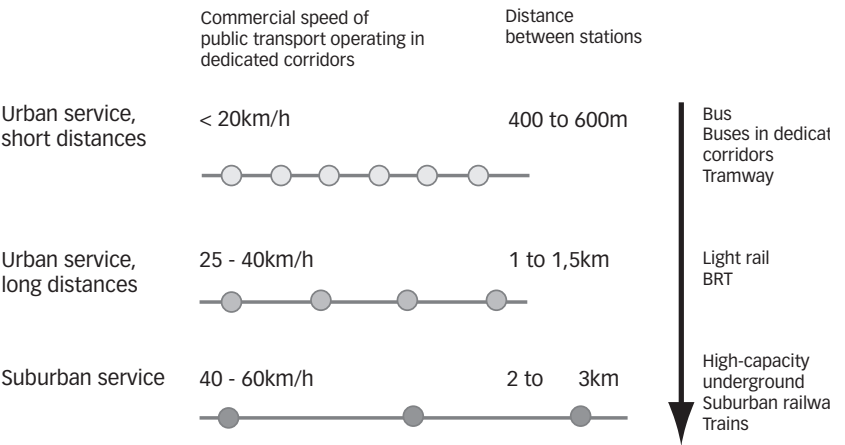
▲ **Figure 1:** System capacity of the main transport modes. Source: SYSTRA 2009: 123

of O&M costs has been enhanced by some studies which have proven that “operational cost of the service is the main variable pushing to negative impacts on place-km per capita supplied” (see Albalade and Bel 2010: 783). Another strong argument in favour of BRT seems to be the short length of construction, which favours the “political feasibility”. However, for the same reason as construction costs, the recorded construction times of BRT could be distorted. In the meantime, new construction methods have developed for metro in the last years, which has led to a dramatic decrease in construction duration. For example, only three years were needed for line 3 of the Delhi Metro.

BRT or MRT: the case of Bogotá

Bogotá, the capital of Colombia, is home of around eight million inhabitants and is recurrently subject to mobility issues. In 1997, public transport policy became a cornerstone of the revitalisation policy promoted by the newly-elected mayor and led to the inauguration of the Transmilenio in 2000, which considerably improved transport conditions in Bogotá. The first line was developed along Caracas Avenue, an exceptionally wide corridor intended as the main trunk of the whole system. The first phase of construction was completed in 2002, and has been expanded since then by two other phases. In 2012, the system consisted of 11 lines totalling 87 km and 129 stations, and it has a ridership of around 1.75 million passengers per day. Eventually, eight phases of development are planned to be completed by 2031. Nevertheless, in

▼ **Figure 2:** Level of service of main transport modes. Source: SYSTRA 2009: 123



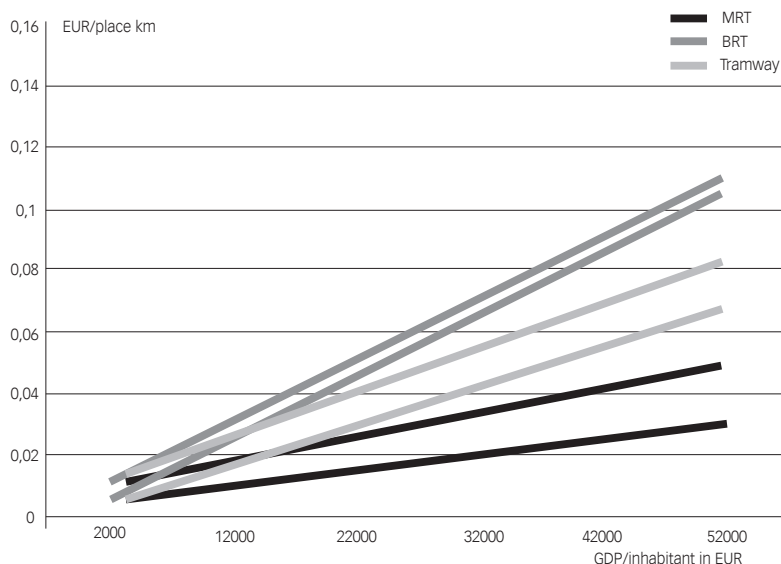


Figure 3: Range of average operating costs for various modes of transport according to GDP per inhabitant. Source: SYSTRA 2009: 126

a troubled political environment, Transmilenio's network development has been hindered since 2005 due to the perpetual changes in political will and to the lack of an empowered transport planning authority. Inevitably, quality has deteriorated over the last years.

Problems at stake in Bogotá

When discussing with local stakeholders, two main issues seem at stake in Bogotá: solving the congestion problem suffered by the historical corridor of major demand (Caracas Avenue), and dealing with the lack of integration of the overall transport network. These two issues often interfere in the debate where, in terms of planning, they should rather be translated into two distinct objectives.

Concerning the integration issue, a project that aims to achieve the SITP plan (*Sistema Integrado de Transporte Público*) has been on-going since 2012. Its main objective is to improve the overall quality of service by eradicating the chaotic system of private buses – the so-called “*Colectivos*”. The goal is to unify Transmilenio's system with the network of secondary buses, while rationalising and controlling the operation.

Figure 4: Typical station of the Transmilenio. Source: SYSTRA



Nevertheless, to be efficient, the future integrated network will need a robust backbone. Indeed, as shown on figure 5, most of the centres of attraction in Bogotá are located along a north-south corridor on the eastern border of the Capital District. The natural axis to feed those centres of attraction is Caracas Avenue, which is already highly congested. The demand on this corridor is estimated around 60,000 pphpd by many professionals, whereas the supply offered by the Transmilenio system corresponds “only” to a capacity of 45,000 pphpd (see Hensher and Golob 2008: 501–518) in degraded conditions of comfort. Enrique Sandoval, who was the first director of Transmilenio, remarked the following during an interview:

“In regards to BRT technology, the maximum capacity ever reached is the one in Bogotá... But for such a capacity, the level of service is very low. Moving 47,000 pphpd? There is only one way to do it: the buses have to operate overcrowded”.

Most professionals estimate that the capacity of Transmilenio could hardly be pushed forward at competitive costs on the Caracas corridor or on parallel corridors due to space scarcity. Indeed, such improvement would imply a complete redesigning and rebuilding of the infrastructures at high costs in order to overcome narrowness of streets and crossroads, which would provide few competitive advantages for a BRT.

To conclude, the core problem in Bogotá (and also the short-term one) seems more about choosing what should be in the future the primary system in the hierarchy of the network, and defining a capacity objective in relation to demand for this system.

BRT or MRT in Bogotá: rather a debate on planning strategies?

The topic of mass transit has been largely debated over the last years in the capital city of Colombia. Basically, the two strategic concepts are, historically, a flexible system built around the BRT in opposition to a rigid system built around the MRT. Unfortunately, a common aspect in the debate is the lack of discernment between planning and

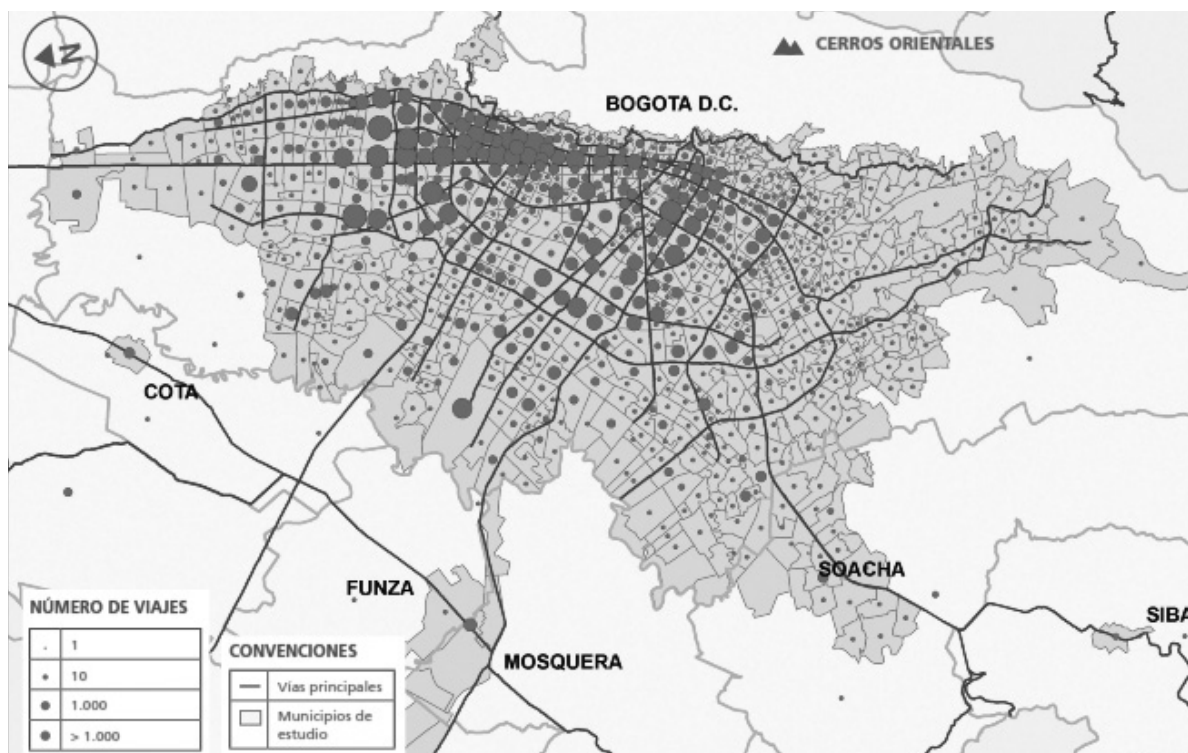


Figure 5: Bogotá's Map – Origin/Destination study, centres of attraction for trips in private vehicles. Source: Secretaría distrital de Movilidad 2011: 111

project-related issues, as well as the lack of dialogue between planners and technicians.

The advocates of a flexible system, often urban planners, maintain that Transmilenio could meet demand growth and preserve its competitiveness through the development of a sharper network and the continuity in investments on existing and new corridors. Others foresee the control of mobility for the benefit of proximity as an alternative to the development of mass transit systems (see Gilbert 2009: 194–201). Those viewpoints follow a widespread trend in planning which consists of arguing that soft measures in line with “adaptive management” concepts are desirable alternatives to mega projects of transport. Evidently, adaptive measures aiming at guaranteeing access to transport for the largest number possible or at controlling city growth cannot be criticised. Nevertheless, when it gets closer to utopia and when it loses sight of some obvious and urgent necessities, a damper to this logic has to be imposed.

In the particular case of Bogotá, as already disserted, the feedback of Transmilenio's project shows some technical limits. By having an iterative dialogue with technicians, planners should be aware of the critical issues met by the system. Moreover, beyond technical issues, flexible systems should continuously evolve. Again, planners should have noticed that the lack of political continuity and the weakness of institutions are additional risks in a country such as Colombia. In that sense, one could legitimately wonder if supporters of flexible systems in Bogotá do not harbour the illusion of solving multiple problems and meeting different objectives (i.e. social and technical) by means of a single transport project.

Yet, in terms of demand and supply, rigid systems offer more certainty concerning operation. Indeed, by simply adding some rolling stock, metro systems usually provide a comfortable reserve in case an increase in capacity is required. Thus, the operation perspectives for the

infrastructure manager are relatively secured for the long-term future. In fact, in Bogotá, the major difficulty for designers of MRT relates to the occupation by Transmilenio of the only corridor that could meet the required demand for a metro. This makes harder a sound project implementation. One could retrospectively investigate the strategic pertinence of Transmilenio's development on Caracas Avenue. Furthermore, the current questioning should be about a possible change in strategy in favour of metro.

In this regard, the author finds it highly hypothetical to base a planning strategy only on adaptive management concepts. Some cities in developing countries are facing such high demands on specific corridors that it would be difficult to deal with them only by mitigation measures. If and when required, the objective of coping with very high demand should be clearly identified as the central focus of a single project. In specific cases, this objective could only be met by investing heavily in infrastructures. In terms of planning, a mix between a strategic plan with a long-term view and an adaptive plan based on smart measures may be more appropriate to meet the largest range of objectives as possible.

The financial issue

Financial criterion is often presented as prohibitive by those – sometimes urban planners – lobbying against MRT in Bogotá: they argue that a metro is an unsuitable option due to its high initial investment cost. According to them, the public funding is restricted and the opportunity cost for the construction of a metro would be detrimental to the fulfilment of “basic needs” of a developing country like Colombia (i.e. electricity, housing, public health, education, etc.). However, as initially introduced in this article, excluding a technological alternative at planning stage is not in line with basic principles for a sound decision-making process. Actually, if one takes the standpoint of a financial designer intervening at project stage, financial arguments against a metro can be to an extent mitigated.

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Firstly, the strategic prevalence of the aforementioned "basic needs" on transport issues is subject to debate in the context of urban congestion faced by the biggest metropolises of the world. It is noteworthy that many metropolises in developing countries have made the strategic choice to invest massively in metro infrastructures. For example, many Chinese cities or Indian metropolises have opted for a metro recently.

Secondly, we may remember that a dangerous short cut is often used by the peremptory statement that a BRT system is much more economical than a metro system. If partially true, this assertion lacks the definition of the boundaries for an equitable comparison:

1. Investment costs are meaningless when imprecise regarding cost/km (Tunnel? Viaduct? Land expropriations? Etc.) and the project environment (i.e. urban form, institutional capacity, local costs of labour and materials, etc.).
2. Long-term financial projections including operation and maintenance leave no doubt that – for similar attendance levels – a rail system presents a better net present value than a bus system for the long-term future.

Thirdly, the impossibility to raise funds can still be discussed and depends on the local and institutional context. Hence, if a mega-project is financially well designed, the municipality can generally have access to national or supranational funding. For example, in Colombia, the law 310 allows a grant from the state ranging from 40% to 70% of the initial investment in infrastructure to a municipality able to guaranty the financial sustainability in operation of its transport project. For the missing funds, by presenting a robust project, the capital city Bogotá could still obtain a loan from the national government (which was done for the Medellín Metro), or from an international funding agency.

Thus, the most important financial issue when assessing the viability of a transport project is operation cost. As already explained, in absolute terms, a metro is an efficient system in term of operation. However, in order to operate it effectively, the demand has to be very high. Moreover, the demand projections should be as accurate and unbiased as possible in order to reduce financial risk. If the predictions prove to be unsubstantiated, there is a high probability that public companies will follow an a-posteriori logic, which is "profit-driven", in order to feed the main trunk of the system at the expense of the quality of service. Despite these pitfalls, some examples of good practice, showing self-sustained operation schemes, have been reported in developing and transitional countries (i.e. Delhi's metro, Santiago's metro, etc.).

In case operation cannot be self-sustained, another approach consists of investigating into the subsidisation of operation. In Colombia, the transport scene is shaped by the "no operation subsidies" policy at the central government level. If understandable at the central level according to the subsidiarity principle, should a "no subsidies" policy also apply to the local level? Indeed, if considering all the positive externalities at the local level (urban development, environment, quality of life, etc.) of a

well-operating transport system, an investment relying on a strategic vision may justify that the municipality engage in a local policy of subsidisation to guarantee the balance of operations. Of course, subsidisation should not imply that a municipality put its treasury in danger. In case of need, the continuation of operation could be secured by using existing financial tools (i.e. betterment or property tax, private public partnerships, etc.) to raise funds in relation to the benefits offered by the project to some stakeholders.

Conclusion

This article illustrates the arguments and controversies involved in a mass transport project. Unsurprisingly, since mass transportation projects focus on all the actors of an urban playground, the controversies that arise often lack clear boundaries. In terms of the process, it criticises a poorly hierarchised framework that mixes up planning and project knowledge. This weakness encourages contested information as well as a debate on technology that depends on non-rational criteria regarding rent-seeking behaviours stemming from politics and industrial lobbies, or with ideological and dogmatic positions associated with some values to a technology (e.g. social significance of Transmilenio, prestige of metro, etc.).

In Colombia, the positive initial success of Transmilenio has led the central government to institutionalise the supposed BRT supremacy by means of policy documents that gave rise to the development of BRT in various cities of the country. At a larger scale, international funding agencies also tend to favour one system. Since they act at the expense of a constructive dialogue and without consideration for local dynamics, such developments in planning and decision-making processes should be avoided.

In light of Bogotá's case, even if they are seductive in terms of costs and social objectives, one should be aware that the flexible systems (i.e. BRT) and soft measures promoted by some planners may not be sufficient on their own to relieve traffic congestion. Obviously, in order to gain this perception, planners should maintain a dialogue with technical experts and be informed of some essential and practical issues of projects. At that point, the main difficulty is not to overstep one's role: as a planner, one should not get too deeply involved in the technical debate, but rather focus on realising a sound diagnosis of urban areas, dissociating the issues and setting prioritised objectives for projects. Especially, even in developing countries, the financial argument should not be used to rule out rigid systems (i.e. MRT) from the plans.

Hence, to conclude on technical criteria, we observed that beyond some limits, BRT have lost their adaptive advantages in comparison to metro systems. Thus, even if the development of MRT presents some difficulties and pitfalls, one could legitimately wonder if, for a mega-city which lacks mass transit, the best strategy for the long term would not be to invest in a metro system rather than BRT. But still, each time there is an inquiry, the aforementioned presumptions should be validated on a case-by-case basis. The decision process should be well-structured, based on a thorough analysis of planning strategies and, then and only then, on a comparative review of technological alternatives.

Potentials and Pitfalls of Transport Innovations: Lessons from Santiago de Chile

Carolin Höhnke

Potenziale und Probleme bei Innovationen im Transportsystem: Lehren aus Santiago de Chile

Öffentliche Verkehrsangebote spielen in den meisten Städten Lateinamerikas eine wesentliche Rolle für die Realisierung alltäglicher Mobilität der Bevölkerung. Allerdings hat die beständig wachsende individuelle Motorisierung zu einer kontinuierlichen Abnahme ihres Anteils am gesamten Verkehrsaufkommen geführt, und in der Folge auch zur Aufgabe der Bestrebungen zur Verbesserung des öffentlichen Transportangebots. Die Einführung des Bussystems Transantiago in Santiago de Chile im Jahr 2007 ist eines der jüngsten Beispiele hierfür. Das ambitionierte Projekt verbindet die Erneuerung der Busflotte und die Einrichtung von Schnellbuslinien mit einer vollständigen Veränderung der Betreiberstrukturen. In ihrem Beitrag analysiert die Autorin die erheblichen Probleme, die mit der Einführung des neuen Verkehrssystems einhergingen. Als Grundlage hierfür dienen ihre qualitativen Erhebungen mit lokalen Experten aus der Verwaltung und Politik, der Wirtschaft sowie der Zivilgesellschaft. Die systematische Analyse der vielschichtigen Konstellation der Akteure und ihrer Interessen nutzt die Autorin, um generelle Lehren für die Einführung bzw. Neugestaltung großer städtischer Verkehrssysteme zu ziehen.

Introduction

In most Latin American mega-cities the public transport system plays an important role for daily mobility. But due to the growing use of private cars, the use of public transport has declined in many cities. Against this background, it is a major challenge for these cities to preserve the current use of public transport, which is still high though mostly in a poor condition and negatively evaluated by its users. This is why many cities like Santiago have been reforming their public transport systems over the last few years by implementing the idea of a bus rapid transit (BRT) system, as has recently been undertaken in many cities across the world (an overview is given by Deng and Nelson 2011).

The BRT system Transantiago in Santiago de Chile is an extensive reorganisation of the public transport system in the entire mega-city, including changes in the entrepreneurial structure and financial system. Implemented in 2007, it began in an extremely chaotic manner and led to a serious crisis for the national government which reminded us that urban transport is a highly sensitive political issue. But what were the main pitfalls and opportunities raised by the implementation in Santiago? And what can the actors of Transantiago learn from this implementation process?

This paper examines the governance of the implementation process of the BRT system Transantiago in Santiago de Chile, and depicts the challenges linked to this process. Transport governance is defined as the regulation of public affairs involving different actor groups (public, private and civil-society actors) at different administrative levels (international, national, regional and local) (see Höhnke 2012: 52).

The findings presented are the result of a qualitative-empirical study that combined a literature review with a qualitative content analysis (see Mayring 2003) of 24 guided expert interviews conducted in Santiago between

2006 and 2009 (see Höhnke 2012). To gain insights into the decision-making processes, I conducted interviews with experts from different actor groups (public, private and civil society actors) at the national, regional and local administrative levels, among them experts with a wider knowledge, in order to understand general planning mechanisms.

The Transantiago reform project

In the wake of various extensive urban development projects which were implemented in the late 1990s to celebrate the Bicentenary of the Chilean state in 2010, the national government proposed a reform of the public transport system. The main goals of the reform project, called Transantiago, were to improve the quality of life in Santiago and enhance the share of the public transport in the modal split (see Cruz Lorenzen 2001: 95). Also, like the former system, it was expected that Transantiago would function without any public subsidies.

Transantiago included three types of modifications: Firstly, the actors (mainly from the national government) carried out technical modifications such as the complete reorganisation of bus routes and the development of an integrated system, including the metro network. Furthermore, they planned separate bus lanes and bus stations, which were financed by the national government. And the new bus companies had to buy special Transantiago buses or retrofit old ones. Secondly, the actors carried out modifications in the financial process with the aim of developing a tariff association and an electronic payment card system, which would enable users to switch from one bus to another or to combine the bus with the metro with just one ticket. Thirdly, they also modified the entrepreneurial system, a process named “*empresarización*”. This referred to the transformation of the approximately 3,800 micro enterprises into just 10 large enterprises, which would function in 14 business units (for more details, see Muñoz/Gschwender 2008 and Muñoz/Ortúzar/Gschwender 2009).



▲
Figure 1: Transantiago 2013,
source: Carolin Höhnke

The national government implemented most of the reforms – which, for the public transport users, were the most obvious aspects – on February 10, 2007. From then onwards massive problems in public transport occurred because of a variety of reasons (see Briones 2009): Firstly, as there was little information about the new network and the system in general prior to the implementation, there was an information deficit for the users. Also, maps showing the new network were mostly not available at the bus stations. Secondly, Transantiago reduced the capacity of the system. Where earlier about 8,000 busses on 370 routes, concerning approximately 12,000 km, were part of the public transport system, from February 10 onwards only 4,500 buses on 193 routes with an approximate length of 5,350 km could be found. And thirdly, the special infrastructure needed to reduce travel times was mostly lacking. Only 8 per cent of the separate bus lanes and only one-third of the normal bus stations were completed.

The total collapse of public transport during the first month led to violent demonstrations by the users and spawned a crisis for the national government. As a result, the national government implemented urgent changes, but only due to the strong protest of the public transport users. Since then, the situation is slowly improving; however, there remains a substantial disparity between an adequate supply in the city centre and the problematic situation in some outlying areas (see Rodríguez and Rodríguez 2009: 18).

A small panel survey (an extensive origin-destination survey is still needed) made it clear that car use has risen slightly while public transport has lost passengers (see Yañez, Mansilla and Ortúzar 2010: 135). Since the main objective of Transantiago was to enhance the share of public transport, it appears that the Transantiago project has not yet achieved its main goal.

Pitfalls and opportunities of Transantiago's implementation process

The implementation process of Transantiago revealed several problems, which Figueroa and Orellana (2007) have

termed institutional problems. These are ultimately an issue of transport governance. This chapter provides an overview of the background of Transantiago's governance and highlights the pitfalls and opportunities associated with the reform process.

The actors implemented Transantiago in a context that was highly formed by the centralised political system of Chile. Therefore, the national government is responsible for transport planning (and also in general for urban planning) in Chile, also in Santiago, and its decisions often have a strong top-down character. At the same time, the administration of Santiago is very fragmented because of the fact that the urban area is a conglomerate consisting of up to 37 independent communes (depending on the definition of the spatial extent of the metropolitan area) without any responsibility for public transport. A single administration for the entire mega-city is still lacking and, moreover, the argument is that the National Ministry of Transport is responsible for transport planning in Santiago and consequently also for Transantiago. This centralised political system is a barrier for the local administrations of the communes in influencing decisions on public transport in their surroundings.

At the beginning of the debate on reorganising the public transport system the National Ministry of Transport planned to implement a metropolitan transport authority to resolve this problem of centralisation. But this idea remained stagnant during the chaotic implementation of Transantiago because the presence of this authority would reduce the responsibilities and influence of the national government. As noted by a former member of the Transantiago planning team in 2006:

"They are very afraid, because an authority of the city of Santiago is an authority of 40 % of the Chileans, which will surely be located in the commune of Santiago. A representative of 40 % of the Chileans next to the president who represents 100 %. This is uncomfortable."

Therefore, the political centralisation turned out to be a barrier for local transport planning.

The public transport reform was a central part of the Public Transport Plan for Santiago (PTUS), which the national government published in 2000 and covered the area of 34 municipalities of Greater Santiago (the main urbanised area of the city). However, this important planning instrument had merely an informal character, as it was not properly coordinated between the various national ministries under which the reform was being implemented. As the public transport in Chile belongs to the National Ministry of Transport, the ministry was also responsible for Transantiago. But other important ministries involved were the National Ministry of Housing and Urbanism (MINVU), which is responsible for transport infrastructure in Santiago, and the Transport Planning Secretariat (SECTRA), which develops transport models.

The planning team of Transantiago carried out the detailed planning of the reform, but it was only part of the National Ministry of Transport, without the other responsible ministries being integrated. This hindered the coordination between the different actors. Although the decision-making

was conducted at only the national administrative level, the distribution of responsibilities between different national ministries was left unclear. This, in turn, complicated the detailed planning and the definition of a clear aim much more than expected. Additionally, a leader for Transantiago was lacking, since the national president frequently replaced the transport minister and also the Transantiago team leader whenever problems appeared (see Muñoz and Gschwender 2008: 52).

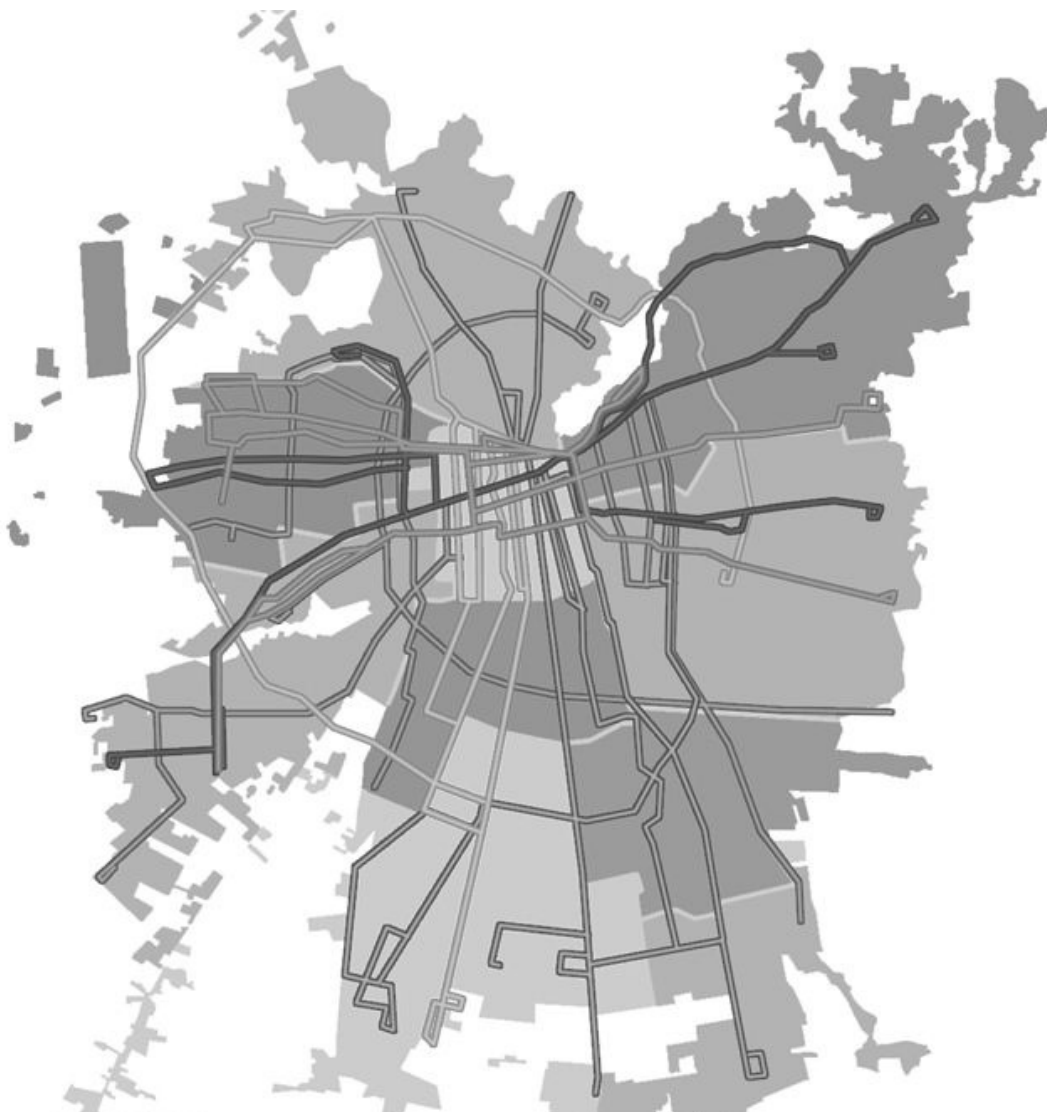
Transantiago was developed in the market-oriented economic system of Chile. That strengthened the planning focus on the efficiency of the private enterprises, so that the new public transport system could be as self-sustaining as the earlier system and would be able to function without public subsidies. But self-sustenance did not work out as planned and the national government finally had to finance the system and is currently subsidising the public transport providers, because they have less income than expected and would have difficulties to provide the service without the subsidies. Moreover, the national government gave revenue guarantees to the new bus enterprises to generate greater appeal in the entire market for the new enterprises and investors. Because of this, the bus enterprises at the beginning did not have any incentives to provide planned services and left many buses standing

in their garages, so that they did not fulfil the requirements.

Such market orientation was accompanied by the "unwritten law" of technocratic planning, which has a strong influence on decision-making also in other areas of Chilean policy-making (see Silva 2008).

For Transantiago, such technocratic decision-making caused the actors to be mostly interested in technical and economical knowledge. It seems that those in charge of decision-making in the national authorities, especially the Ministry of Transport, believed strongly in the results of the technical transport models, like the expected passenger flow in the bus and metro systems, the best location of bus stations as well as the design of the bus network. They used the models for designing the entire system, especially for the reorganisation of the network with feeder and trunk routes, the projection of the required number of buses and their frequencies, and the location of the bus stations (see Briones 2009).

But due to the strong focus on financial efficiency, the Transantiago planning team reduced the number of buses in the planning phase and, with it, also the capacity of the whole system as well, which was one of the main



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Figure 2: Transantiago: trunk network (*red troncal*) and feeder zones (*zonas alimentadoras*), own elaboration, based on <www.transantiago.cl> (2007). Source: Forray & Figueroa (2011)

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problems at the beginning of Transantiago. The considerable trust placed in the transport models led the decision-makers to believe that the system could be efficiently run with fewer buses and lesser capacity than before. Also, in the development of the transport models, the decision-makers had not considered the local know-how about current street conditions or different manners of using the public transport from neither the former bus-operators nor the local administrations of each commune. Moreover, they had not given citizens the opportunity to participate in its development, since the project was to be implemented as quickly as possible and the government did not have confidence in other opinions aside from the transport models. According to a former member of the Transantiago planning team in 2006:

"Technocrats never understood this well and worked harder to establish links with economic stakeholders than to integrate citizens' interests, which are the basis of Transantiago. Also, they widely used the justification that a process of public participation would slow down the implementation of this project."

The national transport authorities planned the implementation of Transantiago by themselves and negotiated the public-private partnerships behind closed doors, guided by the idea that the system must be financially self-sustaining.

Such substantial trust in technical solutions resulted in the "big-bang" implementation strategy, which intended to solve all problems on a technical basis from one day to the next. But this rendered the entire process highly complex, as there was no transition phase from which the actors and passengers could learn. Although there was still a major discrepancy between the Transantiago plan and the reality shortly before the day of the transition in February 2007, the actors decided not to postpone the transition yet again. As was noted by a member of the Transantiago planning team in 2009:

"[...] There was an internal discussion, if they could start with only some of the infrastructure being built or if they could start without having everything ready. They decided that they would start to operate without having everything built, simply with what existed and the project would be improved in the ongoing process."

Consequently, the national government continually re-defined Transantiago after its disorganised implementation. One could draw the conclusion that for them, Transantiago served as a vast experiment on how to reform a public transport system in an entire mega-city as fast as possible. As a result, they implemented and modified the project in a trial-and-error manner.

Lessons from the implementation of Transantiago

In summary, one can say about the implementation process that the strong orientation towards an efficient market for the bus enterprises accompanied by the technocratic decision-making resulted in a major pitfall for Transantiago. Therefore, the decision-makers excluded the

reform's social aspects (e.g. accessibility for all users and tickets for low-income users, such as students). It appears that for Santiago, less technocratic decisions and a strong political leadership for urban issues could foster a debate about its future development.

Another pitfall for Transantiago was the centralised political system of Chile. The top-down decision-making process left no opportunity for the integration of local actors, including local administrations and the civil society. This problem, in combination with the technocratic decisions, led to the decision-makers' disregard of the detailed knowledge of the micro-enterprises, the local authorities and the citizens. This resulted in improvisational planning with a trial-and-error implementation.

Out of these pitfalls, four policy recommendations can be given that could be advantageous for the improvement of Transantiago: Firstly, the actors have to overcome their trust in just technical solutions. That means the specific knowledge of the bus enterprises and the local administrations about local characteristics, like current street conditions or a well-adapted location of the bus stations, must be utilised in order to amend the transport models. Again, participation of the citizens in the planning process is essential in understanding customers' perceptions and to gain more public support.

Secondly, it is important to question the institutional framework and embed the public transport reform into an urban development strategy, one which integrates transport planning as an issue that has an impact on the urban development (for example, a new metro station has an impact on the surrounding land use and real estate prices). Thirdly, the idea of introducing a political leader not only for urban transport issues in Santiago but also for the urban development of the whole city needs to be pushed forward.

A city government for the mega-city, which is capable of taking decisions independently from national politics, is needed to define its own development strategy and integrate local and cultural characteristics in transport planning. In addition, this can encourage discussions about the city's future. And fourthly, for future changes of the public transport, a gradual strategy should be used due to the learning effects that could be obtained in each phase. But at the same time, it is important to establish a plan that is independent of political changes.

The reorganisation of the entire public transport system in Santiago was a major challenge, but the process continues to face a number of pitfalls. Concurrently, it is, however, also an opportunity for Santiago, because nowadays, after a number of years of operation with immense transformations, Transantiago is gradually improving. Of course, this implementation strategy was not the ideal way of managing these significant changes at the onset.

Thus, in comparison to the implementation strategies of other BRT systems, such as in Bogotá or Mexico City, where the public transport system has, for a number of years, remained in a transitional phase and has changed step-by-step only various selected routes, Transantiago's opportunity, and pitfall at one and the same time, was the widespread reform throughout the entire mega-city.

Public Urban Transport, Mobility Patterns and Social Exclusion.

The Case of Santiago de Chile

Regina Witter

Öffentlicher Nahverkehr, Mobilitätsmuster und soziale Ausgrenzung in Santiago de Chile

Der Zugang zum öffentlichen Nahverkehr hat eine große Bedeutung für die Möglichkeiten der städtischen Bevölkerung, am ökonomischen und sozialen Leben teilzuhaben. Die Einführung neuer Verkehrsangebote spielt damit eine wichtige Rolle, um bestehende Defizite zu überwinden. Dies trifft besonders auf eine Stadt wie Santiago de Chile zu, die durch eine sehr ungleiche räumlich-soziale Verteilung der Bevölkerung gekennzeichnet ist. Der Beitrag geht auf Grundlage qualitativer und quantitativer Analysen der Frage nach, inwiefern mit der Einführung des Verkehrssystems 'Transantiago' eine Verbesserung der alltäglichen Mobilität und damit eine verstärkte soziale Inklusion einkommensschwächerer Haushalte erreicht werden konnte.

What are the social impacts of a new, problematic public transport system in a city that is known for its inequality concerning access to daily activities and participation in urban life? Are the changes limited to altered accessibility conditions or are there further consequences for people's travel habits and patterns? In addition, what does that mean for the dissolution or manifestation of social inequality and the risk of social exclusion from daily life? With a specific regard to these interests, this paper specifically focuses on the case of Santiago de Chile and the so-called 'Transantiago', the new public transport system implemented in 2007.

Whilst the 1970s and 1980s public transport in Santiago de Chile had been characterised by an uncoordinated oversupply of private busses (that existed in parallel to a more expensive public metro system), the Transantiago was meant to suspend the stigmatisation of bus-based transport as 'mode for the poor' and to slow down the shift from public to private motorised modes. Modelled from the famous bus rapid transit system 'Transmilenio' in Bogotá, the Transantiago project included the total redesign of the network system and the private operator companies at one glance. It introduced new vehicles and infrastructure as well as an electronic ticketing system that combined the bus and metro systems in a tariff union. Unfortunately, the ambitious project rather failed, due to various political, technical and social reasons. Up until today, the acceptance and satisfaction of the inhabitants with the Transantiago have been rather low. Being aware of the importance of the political and technical problems, this paper concentrates on the social problems and the related impacts Transantiago has had on people's daily life.

In the following, it is first suggested that people's difficulties to get used to the new Transantiago system are, to some extent, due to the characteristics of the previous deregulated public transport system. The previous system was completely different in terms of its supply and operator structure. In a second step, the impacts of the new public transport system on people's daily life are analysed, i.e. people's regular activity and travel patterns and

social in- or exclusion due to transport. The empirical research is based on a set of mixed methods applied from 2007 to 2009 in five urban areas of the Santiago metropolitan area. These methods include qualitative interviews with experts and users as well as a questionnaire-based survey conducted in 2000 households. The results are of major importance for the city of Santiago de Chile, but can also claim to be of interest for other cities in emerging economies where similar transport changes are on their way.

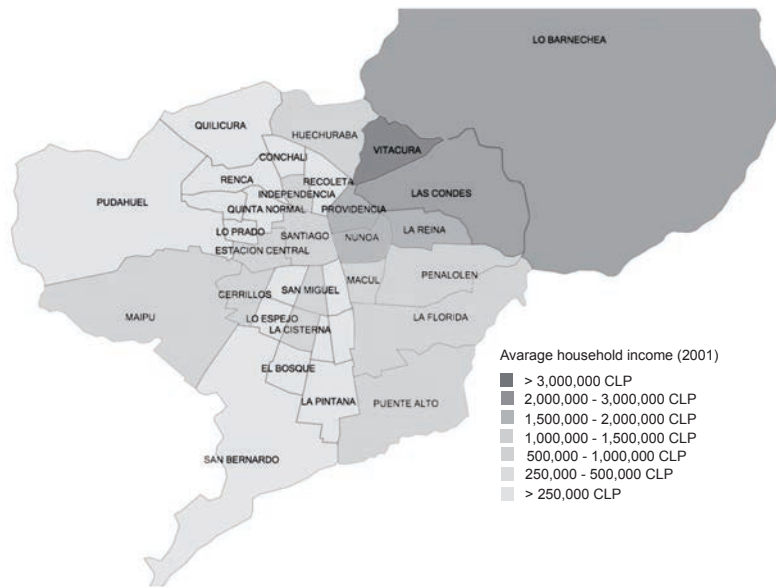
Santiago de Chile: a city characterised by social segregation and deregulated public transport

The city of Santiago comprises today over 6 million inhabitants. It is subdivided in 34 different so-called *comunas* (districts) and is characterised by eminent social segregation (see Sabatini 2001). Enhanced by social housing policies before and especially since the Pinochet regime, segregation patterns are until today strongly sector-related. Thus, there is a strong social gap between the so-called 'eastern cone of wealth' and the other urban sectors of the city. Figure 1 illustrates the distribution of average incomes over the metropolitan area in 2001. The illustration could be juxtaposed to a set of 'social maps' identifying the social differences in the residential quality and size, the availability of formal jobs, the quality of green space, education and health facilities as well as access to a private car, in contrast to 'captive ridership', i.e. the dependence on public transport (see also Witter 2012: 150–164). Anyhow, some authors argue that in the last decade, segregation patterns have been object to change. Thanks to residential forms such as gated communities and so-called socially homogeneous 'valley cities', some peripheral *comunas* have become socially more heterogeneous than other ones (see Agostini 2010 and interview with Sabatini 2007). Whilst the third concentric has become more and more the place of residence of the growing middle-class (often living in social enclaves in a more deprived surrounding), especially the *comunas* located in the second concentric ring continue to be characterised by eminent problems related to poverty, unemployment, crime and accessibility problems.

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Figure 1: Average income per comuna. Source: R. Witter 2010



In Santiago the private car continues to be an important symbol of status, especially among people of middle and higher incomes (see also Witter 2012: 230f. and 322f.). Nonetheless, for the lower-income strata, public transport is often still the only available transport mode which allows commuting within the vast city. Public transport usu-

In order to reverse the negative image of bus-based transport in the city and to stop the increasing modal shift from public to private modes, from 2000 onwards the so-called 'Transantiago project' was brought on its way. The aim was to create a regulated bus system that worked as feeder system to the expanding metro. The bus system itself should be organised into a 'trunk and feeder system', whereas the 'trunk' (main) lines would work in the form of a bus rapid transit system, including proper bus lanes and fast-entrance stops. Obviously, it required a complete re-design of the existing operator and network structure. The initial objective to attract only foreign operator companies guaranteeing a high-quality service did not work out since the financial incentives seemed to be too low and the lobby of the existing operator companies was very strong (see interview with Figueroa 2007).

Finally, most of the previously existing small-scale companies were re-grouped into big enterprises, without having adopted the business skills and procurement standards required (see ibidem). After several postponements, the ambitious Transantiago started on February 10th, 2007 (see Muñoz et al. 2009). Unfortunately, most inhabitants experienced the abrupt start as very catastrophic. A set of planning and implementation failures had produced a loose network, irregular frequencies and very long waiting times as well as serious capacity bottlenecks in both busses and the metro (see figure 2).

The infrastructure such as bus lanes and upgraded bus stops simply did not exist at the start. Neither the electronic ticket that should allow integrating the fares for busses and the metro into a single fare nor the sophisticated internet-based user information system worked properly. Additionally, many people who were used to rely on 'mouth-to-mouth'-propaganda of public transport supply did not know how to use the sophisticated travel information system based on network maps and Internet.

A wide set of studies was published that aimed at understanding the concrete reasons of the failure of Transantiago. These reasons can be summarised into design-related and technical- as well as political- and governance-related ones (see Quijada et al. 2007, Figueroa 2007, Muñoz et al. 2009, and Ureta 2009). Without going into detail of these reasons, in the following the emphasis is put on the problems and difficulties from a user's point of view and the consequences these problems have had on people's daily life.

Research interests and methodology

As mentioned above, from 2007 to 2009 a set of empirical studies was conducted, including in-depth interviews with inhabitants of Santiago as well as semi-structured interviews with experts of the political, academic and economic field. These interviews helped to define two research interests. The first one deals with the failures of Transantiago from the users' point of view, suggesting that (without neglecting the importance of the technical errors) a part of the problems can be explained by people's existing travel skills and habits, which were shaped by the previous system. The second research interest looks at the social impacts of Transantiago, assuming that the Transantiago has affected social inequalities and the risk of social exclusion from daily life of some parts of the

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ally used to be in the hands of private players who were (sometimes more, mostly less) regulated by the public sector (see Figueroa 2005: 42).

After having experienced serious supply bottlenecks of the national bus system, public authorities opened the market for private providers at the beginning of the 1960s. While first the market was regulated by operator concessions, the Pinochet regime decided to completely deregulate the public transport industry in the late 1970s. From 1979 to 1988, market entrance, tariffs and route exploitation were subsequently liberalised, which had rather fatal consequences from a social and environmental point of view. The number of operators and vehicles expanded rapidly and the service quality dropped significantly, whilst tariffs almost doubled. In 1988, there were 360 lines in the hands of 7,000 small-scale operators offering services in over 10,000 busses, which contributed to congestion and pollution in central areas (see Quijada 2003).

Comparing the transport deregulation processes in Santiago, Bogota and Buenos Aires, a local transport expert states: "The case of Santiago is the most extreme one" (Figueroa 2005: 44). Nevertheless, under the Pinochet regime were also laid the cornerstones for the development of the public urban metro network. In the late 1970s, the first two metro lines were inaugurated connecting the eastern cone of wealth with the western periphery as well as the northern and the southern areas adjacent the city centre. But due to its comparably high tariffs and a very limited network, the metro was not a real alternative to the deregulated busses. Whilst the metro rather used to be a 'white-collar-mode', where people were able to travel fast and comfortably (see Figueroa 2005: 45), the chaotic, little reliable and uncomfortable busses were stigmatised to be a transport mode for the urban poor who cannot afford to go by metro or private car (see Zegras and Gakenheimer 2000: 33).



Figure 2: Chaos on the first days after the Transantiago start in the centre of Santiago. Source: Figueroa 2007

population. These inequalities may be even wider spread than during the deregulated transport period, when bus-based transport was stigmatised to be a transport mode for the urban poor (see Zegras and Gakenheimer 2000: 33 and section 1).

The two interests were analysed using the results of a questionnaire-based survey conducted in 2009 in 2000 households in the five *comunas* Santiago centre, Las Condes (being part of the wealthy eastern sector), Lo Espejo (located in the deprived, second concentric ring of the metropolitan area) as well as in the peripheral middle-income *comunas* of Maipú and Puente Alto (see figure 1). Whilst Santiago centre, Las Condes and Puente Alto enjoyed access to the metro, residents of Lo Espejo and Maipú entirely depended (at least to the point of time of the survey on the implementation¹ of the new bus system.

The problems of Transantiago from the users' point of view

First, Transantiago significantly changed people's accessibility conditions. Figure 3 identifies the reduction of places in busses since the Transantiago implementation, taking into account all busses per week in both travel directions. While only the centre of Santiago is better connected today, important losses in capacity have occurred for the periphery, e.g. in the *comunas* of Puente Alto and Maipú. Inhabitants of Puente Alto can compensate the reduced bus services by good access to the metro that is now affordable thanks to the tariff union between bus and metro. Whilst during the deregulated period people had to pay a different fare for each transport mode, the tariff union allows now for travelling with one ticket within two hours, using up to three different modes. Fares are only slightly above the previous one, thanks to (for the very first time in Santiago) permanent fare subsidies by the public sector (see Muñoz et al. 2008). Anyhow, the inhabitants of Maipú

entirely depend on the Transantiago busses that are until today often delayed and less reliable. The on-going deficiencies of bus services are due on the one hand to the scarcity of continuous bus lanes and adequate fast-entrance stops, and on the other hand to bad procurement by some private operators, which is rarely fined.

The reduction in the 'quantitative supply' goes also hand in hand with longer walking distances to the (previously often ignored, now obligatory) bus stops, longer waiting times and the need to carry out transfers between modes. The need to carry out transfers is considered as one major drawback of the new transport system (see interview with Jara-Díaz 2009). While during the deregulated period people rarely had to change between modes, now almost 40% of trips include at least one transfer. Among the survey respondents, almost 80% rather prefer long travel times without any transfers than short travel times including transfers (see Witter 2012: 275f.).

Finally, the probably most crucial issue is that the Transantiago was not able to reduce door-to-door travel times in public transport which continue to be the double of travel

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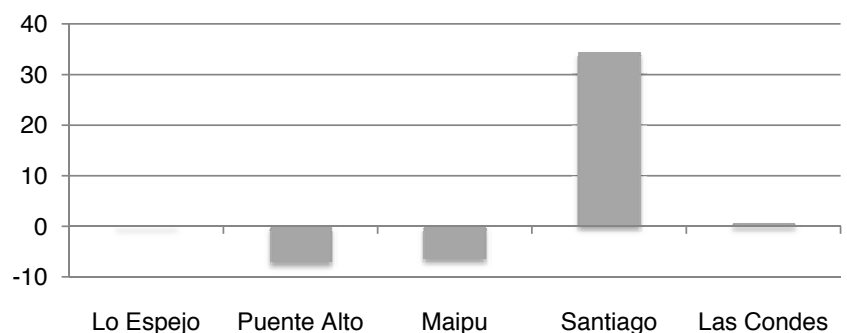
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1
In 2011, the central parts of Maipú were also connected to the metro network. Lo Espejo remains dependent on bus-based services.

Figure 3: Changes in bus-based supply in the five *comunas* at the end of 2009, taking into account all places that are offered in all busses in both travel directions in one week. Source: R. Witter 2012



■ Δ places/week and capita 2009-1999* (estimation for metropolitan average in 1999: 13.31 places per week and capita)

times in a private car (see Albarrán 2009, Ureta 2009 and interview with Jara-Díaz 2009).

Secondly, there were also important changes related to people's travel habits and skills required as well as to the organisation of travel patterns. In this context, two striking examples will be emphasised. The first one refers to the use of formal and informal sources of travel information. Figure 4 presents the answers in relation to the different education groups. Differences in the quality of educational facilities in the different *comunas* obviously affect a strong relation between poverty and a low level of formal education (see website SIMCE 2012; see also section 1).

The survey results identify an important positive relation between the level of education and the use of formal information sources like the homepage of the Transantiago and the network maps posted at the bus stops and distributed in all households of Santiago. Lower-educated groups still rather rely on informal information sources, which were pertinent during the deregulated transport period, such as asking people they know or just acceding a bus stop in order to 'wait and see' ("muddling-through-strategy", see also Lindblom 1959).

The second example refers to people's stated easiness or difficulties to handle the new Transantiago system at the very beginning, as well as their impact on the current evaluation of the system. Initial difficulties were tested on the basis of eight different criteria of transport supply that were related to the new network structure and schedules, but also to trip organisation (including the need to carry out transfers), access to travel information as well as the use of the electronic ticket. The so-called 'tarjeta BIP' has to be charged before entering the bus, which is only possible at metro stops and in some shops and kiosks and which requires the assignment of a fixed travel budget for

a specific time period (in contrast to the payment system based on a daily basis, valid during the deregulated transport period). The disaggregated analysis of results shows that lower-educated groups and residents of the more deprived areas had generally stronger difficulties at the beginning of Transantiago than higher-educated groups and people living in wealthy areas (see figure 5). The transport criteria related to travel organisation and information explain together about 18% of all difficulties stated.

One step further, a strong positive relationship between people's initial difficulties and their current evaluation of the Transantiago system was found, especially for the criteria related to travel information². Thus, deprived people who had more problems to make use of the Transantiago at the beginning are more likely to evaluate the Transantiago as bad today (despite substantial improvements in the meanwhile). It is also worth to mention that the few people without any problems at the beginning and a positive evaluation of Transantiago today are predominant car users who rarely use public transport. Hence, their evaluation is not necessarily grounded on own experiences.

To sum up, the problems of Transantiago are not exclusively due to deficiencies in the network and supply structure, but also, at least to some extent, to people's travel skills and habits. Those are strongly based on the previous deregulated (somewhat chaotic but highly flexible) system. The need now to organise a trip in advance, to transfer between modes, to get access to formal information on the transport supply as well as to make use of the electronic ticket card, has made the adoption of the new system more difficult for some people. The people with stronger difficulties are those who used to be frequent users of the deregulated system and are today 'captive riders' depending on the Transantiago system.

Impact of Transantiago on people's daily life and the risk of social exclusion

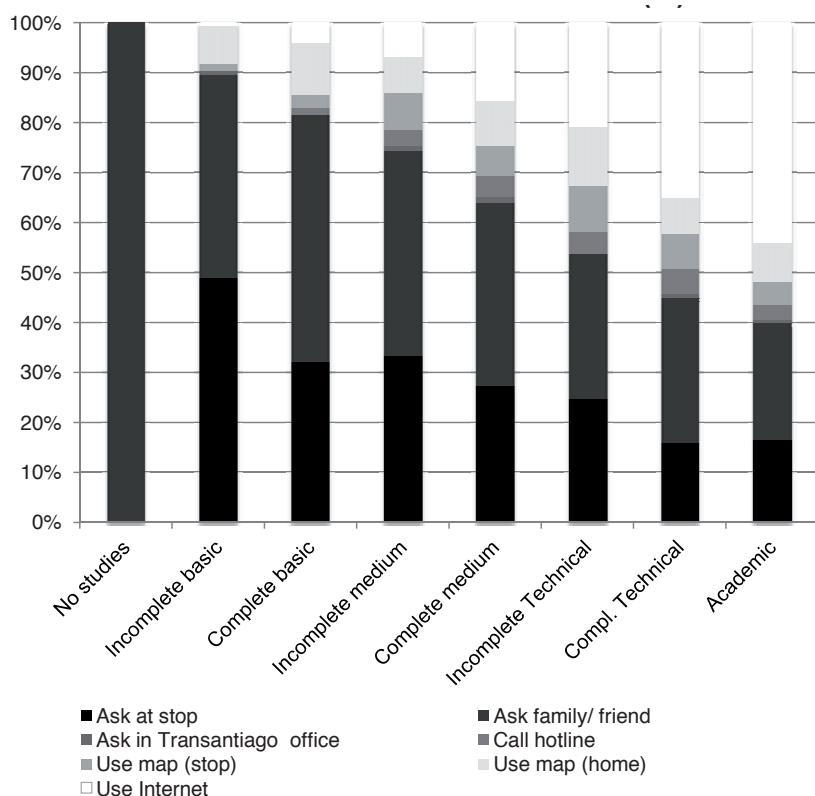
Furthermore, the impacts of the Transantiago on people's daily life are of interest, as well as people's 'adaptation strategies' in order to cope with the new transport system. Survey respondents were asked about the frequency of 13 different types of regular activities (mandatory activities related to work, study and grocery shopping as well as eight types of leisure-related activities), the location of these activities as well as the predominant travel modes used.

This was done once in a retrospective manner asking for the situation in 2006, i.e. before the implementation of Transantiago, as well as once at the end of 2009, when Transantiago already existed for some time. The aim was to get to know changes in people's activity and travel patterns since the implementation of the Transantiago system, despite potential methodological bias. The risk of bias refers on the one hand to people's difficulties to remember their travel patterns three years before, and on the other hand to a wide set of other possible reasons for related changes than those due to the new transport system (for instance, changes in the household structure or consumption patterns or changes in land use).

Results showed that indeed many people changed their activity and travel behaviour since the Transantiago, and

2
The statistical relationship was of Spearman-Rho ≈ 3.1 with $\alpha < 0.001$.

Figure 4: Use of formal and informal information sources of Transantiago in relation to people's level of education. Source: R. Witter 2012



that a considerable amount of people explicitly justified these changes with the introduction of the new public transport system. Since the implementation of Transantiago, especially people of lower income and many women tend to be less active for all kind of purposes, while the out-of-home activity of higher income people and many men has even further increased. Socio-economic and gender-related differences in out-of-home activity could already be revealed during the deregulated transport period, but seem to have become stronger since the implementation of Transantiago (see also Witter 2012: 236–242 and 329–338).

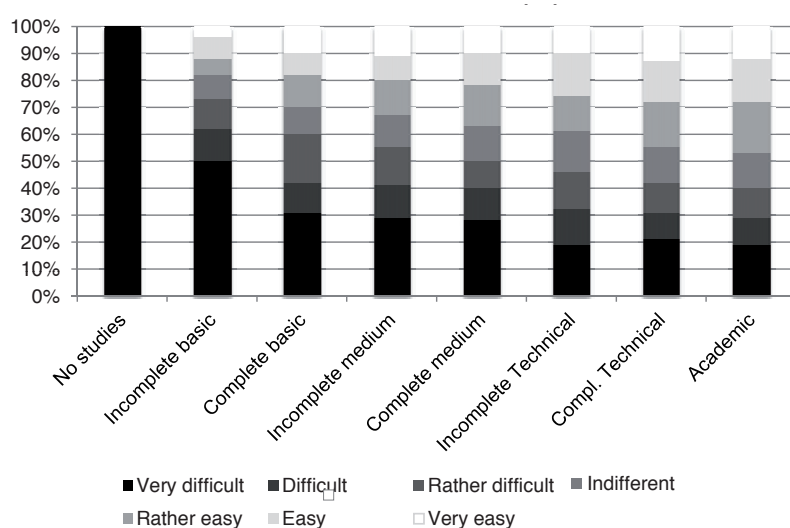
Less out-of-home activity, linked to reduced spatial mobility, might give a hint on travel difficulties for these groups. Even more, the analysis of trip destinations shows that the number of trips that start and end in the same urban sector where the respondent lives ('internal trips') has increased. This increase is particularly strong for leisure-related activities as well as for people living in deprived areas without direct access to the metro, such as Lo Espejo and Maipú (see figure 6).

Therefore, since the Transantiago many lower-income and lower-educated people as well as many women not only travel less often, but also shorter distances. Since the urban sectors in Santiago are usually characterised by very similar socio-economic patterns whose inhabitants hardly interact with the other sectors the share of internal trips can be considered as one possible indicator for socio-spatial segregation (see Figueroa 2005: 44).

The increase in leisure-related trips starting and ending in the same urban sector must not necessarily, but may be due to transport-related difficulties to reach the other sectors. This assumption is also supported by the results of the in-depth interviews with some inhabitants of the five *comunas*, in which especially people of lower income declared to visit family and friends less often since the Transantiago implementation. With regard to comparably little public transport supply during off-peak hours (for instance in the evening and on the weekend), they often prefer to stay at home than to travel elsewhere.

Nonetheless, figure 6 also displays some positive developments such as fewer internal trips and more exchange with other urban sectors for those people enjoying direct access to the metro network, for example residents of the centre of Santiago and the *comuna* of Puente Alto. The metro, thanks to the tariff union with the busses, has become affordable for everyone (see also section 2) and now plays an important role as 'mobility facilitator'. Accordingly, changes in the modal split, explicitly justified with changes in the urban public transport system, show an important increase in metro use at the costs of the Transantiago busses (see figure 7).

In total, 12% of all survey respondents explained to have changed mode use habits not only since, but also due to the Transantiago system. These respondents were by majority people of lower income living in peripheral areas without access to a private car. In the context of the relation between public transport (bus and metro) to non-motorised and motorised (semi-)private transport (private car, motorbike and taxi), figure 7 identifies another important change. Whilst especially residents of Lo Espejo



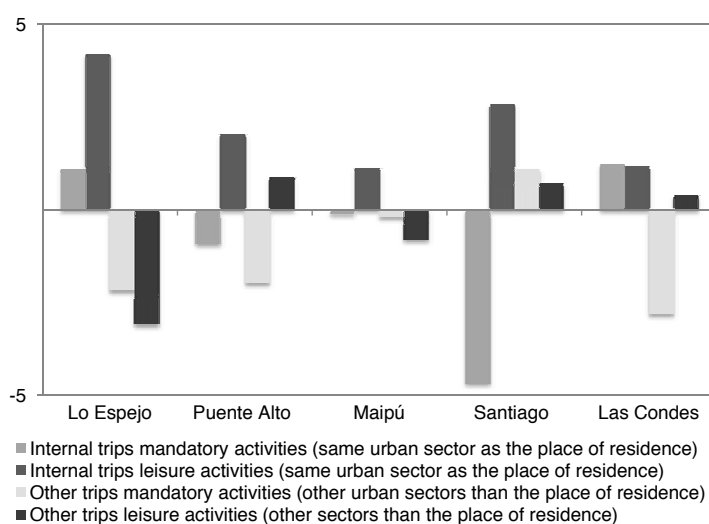
(the poorest areas of the five *comunas* considered) have increased their use of non-motorised modes (which do not cause any costs at all), in the other areas the use of non-motorised modes has instead decreased.

On the one hand taxis and private cars have replaced non-motorised modes, and on other hand public transport has gained clients that previously used of non-motorised modes. The latter is due to the comparably low travel costs of the new public transport system, since a Transantiago ticket allows for travelling two hours within in the entire metropolitan area and includes up to three transfers between modes (see also section 3).

Thus, whereas people previously had to buy at least two tickets for short round trips, now such trips can be done with one single ticket. But even though the shift from non-motorised to (public) motorised modes represents a gain in people's mobility potential, it is disputable from an environmental point of view.

To sum up, the Transantiago has had some negative impacts on people's daily activity and spatial mobility and contributed to the risk of social exclusion, especially of lower-income people dependant on bus-based public transport. The big asset of the Transantiago system does not seem to consist of the new, sophisticated bus system, but of the 'democratisation', i.e. the spatial extension and

▲ **Figure 5:** People's initial easiness / difficulties to organise the trip by accessing relevant information in relation to people's level of education. Source: R. Witter 2012



▼ **Figure 6:** Changes in travel destinations for mandatory and leisure activities since the Transantiago in relation to the *comunas*. Source: R. Witter 2012

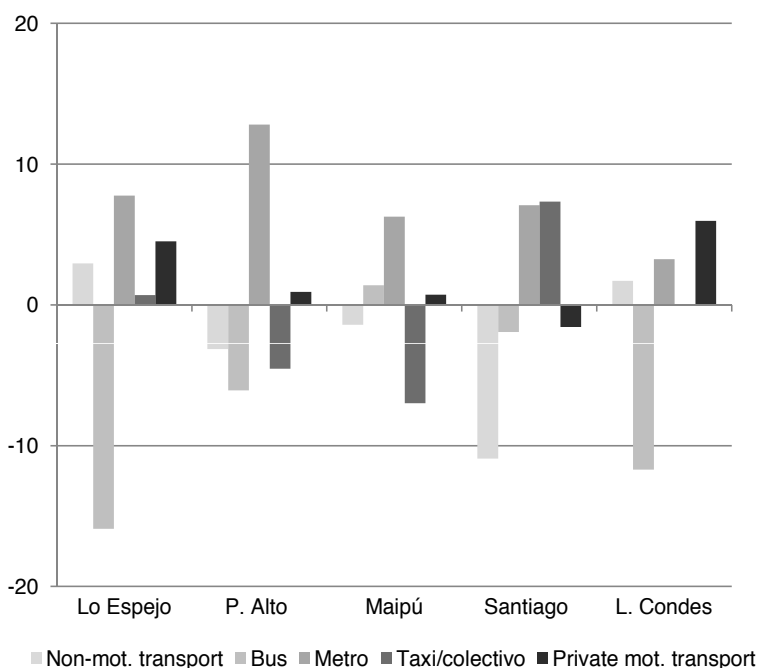


Figure 7: Changes in mode use due to the Transantiago (the 12% of 'explicit changers') in relation to the *comunas*. Source: R. Witter 2012

better affordability, of the metro. Finally, the positive effects of the democratisation of the metro in the context of the Transantiago project make a definitive decision regarding whether the entire Transantiago system has aggravated the risk of social exclusion or not hardly possible.

Figure 8: Metro station in Santiago at morning peak hour. Source: Andre Künzelmann



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Conclusion

The multiple errors of the Transantiago project are not only of technical manner, but also have to do with the abrupt changes in people's travel skills and habits. It is suggested that in Santiago, as in other cities in developing countries and emerging economies, the deregulated bus system had not only disadvantages, but also produced important efficiencies in the context of route exploitation, frequencies and service schedules.

Therefore, the ambitious objectives of public authorities in Santiago to completely abolish this deregulated system were rather counterproductive. In order to prepare the sophisticated bus rapid transit system desired, it would have perhaps been advantageous to depart from the existing operator structure and to stepwise introduce higher quality and procurement standards.

The infrastructure needed could have been developed gradually, whilst the network and operator structure could have been amended step by step. This gradual development could have gone along with comprehensive awareness and education campaigns, in order to make inhabitants understand how to use the future transport system. For instance, the bus rapid transit system 'Metrovía' in the city of Guayaquil was implemented stepwise from 2006 onwards, so "people had time to become accustomed to the system" (TCRP 2010: 34).

In Santiago, the main asset of the new bus rapid transit system is more its integration with the metro system than the improvement of the bus-based transport services. But comprehensive changes of the public transportation system should also improve the performance of the bus system itself, among others by the reduction of door-to-door travel times and the increase of service reliability.

And even though the 'democratisation' of the metro can be considered as a very positive fact, there is still the question whether in so-called 'megacities' a metro system might not be indispensable. While a bus rapid transit system definitely represents an interesting and affordable alternative, it will never provide the same efficiency and capacity as a comprehensive rail-based transit system. Therefore, in Bogotá, the city of the famous bus rapid transit system Transmilenio, people nowadays are once again discussing the need of an urban metro system.

With regard to the – mostly negative – changes in people's activity and travel patterns in Santiago, the crucial role of efficient public transportation in large cities is evident. Even though efficient and affordable (public) transport can only contribute to the habitants' quality of life, its role in the context of social inclusion and cohesion should not be neglected.

With a look at the eminent segregation patterns of Santiago (same as in many other cities in emerging economies), it can be argued that transport policy has also a social goal. This is oriented to equity and equal life opportunities. In order to foster it, transport policy has to be embedded into the framework of urban development and social policies. The latter is obviously a difficult challenge.

The Influence of a Bus Rapid Transit System on Urban Traffic Conditions.

A Case Study of Jakarta

Sunghyun Jang

Der Einfluss des BRT-Schnellbussystems auf die Verkehrsbedingungen in Jakarta

Von der Einführung eines BRT (Bus Rapid Transport) Systems in Jakarta versprach sich die Regierung eine deutliche Reduzierung der Verkehrsprobleme in der stark wachsenden Stadt. Mit einem stetigen Ausbau des Netzes konnte erreicht werden, dass rund 20% der Nutzer_innen vom Individualverkehr umstiegen. Allerdings steigt die Anzahl der Automobile weiter an und eine Ausweitung der Fahrbahnen ist in der dicht bebauten Stadt (auch wegen des BRT) nicht möglich. Ein weiteres Ziel des BRT war die Schaffung gleichwertiger Mobilität für alle Einkommensgruppen. Die bisherige Politik des Straßenausbaus hat eher die Mittel- und Oberschicht begünstigt. Der Artikel zeigt allerdings auf, dass auch das BRT System aufgrund der spezifischen Mobilitätsmuster der ärmeren Stadtbevölkerung nicht das optimale System darstellt, da Zubringerlinien fehlen und die Preise nicht entfernungsabhängig gestaltet sind.

Introduction

Over the past few decades, developing countries have faced unprecedented, rapid urbanisation. Population growth in urban areas places higher demand on transport services and related infrastructure. Motorisation has continued to grow in recent years, a phenomenon which can have negative impacts on urban environments and their inhabitants.

In Jakarta, the capital of Indonesia, the population increased significantly from 4.5 million in 1971 to 9.6 million in 2010 (BPS, 2012). The greater Jakarta metropolitan area, known as Jabodetabek, also experienced a sharp rise of population from 8.4 million to 28 million during the same period (BPS, 2012). This significant population contributed to severe transportation problems. The number of motorised vehicles in Jakarta increased from 1.5 million in 1990 to 12 million in 2011 (BPS 1990, BPS 2012). In contrast, the share of public transportation in Jakarta steadily declined over two decades because of poor service quality such as lack of maintenance and disorderly vehicle operation related to intense competition for passengers (See Rahmah, 2004: 3).

Although the Jakarta government implemented new policies, it was impossible to expect substantial improvement of traffic conditions without a well-managed public transport system. For this reason, the Jakarta government has started to plan and to establish mass transport systems since the 1990s. However, the lack of financial and political capacities made little progress for implementation. Above all, the systems defined by politicians and experts did not match public needs.

A transportation master plan was developed for Jakarta and its surrounding suburbs in 2002. The plan included three main aspects: (1) public transport development, including MRT (mass rapid transit/subways), LRT (light rail transit/monorail), BRT and waterways (waterborne transport); (2) traffic restraint, including high occupancy vehicle zoning, road pricing and parking restraint; (3) network

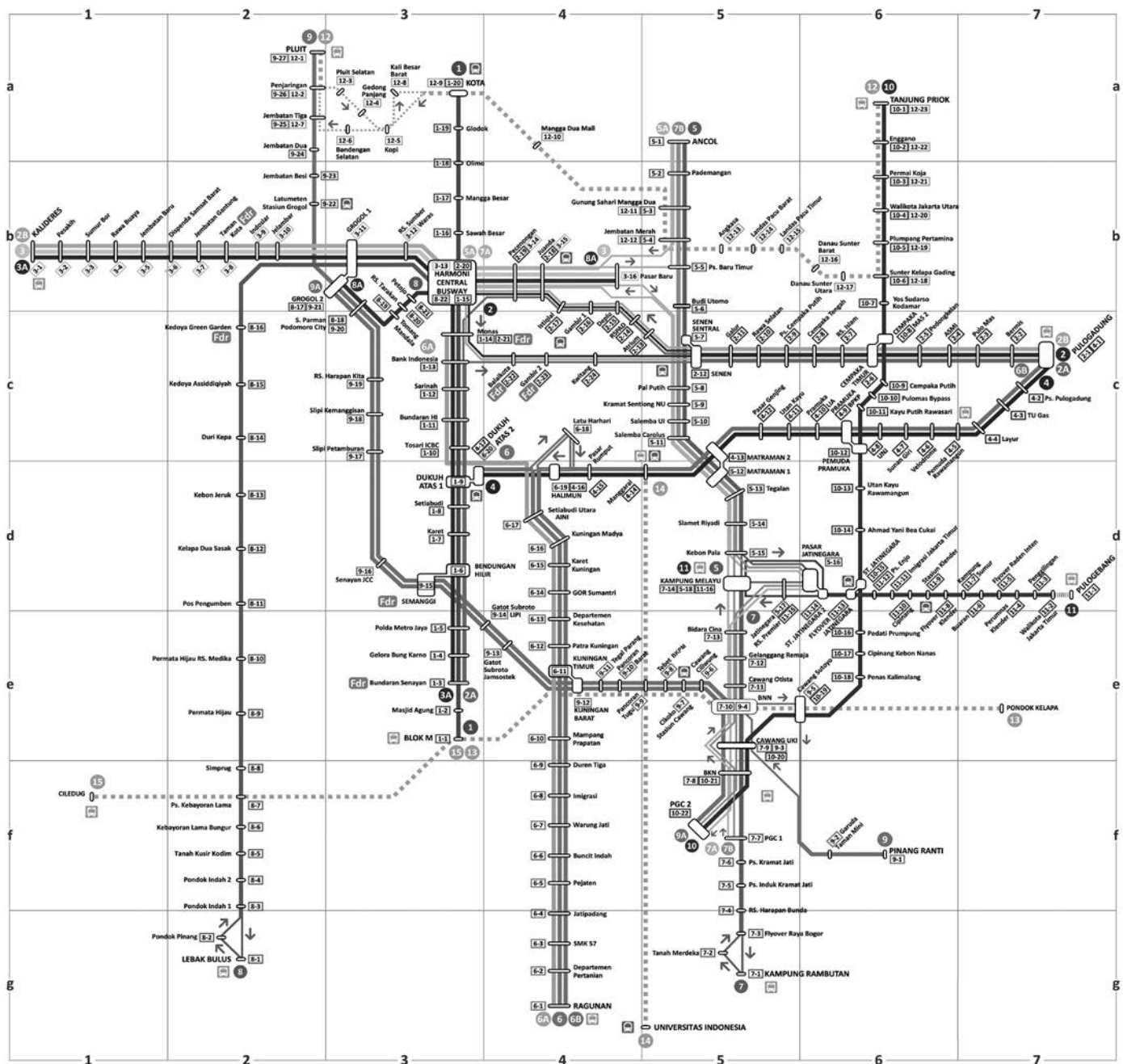
capacity improvement, including road parking optimisation, promotion of NMT (non-motorised transit) and integration of signalling/intelligent transport system (Kogdenko 2011: 40). The Jakarta BRT system first opened in 2004.

This article aims at studying the impacts of this BRT system on urban mobility. It is based on a review of official documents and a literature study. It first introduces the BRT system in Jakarta and then highlights the effects on mode choice and equity.

TransJakarta: The BRT system in Jakarta

Jakarta's BRT system, known as TransJakarta, commenced with a strong commitment from Jakarta's Governor Sutiyoso to create a fast, comfortable and affordable public transport system for Jakarta's inhabitants. In December 2001, Sutiyoso decided to introduce a BRT system, because it could serve transit needs at relatively lower costs and within a shorter construction period compared to other mass rapid transit options. A BRT plan was coordinated with Jakarta's transport master plan. The preliminary plan was to implement a bus way connecting Blok M in South Jakarta with downtown Kota in North Jakarta in December 2002. However, lack of public consultation and financial preparation delayed the plan. In 2003, a visit to Transmilenio Bogotá's BRT system, inspired Sutiyoso to form a task force to implement a BRT system that consisted of five Jakarta agencies plus the three affected local municipalities within Jakarta.

The Jakarta BRT master plan includes 15 corridors to be built in six phases. On January 15th 2004, the first BRT corridor was launched along a 12.9 kilometre route from Blok M to Kota Railway station. The system operation created a very promising situation with increased ridership. In the first year (2004), 15.9 million passengers travelled on the BRT system; approximately 44,000 passengers per day or 3,600 persons/hour/two directions. Following the success of the first corridor, TransJakarta has been extended to 11 lines, crisscrossing the capital and covering 184.31 kilometres with approximately 350,000 daily users.



▲
Figure 1: TransJakarta Map

In April 2006, two more corridors were opened which linked Pulogadung in East Jakarta and Kalideres in West Jakarta with Harmoni in Central Jakarta. Four corridors were added in 2007, three corridors were added in 2008. The 11th corridor was launched very recently in January 2012 and, features an 11.76 kilometre route. The 12th corridor is currently under construction and is projected to be operational by 2013. The final three additional corridors will be developed in the near future.

TransJakarta is a customer-oriented transit combining station, vehicles, planning and intelligent transport system elements into an integrated system. The operating characteristics of TransJakarta can be explained in three points. The first point is the type of buses. TransJakarta consists of 474 single buses and 71 articulated buses. A single bus has a capacity of roughly 85 persons and an articulated bus can carry up to 160 persons. Approximately 90% of their capacities are operational (Akbar 2012: 2). However, given the large population of the city, the ridership of TransJakarta was lower than that of other BRT systems over

the world. To address this problem, the city has increased the percentage of articulated buses to increase passenger capacity. The buses run on two types of fuel: diesel and compressed natural gas (CNG). Except for the diesel-powered buses operating on the first corridor, all of the buses run on CNG. In addition, each bus is equipped with an electronic board and speakers that inform passengers of stops as well as a bi-directional radio transceivers to provide updated traffic conditions for drivers.

The second defining characteristic of TransJakarta is the priority of BRT buses with bus lanes physically segregated from the adjacent roads. BRT lanes are located in the centre of the street and access is prohibited for other vehicles. The exclusivity of BRT lanes ensures much higher capacity and faster travel speeds. BRT stops are designed in the middle of the streets with elevated platforms as well as off-bus fare collection by smart cards or paper-ticketing systems to ensure quick boarding and alighting. The stops are connected by elevated bridges, which make them easily accessible. The design of special

shelters at the stops has improved the safety for passengers.

Finally, TransJakarta emphasises the importance of the affordability for Jakarta citizens. Passengers pay 3,500 IDR (about 35 cents USD) for a single trip. The fare set by the Jakarta government in 2006 is constant regardless of the distance travelled. Additionally, the fare collection system mentioned above permits passengers to change direction or transfer to other corridors without any surcharge, as long as they do not exit the system. The free transfer is attributed to the organisational structure of TransJakarta in which there is no direct contact in transaction or service payments between passengers and operators. Basically, the bus operators are selected from a competitive tendering process. Even though BLU (Badan Pelayanan Umum, Public Service Entity) TransJakarta, which is a public service entity within the government structure, oversees bus operation, buses are purchased and owned by individual operators. They are paid by BLU TransJakarta on a bus kilometre basis. Therefore, financial risks are passed to the municipality and ticket prices remain affordable.

Influences on the mode of choice

Since the inauguration of TransJakarta, the number of BRT passengers has increased 7 times from 15.9 million in 2004 to 114.8 million in 2011 (See El-Amir 2012: 13). With the expansion of BRT corridors, there have been a significant number of modal shifts from private motorised vehicles such as private cars and motorcycles to the BRT system. A survey undertaken by the Japan International Cooperation Agency in 2004 estimated that 20% of all passengers were private motorised vehicle users who had switched to the BRT. In 2006, about 26 % of TransJakarta passengers had switched from using private motorised vehicles (ITDP 2006: 4).

The increase in ridership was caused by the time saved using the BRT system. The average BRT bus speed is approximately 21 km/h. Although it is slower than the 28 km/h targeted, it enables passengers to travel 10~20 minutes faster than conventional buses with a 15~17 km/h average road speed. During the peak hours, up to one hour can be saved by using the BRT system. Another cause of the modal shifts is the extension of 3-in-1 policy to the evening period to restrict automobiles carrying less than three passengers during peak hour traffic in central arterial roads. The limited access for private cars to urban centres played an important role in encouraging citizens to leave their cars and use the BRT to enter to the areas. Consequently, TransJakarta is regarded as one of the great successes among transport policies that have been recently implemented in Indonesia.

Impact of TransJakarta on traffic congestion is, however, limited because it is impossible to restrain the continued high growth of private vehicles ownership and use. In spite of the expansion of BRT corridors, the number of motorised vehicles in Jakarta has maintained an annual growth rate of 11 to 13%. Simultaneously, the exclusivity of BRT lanes has exacerbated traffic flow. TransJakarta was built on the existing roads, which were not widened. The reduced space availability for the increasing number of private motorised vehicles has resulted in a decreased average travel speed in the mixed traffic lanes.

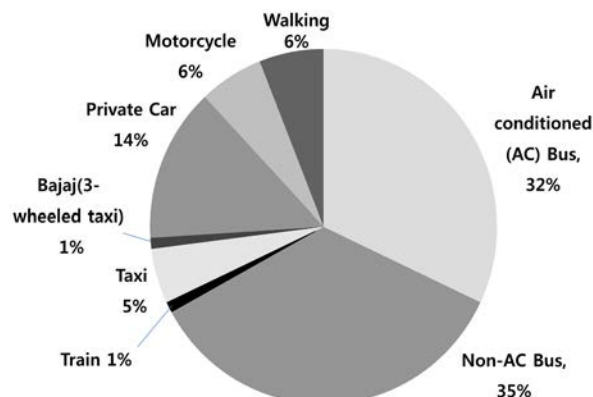
This counterbalanced the influence of traffic reduction by the modal shifts. Moreover, poor land-use management by the local government has accelerated that the capacity of each BRT corridor has reached the saturated point. Jakarta administration has continued to allow commercial property development on areas which is no longer suitable. Social and economic activities that are centralised in the urban centre attract millions of commuters from the surrounding urban sprawl. The saturated capacity of the BRT corridor has forced potential passengers to use private motorised vehicles in the parallel routes, thus declining the quality of service.

TransJakarta and equitable access to mobility

One of the goals in the transport policy of the Jakarta Transportation Agency is to improve mobility for the urban poor population. That means that public transportation should provide better equity among all social levels. In the past, the development of transportation infrastructure in Jakarta was limited to widening of roads. This strategy only improved the mobility of middle- and upper-income groups who could afford to buy and operate private motorised vehicles. Low-income groups had difficulties in getting access to economic and social activities because of the lack of available public transportation and the relatively high travel costs. They relied on non-motorised transit (NMT) and bus-based transit. Even then, the lower income groups spent over 40% of their monthly income on transportation modes (See Rahmah, 2004: 6).

TransJakarta attempted to provide affordable public transportation for low-income groups with reasonable fare levels. Compared with 2000 IDR (about 20 cents USD) of an ordinary bus fare, a fare of TransJakarta is more expensive on average for the same distance. The Jakarta government has maintained subsidies to support a lower morning fare for low-income groups that travel early in the morning.

In the early morning (from 5 a.m. to 7 a.m.), commuters can ride TransJakarta for only 2,000 IDR. As a matter of fact, the government plans to cut the subsidies for the whole system to distribute the money to the poor directly (See Wentzel 2010: 46). This will not be implemented until the level of service is high enough to increase the fare. Nevertheless, some have questioned whether or not these advantages have attracted low-income groups to use TransJakarta. The survey conducted by YLKI (Indonesian Customer Organization) in 2010 indicated that about 45% of the total respondents have a monthly income between 1 million and 2.5 million IDR. Considering the basic



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Figure 2: Previous mode used by BRT Passengers. Source: Hook&Ernst (2005)

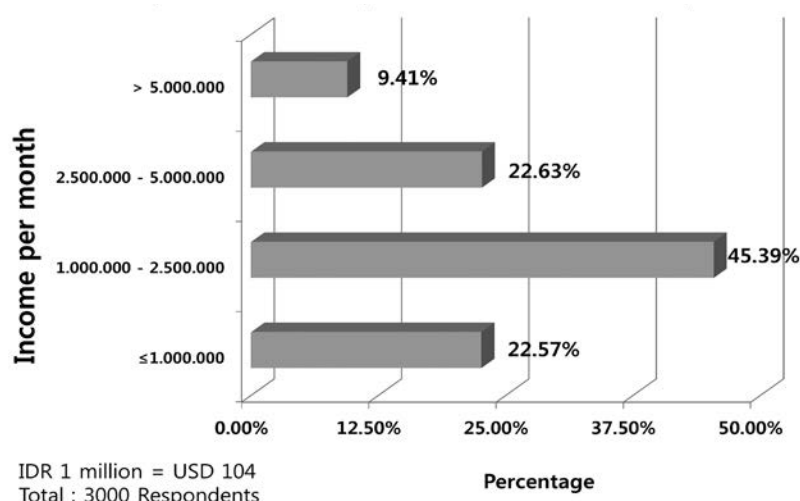


Figure 3: Percentage of BRT respondents/ customers' monthly income in IDR (Indonesian rupiah). Source: L. Wentzel (2010): 46

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living cost in Jakarta, which was 1.3 million IDR per month in 2010, this suggests that most commuters are defined as middle income. Only 22.57% of the survey respondents were under the poverty line, defined as an income below 1 million IDR. Of those under the poverty line, 34.7% are students and pupils (Wentzel 2010: 46). Except for the number of students, the percentage of low-income riders under the poverty line can be lowered from 22.57% to 16%.

The reason for the low BRT ridership rate among low-income groups is the high dependence on other modes based on their travel patterns. Unlike other megacities with slums, Jakarta has no clear income segregation, but low-income groups are slightly concentrated in the northern area of the city. This part of the city is accessed by the corridors 1, 5, 9 and 10. It is difficult to argue that the spatial distribution of BRT corridors is uneven for the urban poor. In general, most low-income citizens have a positive perception of Transjakarta and consider it to be a comfortable and safe way to cover a greater distance (See Wentzel 2010: 46). However, they prefer to use other vehicles such as minibuses, motorcycles and motorbike taxis instead of the BRT system because these modes are more suitable for short distances.

Basically, low-income families tend to live in areas near to their workplaces to minimise transportation expenses. Their residence choices allow minibuses and motorcycles to be more competitive by providing easy access to their destinations for work, school and shopping at less cost. On the other hand, even if free transfer between BRT corridors is possible, the absence of feeder lines often forces low-income groups to pay several times during one journey (See ITDP 2005: 40).

Conclusion

Jakarta has faced rapid urbanisation and motorisation that have negatively affected the lives of urban inhabitants, especially due to severe traffic congestion and environmental pollution. The city has confronted these challenges as well as the need for economic development. A new bus rapid transit system was introduced to overcome an uncontrolled traffic situation. Transjakarta has become an essential part of the solution to these challenges, providing basic mobility and access to employment and community resources for Jakarta's urbanites. The continuous

expansion of Transjakarta has brought about many positive results including: modal shifts from private motorised vehicles to BRT due to the exclusive BRT lanes and the availability of Transjakarta to a range of income groups because of the management system based on subsidies from the Jakarta government.

Despite these advantages, the worsening of traffic congestion in Jakarta reveals limitations of Transjakarta in improving urban mobility. Transjakarta does not substantially reduce the number of private motorised vehicles on the existing roads. For the equity of mobility, the subsidies are not enough to encourage the use of Transjakarta by the urban poor whose travel patterns centre on a short distance. Thus, it can be concluded that Transjakarta, itself, is not able to cope with severe traffic conditions in Jakarta from a long-term perspective.

To complement public transportation based on a BRT system, urban transportation policies should be accompanied by establishing feeder lines that are integrated with BRT to accommodate trips from areas both in peripheries and within urban centres. That is because the improvement of accessibility by feeder lines can stimulate using the BRT system, limiting access of motorised vehicles to urban areas. In cases of successful BRT systems such as Curitiba in Brazil, Quito in Ecuador and Bogotá in Colombia, it has been revealed that the feeder lines play a key role in supplying passengers for BRT systems by improving accessibility and their capacity. Also, integration of the existing transport modes as feeder lines contributed to restrain uncontrolled operation of private transport modes on the existing roads.

This is the reason why most of the cities that designed closed BRT systems with the exclusive lanes shifted from a direct-service system to a trunk-and-feeder system at the same time. However, Transjakarta had operated without a functioning feeder service. Although three feeder lines were launched in 2010, insufficient feeder lines have restricted the range of BRT service areas in view of sustainability and accessibility. This means that without feeder lines, people still choose private vehicles due to the limited access to the BRT system after the expansion of BRT corridors.

In view of social equity, NMT including paratransit and bikes may have potential for feeder lines to sustain Transjakarta. That is because NMT can provide equitable accessibility to social and economic activities for all levels of social groups. In fact, Jakarta's transport master plan states traffic restraint and network capacity by promotion of NMT as one of its goals, but the progress and results have been inadequate. Integrated paratransit and bikes are expected to enhance accessibility for the poor, who do not benefit from the BRT system considering a short-distance travel pattern and reasonable travel costs.

Despite of the need to be complemented by feeder lines, it is clear that in view of the urban growth of Jakarta and its traffic problems, Transjakarta is indispensable to urban mobility as a backbone of public transport system in Jakarta. Therefore, a prospective transport policy should focus on how to successfully integrate feeder lines including the existing transport modes with Transjakarta.

Mobility and Residential Location of the Middle Class in Dar es Salaam

Lisa Reudenbach, Wolfgang Scholz

Mobilität und Wohnstandortwahl der Mittelklasse in Dar es Salaam

Die wachsende urbane Mittelklasse in Städten in Entwicklungsländern ist ein neues Phänomen, welches sich sowohl positiv auf die wirtschaftliche und politische Entwicklung auswirken kann, aber auch mit erhöhtem Ressourcenverbrauch einhergehen gehen kann. Der Artikel zeigt die Schwierigkeiten einer klaren Definition und Abgrenzung der Mittelklasse auf und versucht sie anhand des Fallbeispiels von Dar es Salaam in Tansania zu charakterisieren. Thema des Artikels sind die Mobilitätsmuster der Mittelklasse, ihre Präferenzen für Wohnstandorte und deren planerischen Implikationen. Anhand von zwei Studien nähert sich der Artikel diesem Thema, zeigt die Probleme im Verkehrsbereich der Stadt auf und untersucht die gegenseitige Abhängigkeit von Verkehrsmittelwahl und Wohnstandortwahl. Der Wunsch nach einem eigenen Heim lässt sich in Dar es Salaam aufgrund der nicht ausreichenden Bereitstellung von formalem Bauland und der geringen Dichte der Stadt nur an der Peripherie im informellen Sektor erfüllen, was die Mobilitätsprobleme der Stadt weiter erhöht.

Introduction

An accelerated urban growth combined with rising poverty levels since the 1960s has led to increasing urban problems in Sub-Saharan Africa. Although many Africans still live in rural areas, the urban population is increasing rapidly. Currently, around 40% of the African population live in cities, and the tipping point is predicted to be reached in 2035 with then half of the continent's population being urban (UN-Habitat 2010: 8–9).

Tanzania is a suitable example to study rapid urbanisation. With currently only 26.4% living in urban areas, but an annual urban growth rates of 4.7%, urbanisation is still heavily underway compared to the African average, where urbanisation rates have already decreased to 3.4% (African Development Bank 2011: 60). Dar es Salaam – with more than three million inhabitants the most populous city in Tanzania – concentrates economic power but also social, infrastructure, transport and land-use problems in one place. In a city like Dar es Salaam, residential location decisions and travel behaviour of the residents are highly constrained by long distances, low densities at the peripheries, and poor accessibility. Most of the transport infrastructure is not able to cope with the increasing demand, causing high road congestion and overcrowded public transport (Eickmans et al. 2011: 2).

Another recent development is the emergence of a middle class. Incomes rise along with economic growth, allowing a larger share of the population to consume more than just basic goods. More and more people escaping poverty is a very positive development and the middle classes throughout Africa are discussed as new hope for the continent. However, besides their potential for economic development and democracy, the middle class also has the tendency for higher car ownership as well as higher land and resource consumption, potentially aggravating the already existing problems in Dar es Salaam.

This article analyses travel behaviour of the urban middle class in Dar es Salaam and the role this plays in their

residential location choices. It is based on two separate studies undertaken in Dar es Salaam, Tanzania in 2012.

The study by Lisa Reudenbach (2012) aimed at understanding the reasons of the urban middle class in Dar es Salaam for their residential location decisions and the role of their travel behaviour in these decisions. Nineteen qualitative interviews with members of the middle class were conducted throughout the city of Dar es Salaam in order to find out how the middle class can be characterised, how residential location decisions are taken, what

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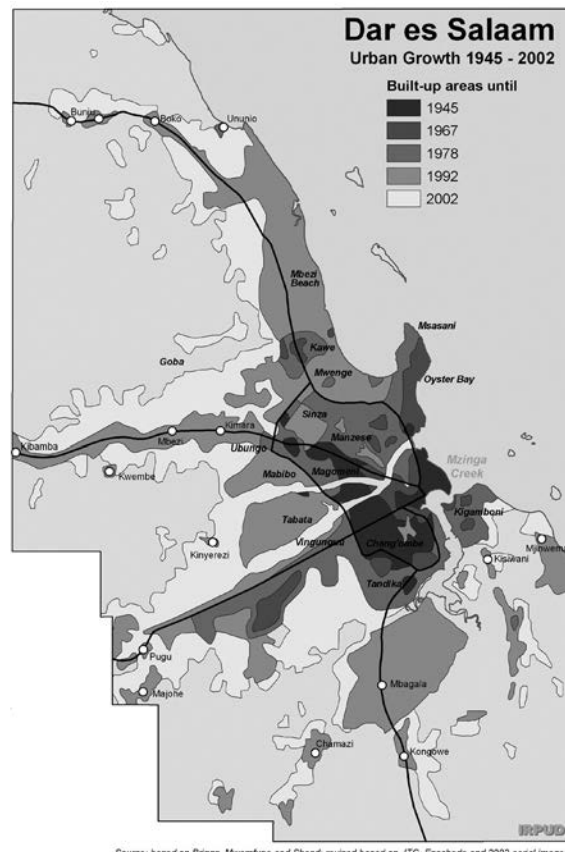
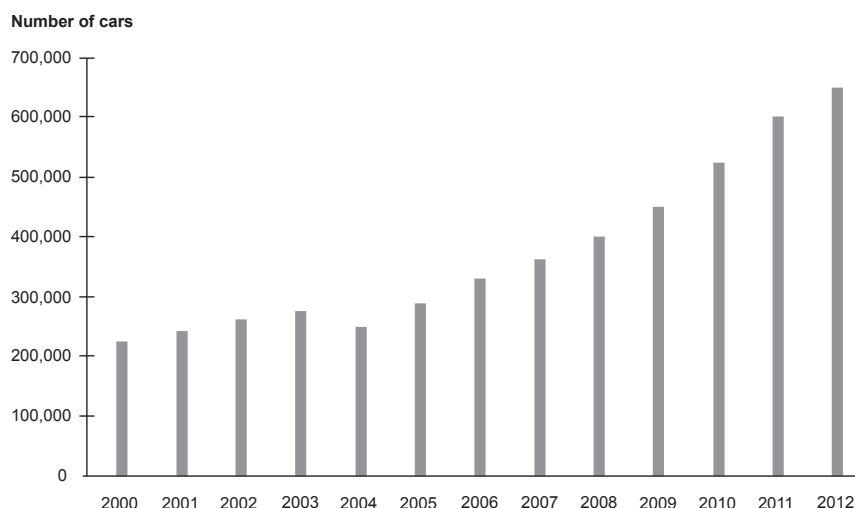


Figure 1: Dar Es Salaam Urban Growth 1945–2002, based on Briggs, Mwamfupi and Shand; revised based on ITC, Enschede and 2002 aerial imagery. Source: Hill and Lindner 2010



▲
Figure 2: Vehicle ownership in Dar es Salaam, 2000–2012. Source: Mrema 2011: 10

characterises their travel behaviour as well as the role this plays in the location decisions.

The study by Wolfgang Scholz (2012) is based on a structured questionnaire (N=60) on travel behaviour and residential location of the formal-sector-employed middle class members aiming at travel behaviour and choices of the transport mode. Obviously, both studies are not representative but provide important insights into the topics.

The middle class

The term “middle class” is commonly used in a wide range of disciplines to describe a group of the population with certain characteristics. However, there is no consensus on the measurement and meaning of the concept of the middle class. It is often not defined by explicit criteria, but is rather described by criteria that do not apply to it or through the differentiation from other phenomena – like poverty or wealth. Settled between these two poles, the middle class is a very heterogenic group with very differing lifestyles, characteristics and biographies, so that a common description is hard to grasp. While some authors try to define the middle class through measurable characteristics like income, occupation or level of education, others use attributes that are hardly measurable, like certain mindsets or behaviour patterns (Burzan 2010: 7–8).

For the middle class in developing countries, a very commonly used concept is the definition by expenditure or income level. However, even using such a clear and measurable definition, there are various ways to define the limits to separate the middle-income class from the lower and upper classes. In addition, they can either be defined in absolute terms or relative to the specific income level of a certain country, as for example done by Birdsall et al. (2000: 3–4).

Alternative definitions, which are not based on income but rather on household assets or durable goods, are used by Filmer/Pritchett (2001: 115–116) and Senauer/Goetz (2003: 1–2). The ownership of certain assets like refrigerators, telephones or automobiles and housing characteristics like number of rooms or type of toilet facilities are used to define a middle-class lifestyle and can be a better indicator.

Accordingly, a definition of the middle class in Dar es Salaam through income or expenditures was not considered as suitable in the context of the conducted studies. This is due to the informal character of many income sources as well as the interrelations within family structures preventing a clear determination of the income or expenditure of an individual person or a household.

The use of aspects that indicate a middle-class lifestyle as shown above is considered more suitable than using a fixed definition. In addition, the middle class is found to possess more economic, cultural and social capital, which provides them with more options in their residential location choices (Limbumba (2010).

The findings from the empirical study by Reudenbach (2012) suggest that the middle class in Dar es Salaam are best characterised by the indicators level of education, mode captivity and car dependency. Mode captivity refers to the degree of voluntariness with which public transport is used and car dependency is seen in the context of the number of people in a household who share one vehicle. In the light of the highly restricted land and housing market in Dar es Salaam, the aspects of tenure type and status of residential area are not found to be expressive indicators for a middle-class affiliation.

Residential location and mobility pattern

Transport, spatial structure and society are aspects that are closely interconnected and there are many developments that significantly impact upon them. Demographic changes, shifts in values and lifestyle variations influence the different demands in regard to transport modes, mobility and housing, which can even change travel behaviour. Alterations in the spatial structure due to, for instance, suburbanisation, and major expansion of transport infrastructure, have led to an acceleration of spatial interactions and a higher accessibility.

At the same time these developments have partly led to social polarisation, dividing societies into the highly mobile ones and the ones that are not able to fulfil their basic mobility needs. (Scheiner 2009: 15–16)

As the location of residence is the starting point for most of the daily trips, it is attributed a high importance in regard to travel behaviour. Different residential locations are characterised by different levels of accessibility. In general, accessibility refers to a potential – the effort required to reach certain resources from a specific location, and the potential results from the spatial distribution of these resources, making accessibility one characteristic of a location. It can be influenced by the distance to the resources as well as by the quality of the transport connections (Beaucire 2007: 2 and Barter 2001: 9).

Due to a lack of affordable and available land in the core areas of many cities like Dar es Salaam, many households decide to or are forced to move to more peripheral areas. The decision for a location in this kind of area involves a trade-off between housing cost and work trip time and cost (Coombs 1981: 228 and Weisbrod et al. 1980: 3). In this regard, a household takes two long-term decisions that have an influence on its members’ daily mobility, the one for a residential location and the one on vehicle

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ownership, influencing a household's action spaces in regard to employment, shopping or leisure locations (Sensbil et al. 2009: 326–327).

Mobility pattern of the middle class in Dar es Salaam

The city's urban expansion mainly takes place along the Indian Ocean towards the north as well as along the major trunk roads in the west and south-west (see fig. 1). Reasons for this spatial expansion are the accessibility provided by the roads and the availability of parallel water mains. The high concentration of commercial and administrative activities in the city centre and cargo traffic to and from the port contributed to the development of a road network in radial pattern around the city centre.

There are various types of different settlements in the city of Dar es Salaam preferred by the middle class. Some are typical middle-class areas, mostly planned areas from colonial and post-colonial times (as Msasani, Sinza, Mbezi Beach), while others are well-located informal settlements where also middle-class households can be found (around Mwenge) and others are completely mixed areas (like Kawe). Generally, there is a tendency of the middle class to build their own house in newly developed areas at the periphery (like Goba, Bunju, Kibamba).

Transport is one of the infrastructures which has not been able to keep up with the high population growth in the city and which has always struggled to meet the demand. Out of the 2000 km of roads in Dar es Salaam, only one forth is a tarmac road (Mrema 2011: 4ff). There is a general lack of maintenance, leaving most roads in a severely deteriorated state (International Association of Public Transport et al. 2010: 17 and Mrema 2011: 4) and causing congestions on the few tarmac roads.

Most people in Dar es Salaam use public transport to get around the city. Around 60% of all trips are done in this mode. Non-motorised transport (NMT), like walking and cycling, accounts for 26% of the trips, while private cars and motorcycles add up to 11%. The remaining 3% are taken by other modes, like taxi (Kumar/Barrett 2008: xi, Geyer 2011: 154 and International Association of Public Transport et al. 2010: 21). Another study by Mrema (2011) counts public transport only at 43% while NMT covers 45%. Public-transport users usually use different modes of transport during their entire trip, which can explain the contradictory numbers.

Public transport in Dar es Salaam is entirely road-based with a system of minibuses – the so-called *dala dalas* with a capacity of 16 to 35 passengers (Kumar/Barrett 2008: 65–67). Estimations suggest numbers of 7,000 to 8,000 *dala dalas* on Dar es Salaam's streets, covering routes with lengths of 3–39 km. With the rapid growth of Dar es Salaam's population as well as the built-up area, population has dispersed, with more people moving from the city centre to the periphery and thus increasing the travel demand. However, the necessary resources are missing to satisfy this need. As a result, public transport does not raise quality of life for the city's residents and even impacts negatively on the environment and health through emissions and frequent accidents (Kumar/Barrett 2008: xiv and Kanyama et al. 2004: 141–144).

Due to the fact that small buses are needed in a much greater number than regular buses in order to transport the same number of passengers, the fleet of *dala dalas* contributes to high congestion for the city, especially during peak hours. Mean speed on the road network is only 26 km/h, causing an average travel time of 76.5 minutes per trip (Geyer 2011: 154).

The study undertaken by Scholz (2012), however, revealed a total travel speed including ways to the bus stop and waiting time by public transport as low as 11 km/h only. The tremendous difference can be explained by the specific target group of his study, namely residents with a permanent job who commute during peak hours.

The estimations of vehicle ownership in Dar es Salaam indicate a dramatic rise from 26 vehicles per 1,000 inhabitants in 2005 (Pendakur 2005: 13) to 73 vehicles in 2010 (International Association of Public Transport et al. 2010: 17). The total number of cars during the last 12 years demonstrates the immense increase, especially in the last five years, which can be seen as an indicator of a growing middle class (fig. 2). This surge might also have been another contributing factor to the high expansion of the city, since more people are able to travel longer distances; or, contrarily, the high urban expansion and low capacity of public transport even enforced vehicle ownership.

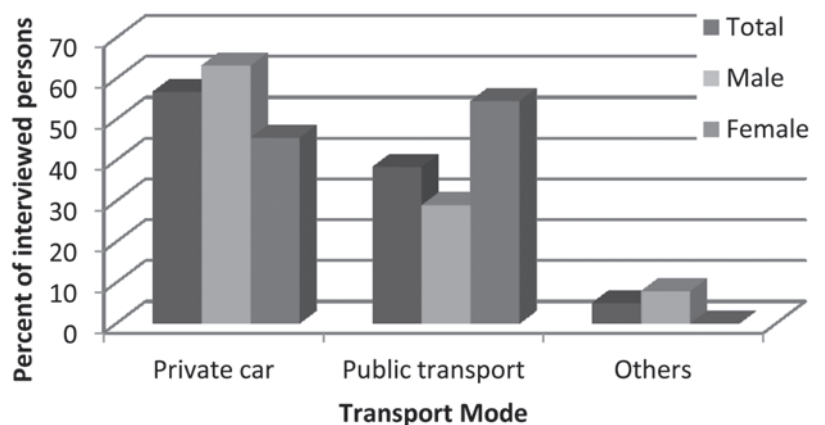
Although not being representative, the study undertaken by Scholz suggests that the mobility pattern of the middle class differs from the overall average and goes in line with the increasing number of cars (see fig. 3). According to this study, 55% use a private car and only 35% public transport. The lower percentage of female using private car can be explained by a lower income and/or the domination of the husband to use the family car. Concerning car ownership, Reudenbach (2012) reveals that about half of the respondents own one car in the family, one out of three even two cars.

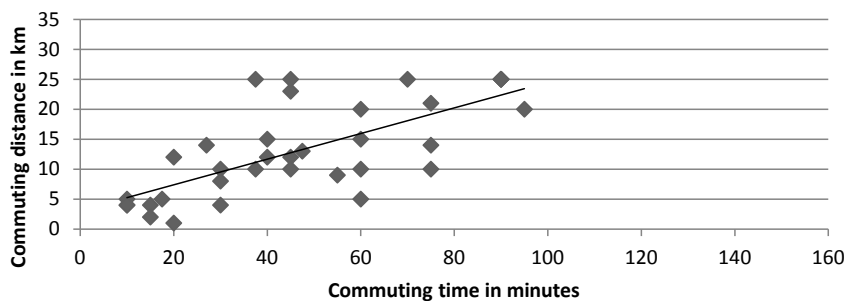
When looking at those members of the middle class who use the public transport system, the reasons are rather of practical matters (Reudenbach 2012): they use public transport only when they encounter some kind of problem with their car or because of economic considerations – for instance taking the bus on days they do not have to be at work very early or when they do not have to carry much, in order to save some money. Only one of four chooses public transport voluntarily, for example because it is more practical to move around in the city centre by bus due to the lack of parking spaces there.

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Figure 3: Transport modes of the middle class.
Source: Scholz 2012



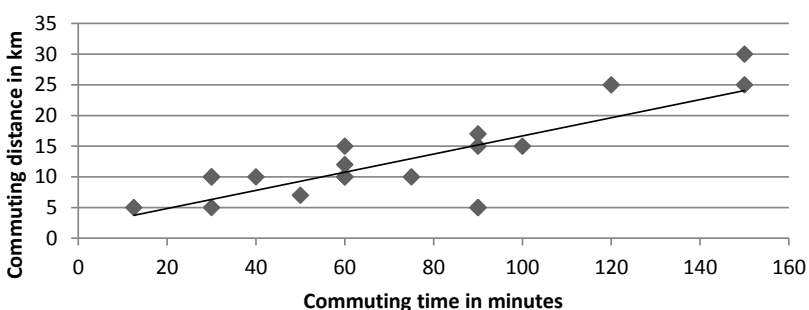


▲ **Figure 4:** Commuting time in relation to distance – private cars. Source: Scholz 2012

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▼ **Figure 5:** Commuting time in relation to distance – public transport. Source: Scholz 2012



To analyse the efficiency of the transport system in Dar es Salaam in relationship to the urban structure, it is useful to look at the commuting time in relationship to the travel distance. For ¾ of the interviewed persons in the study of Scholz (2012), the commuting distance is below 15 km; however, for almost 20% it is already above 21 km. The average commuting distance is 13 km among all respondents, regardless the use of public or private transport. The commuting time one way is, in comparison, for 2/3 still below 1h, but for 20% it is more than 80 min. The average commuting time is 55 min with a great variability between public transport (73 min) and private transport (46 min). For all commuters, the transport situation in Dar es Salaam causes almost a waste of two hours of productive working time.

The average car speed is 17 km/h according to the study of Scholz (2012), however with a large variation: 25 km can take 40 min or 90 min, 10 km 30 min or 70 min (see fig. 4). The location of origin or destination inside the road network including the impacts of traffic jams has a great impact on the commuting time. For public transport users the impact is even more relevant: for 10 km it can be 30 min or even 75 min (fig. 5). However, the difference between private and public transport is not as high as expected since both are affected by the same traffic jam.

In addition to high commuting times, life in the peri-urban zone is found to cause higher monthly expenditures for transportation. Altogether, private car users have a monthly expenditure for transport of over 100,000 TSh, while half of the public transport users spend between 50,000 and 100,000 TSh (100,000 TSh = 46 €). Additionally, use of public transport is more constrained in these areas of the city due to the lack of frequent buses.

Residential location decisions of the middle class in Dar es Salaam

The circumstances in which residential location decisions are taken by the middle class in Dar es Salaam seems to be strongly influenced by the restricted and highly informal land and housing market. However, as the study

undertaken by Reudenbach (2012) shows, the middle class is comprised of people with varying attributes and they are restricted to different degrees by the special problems of the city. Depending on their characteristics, preferences and requirements, they are partly able to avoid the restrictions posed by the developments in the city, making their way through and fulfilling their needs.

A variety of different aspects was discovered to be important when searching for a new house. Most aspects mentioned were related to the neighbourhood, such as a nice and quiet environment, the supply with infrastructure and social services in the neighbourhood or security issues, the price and availability of land and the size and quality of the house. Accessibility-related aspects, like the linkage to the road system, the distance to the city centre, to relatives or to other important activities as well as the public transport connection were mentioned less by the respondents. It seems that most members of the middle class in Dar es Salaam are willing to trade-off accessibility for a nicer and safer environment as well as more spacious houses and plots with sufficient facilities (Reudenbach 2012).

Although life of Dar es Salaam's residents seems to be severely restricted by the transport situation, this aspect plays a minor role in many residential location decisions. Accessibility is an influencing factor in the assessment of a location for only a part of the middle class (Reudenbach 2012).

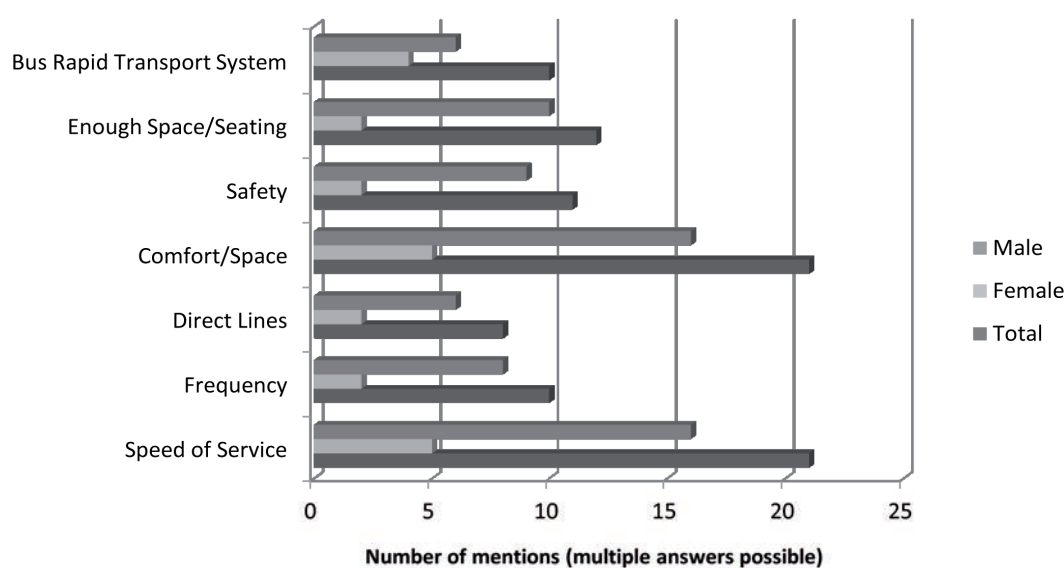
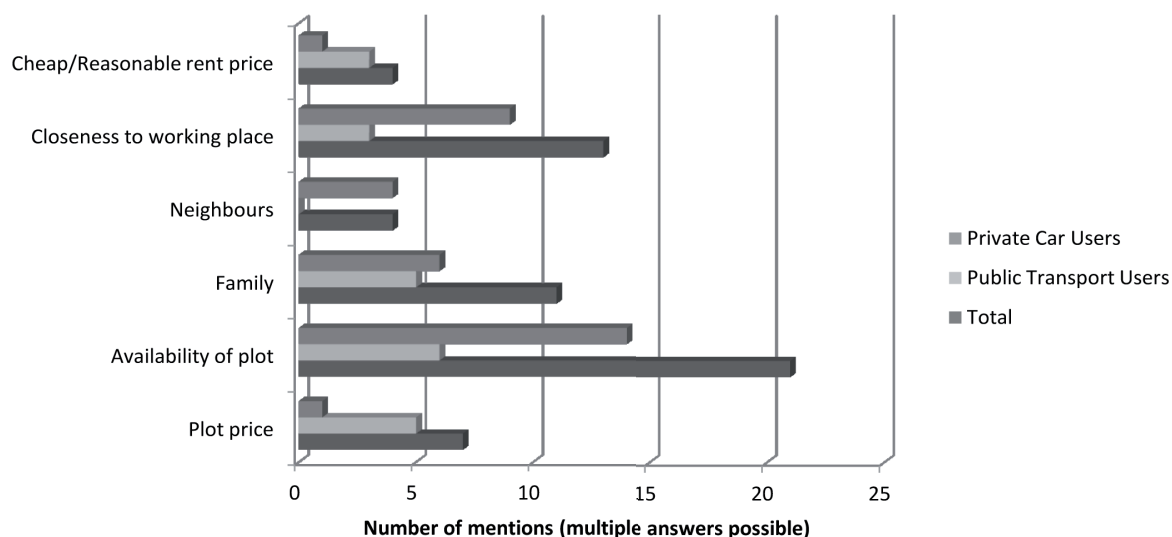
The study by Scholz supports this through the finding that the availability and affordability of a plot to build is the main factor for residential locations. Therefore, respondents did not care about the long work trips and high transportation expenditures when searching for their "dream home", due to the shortage of land (see fig. 6).

Among the respondents who stated that they would prefer to live in a different area, 2/3 have the highest overall times spent in traffic with more than two and a half hours per day. However, they did not state the poor transport situation as reason of their wish to live in a different location but stated that they would prefer to live even further outside of the city in order to have more space (Reudenbach 2012). The study by Scholz (2012) supports this, as it finds the commuting time not to be the reason for the decision for or against a certain location.

Conclusions and implications for Dar es Salaam

The two studies underlined the negative impact of the current transport system for the life of the residents in Dar es Salaam, both for users of private cars as well as public transport.

The studies also revealed that the low density of the city (only 260 inhabitants/ha) and the tendency of the middle class to choose a residential location at the periphery with long commuting distances increases the transport problems. The individual choice of the residential location is taken without much consideration of the impact on the daily commuting situation. The wish to have a nice house on a large and affordable plot in a decent neighbourhood is greater than the awareness of the impact on their daily commuting.



The strong urban growth taking place in Dar es Salaam by itself is not a negative development, as urbanisation is also associated with rising human development, better employment opportunities and higher living standards. However, these positive effects require well-devised urban policies that are able to guide urban growth in a sustainable direction.

Especially for the problems of high informality in land use, the shortage of formal building land in suitable inner-city locations, the trend to suburbanisation and the problematic transport situation, solutions are urgently needed. The city has to find a way of providing sufficient land and housing for its growing population closer to the inner city at a higher density and of enabling the urban dwellers to move around the city in an efficient and affordable way.

The planned BRT system (see article by Holzwarth in this issue) can help to address the transport problem. It could be a suitable solution not only for the middle class and would serve as an adequate alternative to individual car use, as it would be more comfortable and reliable than the existing public transport system with lower costs compared to the costs for a private car. However, a shift towards public transport has to consider the current preferences of the middle class to use a private car.

Fig 7 clearly states under which conditions middle-class members would consider the use of public transport. If it can provide a reasonable speed of service and enough comfort and space, about 40% of the users of private cars are willing to switch to the public transport system.

These are the key issues to address for a potential future switch towards public transport, which goes hand in hand with the need for solving the urgent land-use and housing issues.

However, the current residential preferences of the middle class can, in most cases, only be achieved at the periphery and therefore not be changed by a BRT system. Suburbanisation could even be supported by the introduction of a BRT system, depending on the length of the network into the urban fringe.

Unlike the situation in Nairobi, for example, where apartment blocks are seen as an option for the middle class, in Dar es Salaam the trend goes to single family houses at the periphery. In order to stop this mostly informal suburbanisation and the urban sprawl at Dar es Salaam's periphery, a strict land-use control through the planning authorities and the provision of formal building land are needed.

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Figure 6: Reasons for the selection of the residential area in relation to transport mode. Source: Scholz 2012

Figure 7: Aspects for considering a change to public transport. Source: Scholz 2012

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Bus Rapid Transit Systems for African Cities

Stefanie Holzwarth

BRT-Schnellbus-Verkehrssysteme für afrikanische Städte

Eine Lösung der Transportprobleme in vielen Afrikanischen Städten gehört zu den Hauptaufgaben der Stadtplanung, um die Wirtschaftskraft und Lebensbedingungen in den Städten zu verbessern. Eine Möglichkeit bieten hier Bus Rapid Transport Systeme (BRT), die auch in Afrika Einzug gehalten haben. Anhand von Fallbeispielen in Lagos, Johannesburg, Kapstadt und Dar es Salaam zeigt der Artikel Vor- und Nachteile unterschiedlicher BRT-Systeme auf und definiert Rahmenbedingungen für eine erfolgreiche Umsetzung. Dabei werden die Standpunkte der Nutzer_innen als auch der bisherigen Anbieter, meist Minibusbetriebe, einbezogen.

Introduction

Rapid population growth – due to natural increases and rural-urban migration – is one of the major problems in African cities. Africa is and remains one of the fastest urbanising continents of the world.

Although massive investments have been made in many African cities, the road infrastructure and transport service delivery has often been unable to keep pace with this population growth. Most cities face severe transport-related bottlenecks. Policy responses to solve the traffic problems have been scarce. “Weak, fragmented, and under-funded authorities have been unable to maintain existing services or to plan for expansion” (Kumar and Barrett 2008: ix).

The majority of the urban dwellers depend on available and affordable public transportation. However, over the last decades, a widespread downfall of formal public transport services can be observed. Privately-operated, often informal minibuses are the most popular mode of public motorised transport in many cities. Besides the positive fact that the minibus taxis are able to serve a dense transport network and are characterised by a high rate of operational flexibility, they are notorious for their

poor safety records, which are a result of overcrowding and reckless driving (Kumar and Barrett 2008: 10f).

Efficient transport is not guaranteed in most cities in Sub-Saharan Africa – resulting in low productivity levels of the respective economies and societies. Strong interventions and innovative, cost-efficient, affordable and sustainable solutions are urgently needed – such as bus rapid transit (BRT). Otherwise the traffic problems will rise, private motorisation rates will increase, social exclusion will worsen and emissions will steadily rise.

Bus rapid transit systems

“BRT is a high-quality road-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. The quality is near a rail-based system, but at a fraction of the cost” (Hertel 2008: 9).

BRT systems are primarily characterised by measures, that target at the optimisation of transport time and capacity as well as at an overall improvement in service. To which extent the characteristics are actually utilised within a BRT system strongly depends on the local circumstances. The implementing cities have to consider the feasibility of the attributes within time, cost and capacity constraints.

Taking into account to what extent the key characteristics are applied, three developmental stages of BRT systems can be distinguished: BRT-Lite, BRT, Full-BRT. BRT-Lite is characterised by partly segregated lanes, improved travel times and clean vehicles, whereas BRT already operates on fully segregated busways and has a pre-board fare collection. Full BRT systems additionally offer metro-quality service, are integrated into the network of routes and corridors, and provide a superior customer service (Wright/ Hook 2007: 12).

Current and planned BRT systems in Africa

Over the last years, BRT has emerged as a fast-growing approach as many cities seek low-cost, sustainable urban

Figure 1: Afternoon's high traffic volume on Morogoro Road, Dar es Salaam. Photo: S. Holzwarth 2012



transportation approaches. Particularly the number of BRT systems in the developing world increased rapidly over the last years (see ALC-BRT/ EMBARQ 2012). But despite the success of BRT in Latin American and Asian cities, BRT systems in comparable African cities are still limited in number.

The BRT systems of Lagos and Johannesburg are currently the solely fully operating cases in Africa. The BRT project in Cape Town is in the pipeline, whereas the BRTs of Dar es Salaam as well as in the East African cities of Kampala, Nairobi and Addis Ababa are recently in different stages of the planning cycle.

Fully operating BRT systems, Lagos, Nigeria, BRT-Lite

Until the late 1990s, Lagos was the only city of more than 10 million dwellers to lack a regulated and efficient public transport network. Transport was considered as one of the most pressing issues in Lagos State. In order to address this problem, in the year 2003 the government established – with the support of the World Bank – the Lagos Metropolitan Area Transport Authority (LAMATA).

For the BRT-Lite, a public private partnership strategy was applied. The responsibility of the project has been divided among the Lagos government (for infrastructures), LAMATA and suitable bus operators. The Lagos BRT now carries around 200,000 passengers daily on a 22 km corridor (see figure 2). The Lagos BRT is considered a “BRT-Lite” since not all attributes of a full BRT system are applied (only 60% on segregated lanes).

The introduction of the BRT in Lagos brought along many positive impacts such as improved reduced travel time, increased safety and comfort, and reduced travel costs. Given the achievements within the short timeframe, the Lagos experience is unique.

The success can be traced back to the following factors:

- Early study tours to Latin America helped the steering group to become inspired by best practices;
- Clear and consistent political commitment and cooperation among ministries and;
- The distribution of responsibilities among public and private bodies helped to avoid overburdening of one single actor;
- Appropriate regulatory framework by LAMATA;
- Eco bank Nigeria supported operators to pay off over two years the vehicles due to a counterpart risk;
- A community engagement programme ensured that BRT was seen as a community project and that LAMATA was not seen as a “faceless” organisation;
- An integrated marketing strategy;
- Many existing operators were retrained for BRT services. (see Mobereola 2009; UITP 2010: 8; see Dairo/ Brader 2009.

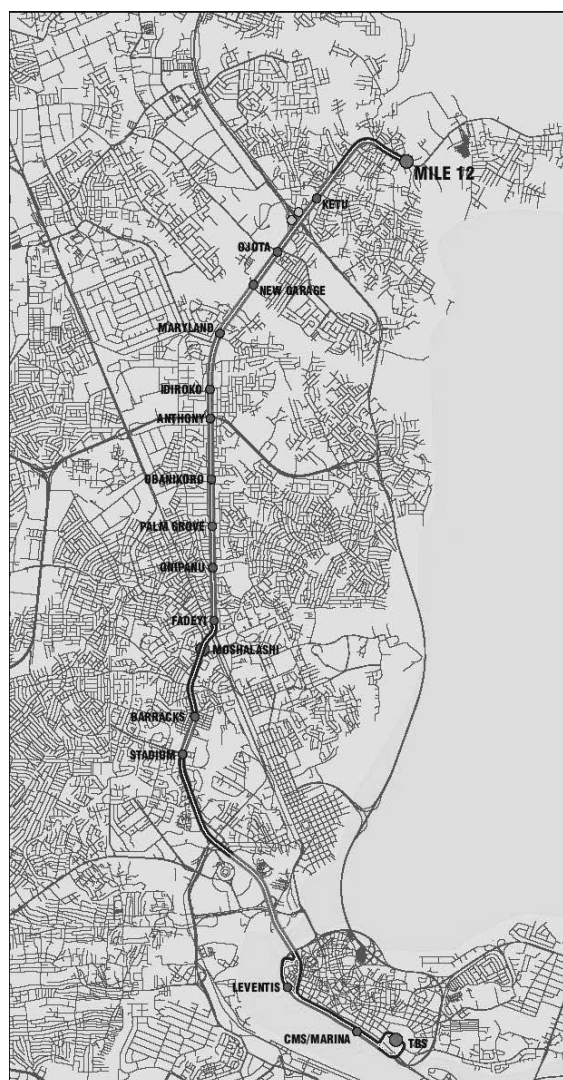


Figure 2: The 22 km BRT corridor from mile 12 to Lagos Island. Source: Mobereola 2009: 8

However, only a limited percentage of private car users shifted to BRT. The new bus system seems to have mainly captured the former minibus users – but could not convince many car drivers. Particularly during peak hours, demand considerably exceeds supply. The BRT-Lite in its current form illustrates only a pilot scheme from which improvements and extensions will be made. Currently, efforts are being undertaken to upgrade the BRT-Lite to a full-fledged BRT.

Nevertheless, Lagos BRT-Lite demonstrates a public transport project successfully implemented in a challenging context (limited funds, very high demand, etc.) and therefore might be a reference case for those African cities seeking to develop a cost-effective BRT-Lite (UATP 2010: 119–125).

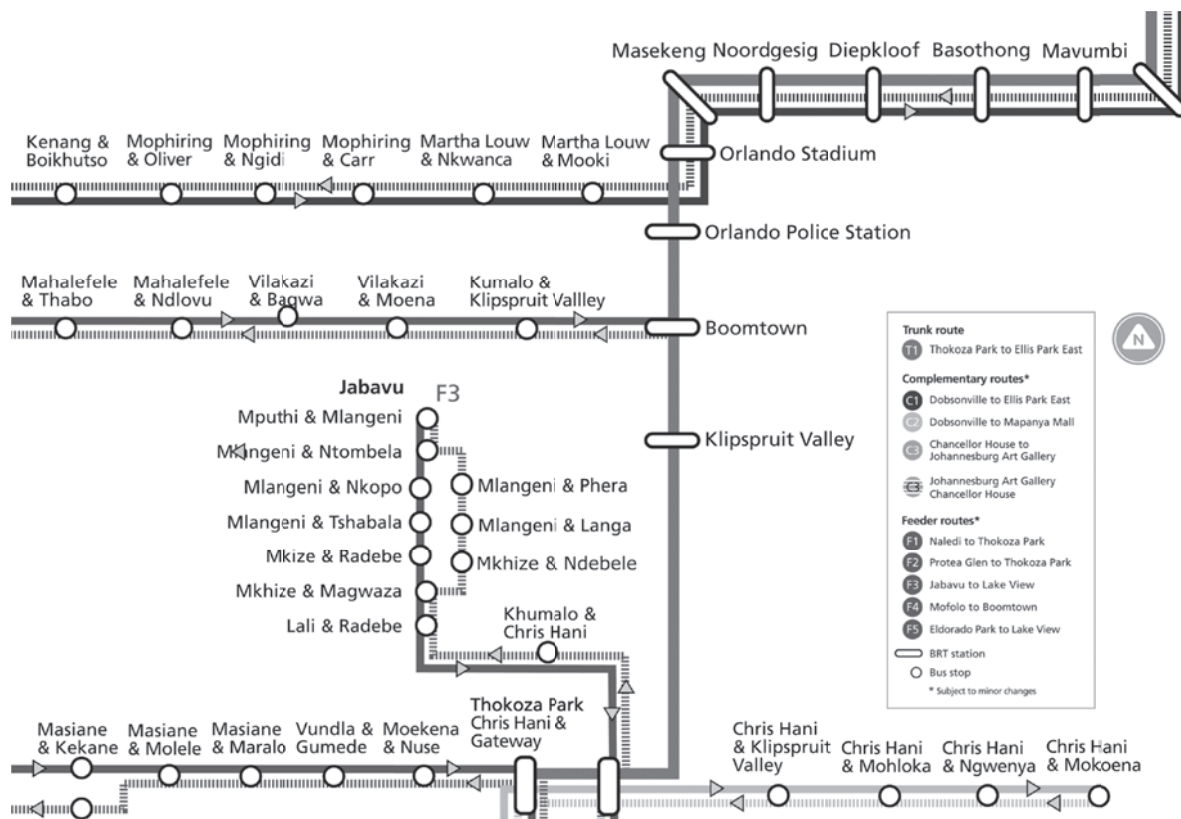
Johannesburg, South Africa, Rea Vaya Full-BRT

Stimulated by the transport needs which arose from the Football World Cup 2010, Johannesburg decided to introduce BRT systems rather than other mass transit systems because of its lower cost and the higher flexibility. For many years, Johannesburg tried to come up with new transport solutions that would not only be safe, efficient and affordable, but would also improve the overall quality of life of its inhabitants. In the year 2006, the city started planning for a BRT. Starter services of the Full-BRT system Rea Vaya (“We are going”) began on 30 August 2009.

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Figure 3: Rea Vaya route map 2013 (section). Trunk routes, complementary routes and feeder routes. Source: Rea Vaya website, <www.reavaya.co.za/images/stories/2009pdfs/route_map_latest.pdf>



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The BRT recently carries 42,000 passengers daily on a 25.5 km corridor and provides links between townships and central Johannesburg (phase 1A, see figure 3).

The full phase 1 will comprise 122 km and 150 stations and shall be finalised by 2013. Until 2020, the city plans to roll out the BRT system (see Rea Vaya 2012).

In Johannesburg – as in the case of Lagos – the responsibility of the BRT is shared between the public and the private sector. The city paid for most of the infrastructure and is engaged in scheduling and marketing. On the private side, a full-fledged bus operating company (BOC) took over the system – consisting of some of the minibus operators who previously used the routes (Candiracci et al. 2010: 16).

To date, Rea Vaya has brought numerous benefits to the city (see Rea Vaya 2012). The success has been influenced by various factors:

- An institutional reform leading to increased project efficiency;
- Study tour of the officials to the Colombian cities of Bogotá and Pereira;
- Strong political commitment and a unified vision among governmental bodies;
- Green-technology buses contributing to sustainable development;
- Environmental impact assessments ensuring that construction would not negatively impact the livability of the city;

- High-tech efficient BRT system (fare system, passenger information system and GPS);
- The establishment of a technical BRT steering committee (which involved the city and the minibus taxi associations) for regular dialogue;
- Provision of training to minibus drivers on skills needed for BRT service, however, not all former drivers could be absorbed by the new system;
- A smart-card (ticket) ensuring smooth link between the various transportation systems;
- Accessibility of people with disabilities and mothers with children (access ramps, etc.);
- A public education campaign on positive impacts of BRT and road safety;
- Video monitoring and an increased police presence enhancing security (see UITP 2010: 12; see Seftel 2010).

Despite many benefits of the BRT, severe challenges were faced during the development of Rea Vaya. Even though the significant role of the integration of the minibus industry was recognised and collaboration was encouraged from early stages on, severe problems arose because some minibus operators could not be integrated in the new system. Rebel taxi drivers started to shoot at their former colleagues who had been retrained to drive the BRT buses (see O'Connor 2010).

The minibus industry was not the only opponent of the system. Residents of Johannesburg's wealthier suburbs

in the north also opposed BRT. They expressed concerns about increased traffic, pedestrian safety, air and noise pollution, increased crime rates and devaluation of properties. This suburban opposition to the BRT can be considered as a symptom of the racial and class divides that persist in post-Apartheid South Africa (see Carrigan 2010).

A challenge which arose in the early operational phase was maintaining the bus schedules. Other motorists started to use the dedicated BRT lanes. In addition, private cars have parked at stations, forcing some buses to load and off-load before or after the station (Seftel 2010: 5).

The BRT network was supposed to ensure that the system feeds into existing transport networks. However, the modal integration remains poor despite all the efforts undertaken. This lack of modal integration (among other issues) makes public transport in Johannesburg relatively expensive. In addition, strikes on employee remuneration of Rea Vaya drivers leave commuters regularly stranded and without BRT service provision (see Times Live 2012).

Although the BRT came along with severe challenges, the Rea Vaya BRT is an innovative, clean, high-tech, high-capacity and relatively low-cost public transport solution that can significantly improve urban mobility. Particularly the application of the “green” technology can be seen as a flagship model for other African cities.

BRT system in expansion, Cape Town, South Africa, MyCiTi BRT

Since 2007, Cape Town has been working towards a well-run and inclusive city – one in which public transport is accessible to all communities. The decision to implement such a system was prompted by the recognition that the fragmented and non-integrated public transport services are unsustainable. Therefore, the city currently is implementing the first phase of an integrated rapid transit (IRT) system by which all current transport modal options will be integrated into a coherent package. One component of the IRT system is a bus rapid transit – the so-called MyCiTi BRT system (City of Capetown 2013)

Even though it is still very early to draw long-term conclusions about the impact of this transport system, some observations can be made. MyCiTi – so far – brought along various benefits to the citizens of Cape Town. Of particular importance is its inclusiveness that is shown in various design features. Disadvantaged passengers, such as elderly or disabled individuals, enjoy modern and low-floor buses, priority seats, boarding ramps and optimally designed bus stops (see Smit 2012).

Despite the great opportunities that MyCiTi offers to Cape Town, some challenges arose during planning and implementation. Goldwyn (2013) identifies lower than projected ridership as one big threat to the long-term viability of the system. The current inability to sustain itself financially is the main cause of delayed construction work for network expansion.

Despite some challenges that MyCiTi is currently facing, the system has the potential to become a modern, world-class public transport system that will benefit all residents and is characterised by excellent customer service.



BRT system in construction process, Dar es Salaam Rapid Transit – DART

Public transport in Dar es Salaam is lacking efficiency, professionalism, quality and safety. The main reasons are the rapid urbanisation, the poor state of the vehicles and the non-adherence to traffic rules (Dar es Salaam City Council, 2013). In consideration of that, the city officials initiated a bus rapid transit. After 10 years of project initiation and planning of the Dar Rapid Transit System, the German company STRABAG International has finally started the construction work. DART Phase 1 – connecting Kimara, Ubungu, Morocco, Kariakoo and the Ferry Terminal will consist of 20.9 km, 29 stations and 5 terminals (see Mlambo 2012: 16). The end of construction of phase 1 is planned by the year 2015. However, progress along Morogoro Road is still in an infant state (Schwender 2012: 1).

The project is very ambitious. It shall extend to most areas of the city (see figure 5). A daily passenger ridership of 200,000 passengers (20% of the daily bus trips) is expected in the future (DART 2008 a.). The system strongly aims at the integration of non-motorised transport such as high-quality pedestrian and bicycle facilities along the BRT corridors.

In Dar es Salaam, institutional and political circumstances led to the delay in the project implementation. In addition, some minibus owners are government officials – resulting in lower levels of commitment for BRT. Despite readily available international funding and technical expertise for BRT, the existing fragmentation of bureaucratic and transit operating structures has added to the delay of the implementation of the BRT (Stewart, 2011). In addition, challenges related to expropriating property for bus terminals and depots arose. Compensation measures turned out to be difficult to implement in the case of Dar es Salaam (Stewart, 2011).

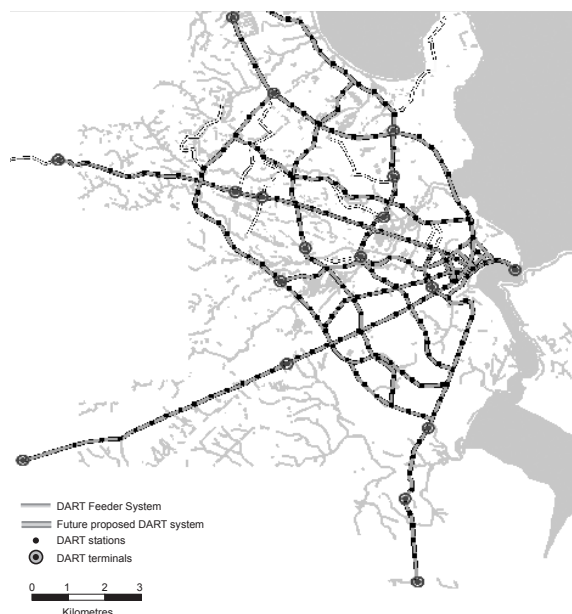
Nevertheless, the long-term feasibility of DART seems to be auspicious. The dense corridors and high demand for the system (e.g. corridor along Morogoro Road) are expected to make the system financially sustainable without government subsidy. That is a crucial aspect for Sub-Saharan Africa and illustrates an example where BRT is possible with limited financial resources.

▲ **Figure 4:** “Asante kwa kuelewa” (Thanks for your understanding) - Current BRT developments on Morogoro Road, Dar es Salaam. Photo: S. Holzwarth 2012

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Figure 5: The proposed BRT system will extend to most areas of Dar es Salaam. Source: Takule 2010: 28



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Other African cities with an interest in BRT

The project “Sustainable Transport for East African Cities” (GEF Sustran East Africa) is funded by the Global Environmental Facility (GEF) and was introduced in January 2011. Among other projects, Sustran aims at the implementation of demonstration corridors of BRT in the three capital cities of Ethiopia (Addis Ababa), Uganda (Kampala), and Kenya (Nairobi).

Besides that, the project dedicates a large portion of its efforts in building capacity of the governments and bringing together the ideas and strategies of different stakeholders. The regional nature of the project facilitates trans-boundary exchange as well as incites the governments to strive for fast and sustainable solutions. Ideally, the project might also provide stimulation for replication beyond the borders of East Africa.

Despite the efforts of Sustran, progress in East Africa has been slow so far due to institutional inefficiencies. Some of the city departments are not interlinked and responsibilities are not clearly defined (see GIZ-SUTP 2012).

In other cities such as Dakar (Senegal), interest was expressed and BRT was already assessed as one possible solution to solve the urban transport problem. However, despite some planning activities and feasibility studies, not much progress was achieved so far (Hertel 2008: 12).

Benefits and barriers of the BRT in Africa

The African BRT systems of Lagos and Johannesburg clearly illustrate that their implementation resulted in many benefits for the respective cities such as higher-quality public transport in terms of comfort, travel time, cost, social inclusion and safety. In addition, the systems have reduced energy consumption and emissions. All in all, BRT is able to contribute to sustainable urban development.

Particularly the high cost-efficiency ratio (low implementation and running cost as well as no/low subsidies needed

and high passenger capacity) and the short period of implementation underlines the great potential of BRT for African cities, where financial resources are scarce while mass transit is urgently needed.

Another potential of BRT for Africa is its operational flexibility (in comparison with rail-based systems). In the course of fast urban expansion in African cities, BRT can easily adapt and rapidly expand into new areas of high transport demand. However, the potential of BRT needs to be assessed in regard to local circumstances, capacities, preferences and needs.

Many African cities face severe environmental challenges related to air pollution. BRT demonstrates a solution with a great potential to reduce emissions since the number of vehicles on the road can be reduced and the technology is cleaner. A successful integration of BRT with NMT (non-motorised transport) and IMT (intermediate means of transport) additionally contributes to a sustainable future of the respective cities.

Despite the potential of BRT for African cities, various obstacles limit its wider application. One of the main hindrances of BRT is the institutional performance: limited capacity and scarcity of resources (human and financial), low commitment, and a lack of coordination among institutional bodies. Capacity building for authorities and persuasive power of the project initiators are essential to overcome these barriers.

Another challenge is related to the technological level of BRT systems. The projects are characterised by high-quality technology. This know-how might partly be lacking among local engineers, planners or construction firms.

The question of how to best deal with the existing minibus industry is not solved yet and has to be assessed case by case. Minibus operators have good arguments against the introduction of BRT and their opposition can not be circumvented. But public benefit should be emphasised over the special interest of one industry. Therefore, solutions with the lowest rate of dissatisfaction for the minibus industry have to be sought.

BRT systems cannot provide jobs for all the previous operators and drivers. Nevertheless, in comparison with other mass-transit options (such as metro), BRT provides more job opportunities and leads to lower rates of work losses. BRT can be considered a “lesser evil” and therefore has a big potential for African cities – compared to other mass-transit options.

The excluded units – such as former drivers who lost their job as well as resettled or expropriated people – should be compensated adequately. For instance, in the case of Dar es Salaam, a resettlement action plan with compensation schedule has been established (see DART 2008b).

Additionally, there is a negative connotation of the bus with the poor. As shown in the case of Lagos, former car users could hardly be convinced to shift to bus rapid transit. Compared with rail-based transport, BRT is regarded as being an inferior transport mode. Attractive marketing strategies are essential to overcome the negative image



◀ **Figure 6:** Rea Vaya bus station at Ellis Park Stadium, Johannesburg, South Africa. Photo: K. Teschner, 2010

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of the bus. BRT needs high urban densities along the BRT corridors in order to ensure that the system is feasible to run the service it is designed for. Compared to Latin American cities, the density in many African cities is much lower, travel demand is dispersed, and affordability of fares is lower. Therefore, a pre-feasibility study is of crucial importance in Africa in order to assess the viability of BRT for the respective city. However, in most African cities, the density is sufficient and other mass-transit options (such as rail-based systems) would require even higher densities and fees.

There is a great demand and urgency for sustainable transport interventions in African cities. Africa's larger cities might have no other choice than implementing efficient mass-transit options. Being a relatively low-cost intervention with a high passenger capacity and a fast period of implementation, BRT has a great potential for the African continent and illustrates a feasible solution for many African cities – if the barriers can be overcome or at least reduced. Once success stories of operating BRT systems spread, more and more African cities will become interested in BRT.

Requirements for implementation of BRT in Africa

Based on the assessment of benefits and barriers, the following factors have to be considered in order to guarantee a successful implementation of BRT in African cities.

First of all, a precise preliminary analysis is essential in order to determine if the introduction of a BRT is at all adequate, feasible, and beneficial for a location and its inhabitants. Considerations to be made are e.g. the availability of public budget, physical constructability, current and future transport demand, existing energy sources, city vision, and commitment of public officials.

Secondly, enough resources – in terms of time, money and/or expertise – have to be dedicated for an appropriate preparation and accomplishment of the project in order to mitigate later confusion or unexpected incidences.

Furthermore, supportive authorities are an essential ingredient for a successful BRT project. Approval and support of high-level authorities is important because their commitment for BRT accelerates the process.

Capacity building, training or study tours of officials might also be crucial to increase capacities among the main public actors. BRT is a relatively new approach in Africa and expertise has to be built. Moreover, communication among actors and participation of all stakeholders are of crucial importance for a successful, widely-accepted and transparent BRT project.

In all stages of the project cycle, communication and participation are essential as they form the basis of the acceptance of the BRT project.

Another important factor is that technical training for involved implementers is essential to successfully introduce BRT systems in Africa, where experience with modern bus operation systems is limited.

Besides, the integration of BRT with other transport modes has to be considered as a major part of the planning task. An adequate integration of the BRT system with other transport modes (particularly non-motorised transport) and with the land-use development results in a sustainable, liveable and holistic urban design (ex. Cape Town, Dar es Salaam).

Above all, a successful promotion of BRT leads to higher levels of acceptance of the new buses – even among discretionary riders.

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Public Transport, Informal Settlements and Accessibility:

The Case of Aerial Cable Cars in Medellín, Colombia

Dirk Heinrichs, Judith S. Bernet

Nahverkehrsanbindung für informelle Siedlungen: die Seilbahnen in Medellín, Kolumbien

Seilbahnen rücken als städtisches Verkehrsmittel zunehmend in den Fokus der Verkehrs- und Stadtplanung. Mit ihnen können Stadtviertel erschlossen werden, die aufgrund ihrer topographischen Lage und städtebaulichen Struktur bislang nicht oder nur schwierig mit öffentlicher Verkehrsinfrastruktur versorgt werden konnten. Insbesondere informell entstandene Siedlungen an steilen Berghängen, z.B. in Städten Südamerikas, konnten in der jüngeren Vergangenheit mit Seilbahnen oftmals zum ersten Mal vom öffentlichen Verkehr erreicht werden. Am Beispiel der Stadt Medellín in Kolumbien zeichnet der Beitrag die Einrichtung einer Seilbahnlinie nach und analysiert ihre Bedeutung für die Erschließung des Stadtviertels sowie ihre Erreichbarkeit für die Bewohner_innen. Die Autoren kommen zu dem Schluss, dass die Wirkungen eines solchen Projekts, als Bestandteil einer integrierten Stadterneuerung, weit über die Verbesserung physischer Erreichbarkeit hinaus gehen. Der Artikel verdeutlicht aber auch, dass bei weitem nicht alle Einwohner_innen in ihrer alltäglichen Mobilität von diesem neuen Verkehrsangebot profitieren.

Introduction

Aerial cable cars have recently moved into focus as a means to improve access for residents in cities, particularly in locations where the topography limits other forms of public transport. As a relatively cheap and highly visible response to urban transport problems, their well-tested and relatively simple technology has already been introduced in several cities such as Caracas, Algiers (see Perschon et al. in this issue) and, most recently, Rio de Janeiro. In many cases, these cable car systems connect informal settlements that have emerged over the past decades along steep slopes and hilly terrains in these cities. For the residents of these localities, this means that public transport has reached them for the first time.

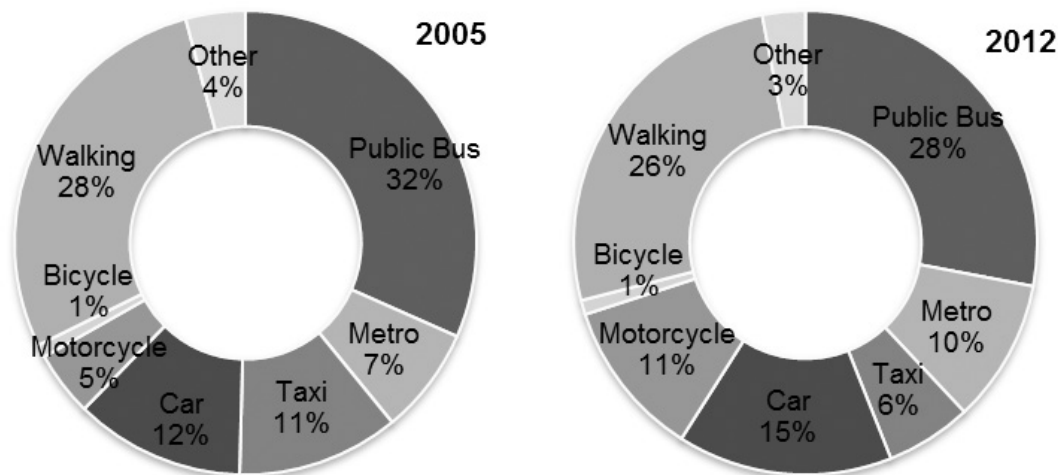
A major potential of aerial cable cars for urban improvement is seen in the increase in accessibility between these newly serviced settlements and other locations within urban areas (e.g. Brand and Dávila 2011). In general, the term accessibility describes the ease of reaching services or destinations (Litman 2012).

Along this definition, better accessibility through cable cars first of all occurs through the quality of the transport itself, including improvement in travel time, operation times, comfort of travel or safety and security during trips. Secondly, improving access relates to the destination of trips and the new opportunities that the transport system provides to access goods, services and activities that have previously been outside reach.



Figure 1: Steep slopes in the Comuna Popular. Source: the authors

◀
Figure 2: Modal split in the metropolitan area 2005 and 2012. Based on: AMVA 2006, AMVA/Universidad Nacional 2013: 160



In Medellín, Colombia, the integration of the aerial cable car MetroCable with three lines since 2004 is an attempt to improve accessibility to outside destinations in the above sense. It complements these with other social and physical measures. Conceived as part of an integrated urban project (*Proyecto Urbano Integrado*, PUI), and led by the local government-owned mass transit authority (Empresa Transporte Masivo, EMTVA), the MetroCable was complemented by the construction and upgrading of community facilities and public spaces and intensive efforts to involve residents in the planning and implementation. This approach clearly supports wider urban-planning goals to transform the living conditions for residents within informal settlements to improve the image of these locations, and to demonstrate that after decades of neglect, city planning and politics finally were taking the problems in these municipalities seriously.

This article explores the question how and in what ways the MetroCable as part of an integrated urban-improvement package affects accessibility. Based on this, it seeks to identify possible lessons and implications for planning interventions that are concerned with improving accessibility of residents in low-income neighbourhoods. To achieve this, the next section discusses concept(s), forms and influencing factors of accessibility.

This review is followed by the introduction to the MetroCable and the urban integrated project in Medellín. Using the MetroCable line K in the two municipalities Popular and Santa Cruz as a specific case of reference, the article then explores the linkages between the project and accessibility. A concluding section discusses lessons for planning. The sources of the article are official documents, scientific literature as well as results from our own qualitative interviews carried out in the two municipalities in 2012.

Accessibility: definition and influencing factors

In the context of transport, mobility and urban planning, accessibility defines the ease of reaching goods, services, activities and destinations (Hansen 1959, Engwicht 1993, quoted from Litman 2012). It can be defined in terms of activity or the destinations that actually are reached. In this case, accessibility can e.g. be measured by the

number of real trips that occurred. Accessibility can also be defined as the potential or the opportunities that could be reached. In this case, accessibility has an 'option value' where people who do not use a particular form of access may attach value to having either services, destinations, or transport options within their reach.

Access is the concern of transport, land-use and social-service planners, whereby each profession places a different emphasis (Litman, 2012: 3). Transport professionals generally focus on the quality of the transport that connects place of residence and destination, and the question how to improve usability. This transport-supply perspective takes into consideration various factors such as time, distance, mode, cost, quality, reliability and levels of service.

Land-use planners generally focus on geographic accessibility, such as the distribution of services and destinations and the distances between them (densities, land-use mix, connectivity and walkability). In both land-use and transport planning, access is measured in terms of the time radius at which destinations can be reached, related to the options for reaching these destinations.

Social-service planners focus on the options for improving accessibility for particular groups such as access to employment for unemployed people or access to education for school children. In social planning, accessibility refers to people's ability (or their constraints) to use services and opportunities. This is often described in the form of competences or skills (e.g. Hägerstrand 1970, Kaufmann et al. 2004) that may directly or indirectly relate to access.

Three areas of skills are commonly distinguished. Firstly, the physical ability or acquired skills refer to knowledge related to rules and regulations of movement, licenses, the ability to afford a service, or the simple intellectual capacity to use information services.

Secondly, organisational skills cover planning and synchronising activities (e.g. adjusting work times to transport offers and availability). Thirdly, cognitive appropriation covers how agents consider, deem appropriate and select specific options (includes their mobility habits as well as security perceptions etc.). Together, transport supply,

land-use characteristics as well as people's abilities or constraints to be mobile define demand as the amount of mobility that people choose.

Daily mobility in Medellín

Medellín is the second largest city of Colombia with a population of about 2.2 million (DANE 2005). It is situated in the centre of the metropolitan area of the Aburrá Valley with more than three million inhabitants (ibid). Administratively, the city is subdivided into sixteen municipalities. In terms of socio-economic stratification, Medellín is characterised by a marked segregation. Popular neighbourhoods with predominantly low-income households are situated in the north and northeast and the wealthier neighbourhoods located in the centre and towards the south of the city.

According to the most recent origin-destination survey, the total number of daily trips in 2012 reached about 5.6 million, translating into an average number of 1.7 trips/person. This indicates an increasing mobility in comparison with the earlier survey of 2005, where the average person completed about 1.5 trips/day (AMVA/ Universidad Nacional 2013: 161). This fairly moderate average number of trips already suggests that users make their trips to a large extent for 'essential' purposes. The origin-destination survey found that by far the largest motives for travel are work (44%) and study (26%), which together explain 70% of all trips. Other motivations are reported to be far less significant.

For example trips for recreation, shopping or visiting friends have a share of less than 3% each. Only the motive 'official transaction', which describes trips to pay monthly instalments at shops or to collect the salary at the bank, explains around 8% of all trips. The low proportion of shopping trips seems a bit surprising and suggests that particularly very short trips like those to a nearby grocery shop are perhaps not reported in many cases.

About 28% of all trips are realised by the use of so-called collective public transport (Transporte Publico Colectivo, TPC). This 'traditional' system covers privately owned and operated buses (so-called buses, busetas, microbuses) of diverse size and standard. It is currently operated by

more than 40 different bus companies with more than 4,000 registered vehicles (Alcaldía de Medellín 2011), which are regulated by transit and transport secretariats in each municipality. A journey with the TPC costs 1,700 COP (around €0,68) or 2,150 COP (around €0,90) when the trip is combined with the metro. When compared to 2005, the total share of the collective public transport has decreased slightly.

The metro mass transit system was responsible for about 10% of the total journeys in 2012, which is an increase by 3% compared to 2005. The system in Medellín came into existence in 1995, when a newly created Empresa the Transporte Masivo del Valle de Aburrá (ETMVA) started operating a rail-bound metro mass transport system. ETMVA is owned in equal shares by the local government of Medellín and the surrounding Department of Antioquia. It is responsible for the regulation, planning, operation and maintenance of the integrated system in Medellín and the surrounding nine municipalities that are situated in the wider metropolitan area, the *Area Metropolitana del Valle de Aburrá*.

The metro network presently covers two elevated rail lines (line A and B) with 34 stations and three cable lines (lines J, K, L) (Metro de Medellín 2011). Two of them are urban public transport systems (line K inaugurated in 2004 and line J in 2008), along with a third line, L, introduced in 2010 which connects with line K as a tourist route to an ecological park on the edge of the city. They are treated as three additional metro lines in organisational and tariff terms. More recently, two BRT corridors have been opened, the so-called Metroplus. A single ticket with the metro costs 1,800 COP (around €0,75). Discounted rates are available for students, seniors and disabled persons.

Private car use has significantly increased in recent years, with a share of about 15% compared with about 11% in 2005. Even more significant is the increase in private motorcycles. The share rose from 5% in 2005 to 11% in 2012, meaning that one out of 10 journeys was made by motorcycle.

Walking continues to be one of the most frequent modes of transport with about one fourth of all trips in 2012. The bicycle, on the other hand, plays only a marginal role. Although several initiatives try to increase the attractiveness of biking (e.g. construction of bicycle lanes or campaigns like "Wednesdays on Bike" (*Miércoles Encicla*) [AMVA 2011], the partly extreme topographic conditions provide a substantial disincentive to cycling.

The MetroCable line K in the municipalities Popular and Santa Cruz

The adjacent municipalities Popular (*comuna 1*) and Santa Cruz (*comuna 2*) are the result of immigration in the late 1960s (Ballesteros et al. 2009). Due to the hilly topography and a lack of infrastructure investment, the municipalities have long suffered from a low connectivity to the city's public transport system and street network.

The two municipalities together had a population of approx. 230,000 in 2005 and residents share similar socio-economic characteristics. According to the official census income classification, the population in both localities

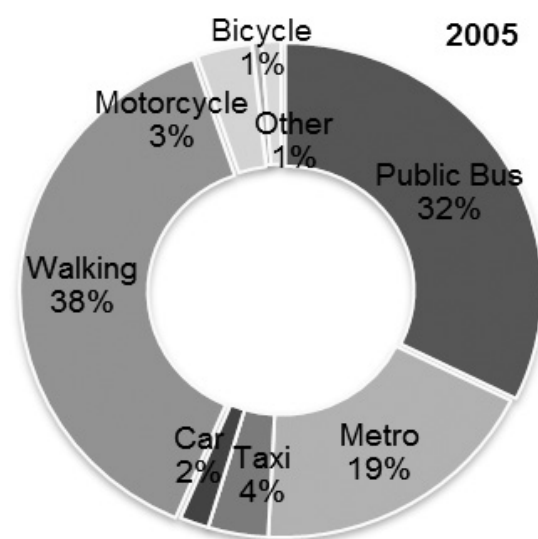
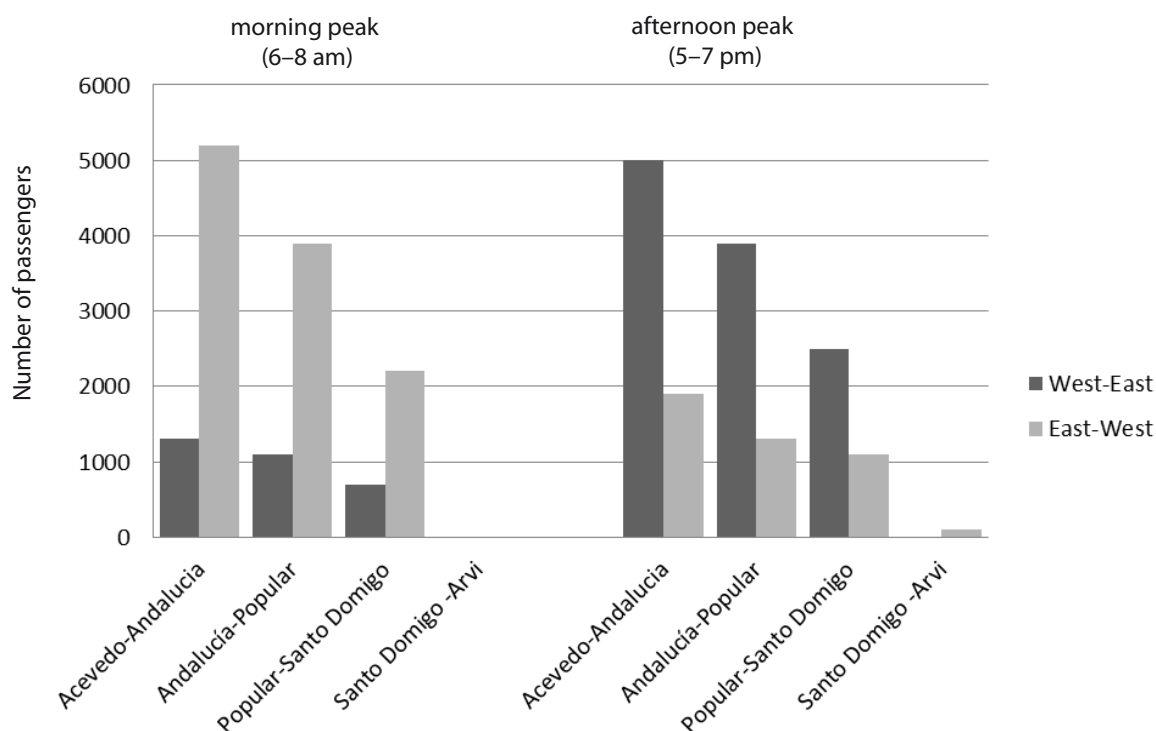


Figure 3: Modal split 2005 in the municipalities Popular and Santa Cruz. Based on: AMVA 2006



primarily falls into the income categories 2 (low income) and 1 (very low income). Unemployment rates in 2005 were well over the city average. Over 40% belong to the group of young adults at 15 – 39 years of age (DANE 2005). Both localities are very densely populated with 35,000 and 40,000 inhabitants/km² (ibid).

The socio-economic situation is reflected in the daily mobility. Based on the available mode choice and trip data, the residents of the two municipalities exhibit a mobility pattern that is quite different from the overall average in the city. To begin with, the amount of reported trips per person of about 1.2 in 2005 was comparatively low. The average motorisation rate was about 7 vehicles/1000 inhabitants in 2005, compared to an overall city-wide average of 54 vehicles/1000 inhabitants, and 434 vehicles/1000 inhabitants in the municipality 14, in which the highest number of cars per inhabitants were registered (AMVA 2006). Consequently, the amount of trips by car was very low with less than 2%. In contrast, the motorcycle was used for almost 4% of all trips, which is not much lower than the overall average.

A striking difference in the modal split of people in the two municipalities to the overall patterns is the strong role of walking. More than one out of three journeys is made on foot. Likewise high is the use of collective public transport and the metro, which includes the MetroCable (which is not treated as a separate category by the origin-destination survey). Together, these modes realised more than 50% of all trips.

The MetroCable line k in the municipalities Popular and Santa Cruz was the first to open in Medellín. The idea for a cable car dates back to the transport masterplan for the 1993 Medellín Land-use Plan, where for the first time an aerial ropeway was suggested (Hernández 2006). It took the idea to mature until the revision of the land-use plan in 2001, which included a first transit corridor for an aerial ropeway to connect the two municipalities. The cable-car

system is a public-sector project, financed jointly by the municipality and the Metro de Medellín company. In the case of Medellín, all three lines have been financed through normal capital investment budgets. The financial contribution of the Metro de Medellín company is based on the calculation of future returns accruing from increased passenger numbers using the metro over a 10- to 15-year period, and the difference is justified by the city authority as a social investment (Brand and Dávila 2011).

There were a range of motivations to build the Metro-Cable. A cable car was on the one hand an idea to bring passengers down from the hillsides to the metro system itself as a way to increase passenger numbers for a then underutilised metro capacity (ibid). On the other hand, the metro authorities insist that it was always a socially-motivated project and a way of extending the benefits of the metro to the poorest and more inaccessible areas of the city. In this way, the project was designed to demonstrate that the government took responsibility for these areas that were characterised by an absence of local government and deteriorated in physical and social terms. Thus, it had a 'symbolic' objective to pay back the historical debt of neglect (DNP 2010).

The MetroCable has not been implemented as an isolated project. It rather is part of a plan aiming to increase investment in the informal settlements of the city with the objective to improve the living condition of its residents. This plan was implemented in the form of the encompassing North-eastern Urban Integrated Project.

This project combined three dimensions. A first dimension included physical interventions like housing provision, up-grading and tenure legalisation, the construction and up-grading of community facilities and public spaces and the MetroCable. This was complemented by a second dimension with activities to engage residents of the affected communities. A third dimension consisted of institutional coordination (Blanco and Kobayashi 2009).

Figure 4: Number of passengers between MetroCable stations during morning peak 6–8 am (left) and afternoon peak 5–7 pm (right). Based on: AMVA/Universidad Nacional 2013: 131

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Figure 5: Long queues at the metro station Acevedo during afternoon peak hour. Source: the authors



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The investment for the first MetroCable was close to US\$24 million at current 2012 exchange rates (Agudelo et al. 2011). The cost per kilometre in urban areas compares favourably with BRT and rail systems and has the potential for less discontent by residents as the land requirements are lower than that of other new transport interventions. On the other hand, due to technical limitations, aerial cable cars are not mass-transit systems and cannot transport significantly more than 3,000 passengers per hour.

The cable line K has a length of about 2 km and covers four stations: Acevedo (the interchange to the metro), Andalucía, Popular and Santo Domingo. The line can operate a maximum number of 93 cabins, each of which carries up to eight seated and two standing passengers (Agudelo et al. 2011). A journey from the river valley to the highest station – 400 metres above the valley – takes about 15 minutes, which is a significant reduction in travel time compared to the bus or to walking. Operation hours on a weekday are from 4.30 am to 11 pm. The single fare is that of a 'normal' metro ticket (1,800 COP). No separate ticket is needed for a transfer to the metro. Although the data on the modal split of the recent origin-destination survey does not provide separate data for the MetroCable, it contains some passenger data. Accordingly, the line has been used by around 43,000 passengers/day (AMVA/ Universidad Nacional 2013), with a demand close to system capacity during peak hours. Disaggregated data on the morning peak (6–8 am) shows high passenger flows from east to west (i.e. down from the municipalities to the metro station Acevedo in the valley), in particular between the stations Andalucía and Acevedo.

Effects on accessibility

With respect to the available transport options, the MetroCable appears to have evidently improved accessibility. This includes shorter journey times, greater comfort and a reliable operation from very early in the morning until very late at night. In addition, the combined tariff permits to combine the cable-car with the metro and the Metroplus, and the use of a prepaid card (*tarjeta civica*) reduces the single fare by about 200 COP.

This makes the use of the cable car economically attractive for long journeys, where a transfer to another mode of transport saves about 33% compared to two bus journeys (Brand and Dávila 2011). The city likewise offers an integrated ticket, which permits the combination of the mass-transit modes with some privately operated buses that run along so-called integrated roads (*rutas integradas*). However, the MetroCable line K is not directly connected to any of these routes.

Lengthy periods of walking and queuing of over an hour in peak periods may, however, inhibit the use of the MetroCable and make a conventional bus slightly quicker. However, this disadvantage is compensated by the generally very good, accessible location of the stations and their generous layout and good organisation, which makes waiting time not unpleasant (Bernet 2013).

Connected to this, users highlight that the introduction of the stations and operation of the MetroCable, in combination with the rehabilitation of the surrounding public spaces, has improved the general security in the vicinity of the

system. In their view, this has improved accessibility in the area. They report that before the introduction of the MetroCable, they often could not get a taxi that would drive into the *comuna* because of many assaults, and even the police avoided the area. This situation has changed entirely, as also demonstrated by the large number of tourists who visit the *comuna* (Bernet 2013).

In the last years the MetroCable has become a landmark for the city of Medellín. The residents identify themselves with it and are proud of it. It has become a main touristic attraction. Tourists come with the MetroCable to the *comuna*, enjoy the view over the city and take a walk around the station Santo Domingo. This better image of the *comuna* helped to reduce the stigmatisation of the residents that had had a huge impact on their lives.

Conflicts between gangs had produced so-called 'invisible borders' between different parts of the *comunas* that were controlled by different gangs. Residents from one part could not cross these borders without the danger of becoming a victim of the conflict. The changes in the physical infrastructure of the *comuna* and the presence of security personnel have minimised these 'invisible borders' that in other parts of the city are still a big problem for the residents in terms of accessibility (Bernet 2013).

The data on the travel patterns shown in the previous sections suggest that the ability, or better the constraints, of the residents to use the MetroCable differs between groups of residents. The low average number of trips per person/day, which suggests a restriction to only the most necessary trips, and the overwhelming proportion of journeys made on foot, clearly point out that affordability for a majority of the residents is the major constraint.

An exception seems to be the group of workers with their work locations outside the area in other parts of the city. Advantages are more limited for those in the informal sector of the economy (the great majority in the study area), children and young people, housewives, the elderly and infirm.

Discussion

The case of the MetroCable in Medellín shows the potential that a holistic and integrated urban-improvement package can have on improving accessibility for residents in low-income settlements. The case demonstrates not only that an aerial ropeway can be a solution to address transport demand, but also acknowledges that transport innovations, if they are part of an integrated package of physical, social and economic urban regeneration, can have a much wider set of benefits beyond 'mobility concerns'. In this sense, the MetroCable can be arguably seen as a crucial factor of the urban integrated project as a whole.

At the same time, the case highlights that changes in the transport supply cannot easily overcome accessibility constraints of all residents in informal settlements. In fact, conventional buses and walking continue to be the main transport modes for the majority of the population in the municipalities Popular and Santa Cruz. Also, there is little evidence to suggest an increase in the number of journeys for non-essential trips, which might at least indicate

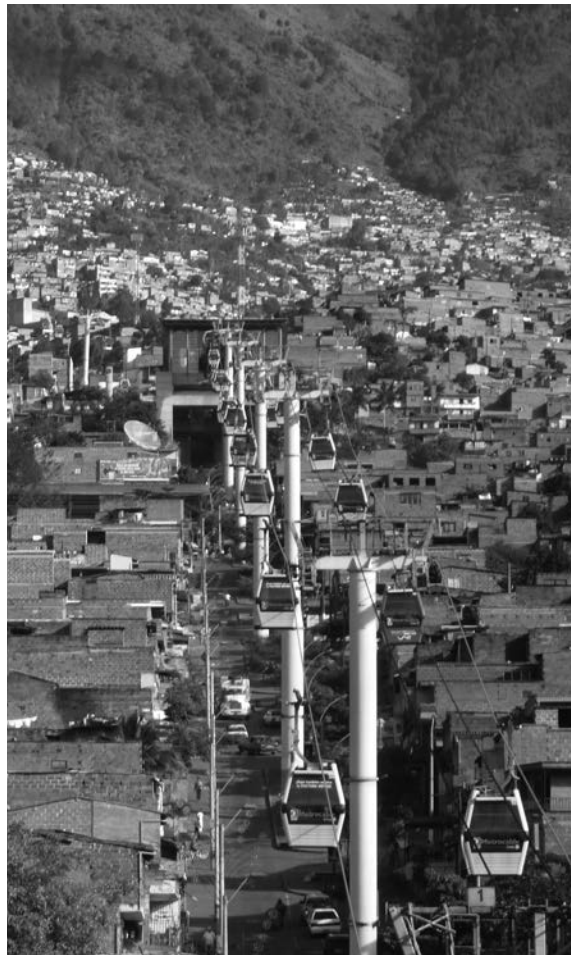


Figure 6: The MetroCable as landmark of Medellín. Source: the authors

greater participation in city life. Affordability appears to be still the main constraint.

The observation that a substantial improvement in transport supply, despite its undisputed benefits, is not necessarily sufficient to overcome constraints of potential users provides a main lesson for planning. This lesson is that any transport-related intervention needs to embrace a comprehensive understanding of the concept of accessibility.

This understanding needs to include first of all a careful analysis of the abilities and the constraints of the different potential user groups. As suggested by the data, the use of the MetroCable, despite its benefits, seems to be not a choice alternative for a large proportion of residents in the two municipalities Popular and Santa Cruz due to budgetary constraints.

Secondly and related, it needs to understand demand in terms of the location of destinations and the purposes of travel. So far the use of the MetroCable seems to be attractive particularly to residents with job locations in other more-distant parts of the city.

Thirdly, it needs to conceptualise transport options and supply in a way that is suited to these demands and constraints. As the positive effect of the MetroCable on reducing perceived insecurity around the stations highlights, the design of these interventions may well need to encompass a wider range of elements. This confirms that innovations in public transport can play a prominent role in planning urban regeneration and development.

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Urban Ropeways as Part of Sustainable Urban Transport Networks in Developing Countries *

Joachim Bergerhoff, Jürgen Perschon

Seilbahnen als Teil nachhaltiger Nahverkehrsnetze in Entwicklungsländern

Seilbahnen werden traditionell mit Skisport oder Erholungsparks in Verbindung gebracht. Ihre technologische Weiterentwicklung und neue Betriebskonzepte haben sie seit ihrer ersten Nutzung in Algier im Jahr 1956 mittlerweile auch zu attraktiven Angeboten für städtischen öffentlichen Verkehr gemacht. Im vorliegenden Beitrag werden eine Reihe von Fallbeispielen vorgestellt und die konkreten Einsatzmöglichkeiten diskutiert. Dabei werden die Vor- und Nachteile sowie auch die Komplementarität zu anderen Systemen wie Bus Rapid Transit oder Light Rapid Transit herausgestellt. Die Autoren kommen zu dem Schluss, dass Seilbahnen eine technisch ausgereifte und ökonomisch realisierbare Lösung insbesondere in solchen Gebieten sind, in denen aufgrund einer dichten Besiedlungsstruktur und einer komplexen Topographie die Einrichtung anderer Verkehrsangebote als unmöglich gilt. In Städten von Entwicklungsländern können sie als ‚erste‘ öffentliche Verkehrsangebote sichtbare Zeichen setzen, dass auch unter schwierigen Bedingungen ein multi-modales Verkehrssystem möglich ist.

Introduction

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A preliminary version of this article has been presented at the CODATU Conference in 2012 in Addis Ababa (Ethiopia) and has been published as a conference document (online): Bergerhoff, Joachim & Perschon, Jürgen (2012) 'Urban ropeway as part of sustainable urban transport networks in developing countries.' Paper presented at CODATU XV Conference 'The role of urban mobility in (re) shaping cities'. Available at: <www.codatu.org/wp-content/uploads/J.-Bergerhoff-J.-Perschon-ARTICLE-Codatu-XV-2012-EN.pdf>.

Ropeways have been associated with mountain resorts and leisure parks. Technology and operational concepts, however, have evolved to make them a reasonable and attractive proposition for mainstream urban public transport, too. Unlike the cliché ski resort facility, urban cable cars are easy to board and alight, even for mobility impaired travellers and wheelchairs.

Generally speaking, the aerial tramway with additional supporting cables offers more stability in very windy conditions and a faster cruising speed (45 km/h), which explains why this type is chosen to service very high mountain tops. In urban conditions, however, these qualities are less critical and mono, bi- or tri-cable gondolas offer a comfortable and safe ride at around 25 km/h (i.e. 7 m/s) (The Gondola Project 2013). In regard to capacity, ironically, an aerial "tramway" service is rather comparable to that of a standard bus, while the cosy word "gondola" refers to a system offering capacities comparable to small- to medium-sized tramways on rail tracks.

Gondolas also offer a number of additional advantages, which make them the preferred system in urban transport applications (except for New York and Portland):

- The large number of gondolas offers continuous service, with several departures/minute, and thus reduces waiting times (as opposed to come-go tramway services where waiting time = travel time, i.e. several minutes between departures).
- The small gondolas offer seating for most passengers and a more private atmosphere, and double hourly capacity. Typical small gondola systems have up to around 10 seats.
- It is easier to adapt system performance to service demand by modulating the travel speed and,

possibly, the number of cabins in circulation. The system, however, does not easily adapt to low demand.

- The infrastructure required for smaller cabins tends to be lighter, more flexible (including curves and intermediate stations) and, therefore, less costly, making the mono-cable gondola the preferred system in cities seeking highest efficiency (Algeria, South America) (Clément-Werny / Schneider 2012).

Urban applications of ropeways

The idea of using ropeways for urban passenger transport is not new, but it has evolved gradually. Its leisurely image has long kept it in the realm of providing access to universal exhibitions, Olympic Games, amusement parks or garden show sites and urban parks.

But purely urban applications date back as far as, for example, 1956, the creation of a small aerial tramway El Madania in Algiers linking two neighbourhoods 83 vertical and 215 horizontal meters apart. Algeria is also a cradle of the modern urban ropeways. In 1982, the El Madania was renovated and three similar, short, steep, small aerial tramway systems built in Algiers in the following years.

At the same time, Annaba and Blida saw construction of the first gondola systems. But the breakthrough of the gondola ropeway as a mainstream urban transport mode dates to the first decade of this century and the construction of the gondolas in Tlemcen, Skikda, and the larger cities of Oran and, most typically, Constantine, where the gondola's three stations make a line of 1,517 metres total length and 30+ gondolas, connect three parts of the city (city centre, both sides of the gorge, the hospital and a residential complex).

In July 2012, the Constantine gondola celebrated 12 million passengers in 4 years of smooth operation, and the Algerian Ministry of Transport confirmed its commitment

to two additional gondola lines to be built in this city. These new lines would have 4 stations and a total length of 2 km and 3 km respectively. With additional length and stations, these new lines would function like a “tramway-in-the-air”, serving a short corridor rather than merely establishing a point-to-point connection. The gondola will thus be developed in parallel with the “tramway-on-road”, which has been under construction in Constantine since 2008 and is expected to open its first line of 10 stations on 9 km.

Similarly, Algiers and Oran are developing underground rail, tram and gondola projects in parallel and full complementarity; and Tizi-Ouzou is studying a first gondola line of 5.5 km, linking the intermodal transport hub of Kef Naadja with the city centre and neighbourhoods on the opposite, hilly side of town.

A similar history was written in South America, where a ropeway was built in Caracas as early as 1952. But it was closed in the late 1970s and re-built (and extended) in the first decade of this century to a length of 3.5 km, served with 70 gondolas, following the archetypical urban transport gondola ropeway, the “Metrocable” of Medellín, Colombia, which was built in 2004 and opened in 2006. In Caracas and Medellín, the gondolas are planned and operated as feeder lines connecting hillside neighbourhoods to the existing rail-based high-capacity public transport in the valley.

It probably is no coincidence that the latest innovations defining the modern concept of urban, mass public transport by gondola ropeway were made in Medellín, the second city of Colombia after Bogotá, where the concept of BRT, initially from Curitiba, Brazil, was perfected to worldwide model status. Both systems are characterised by the flawless implementation of a coherent, innovative but solid concept that takes into account urban structures, the transport market and economics in the context



of local demand for public transport, and the capacities of local public and private actors to serve it.

Energy efficiency and operating costs

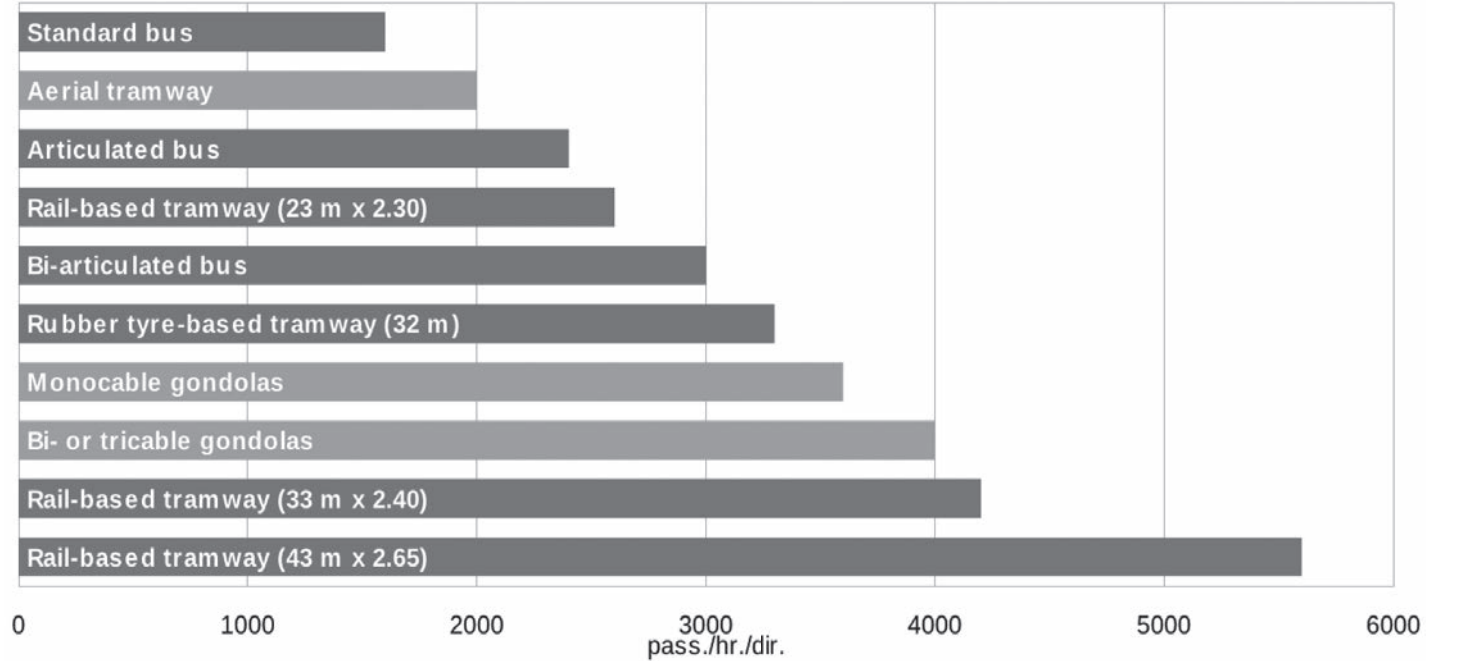
The ropeway’s unique advantage is of course its capacity to climb steeply and to fly over obstacles, which seduce many urban planners. The most thrilling opportunities, however, can only remain dreams if the economics do not match.

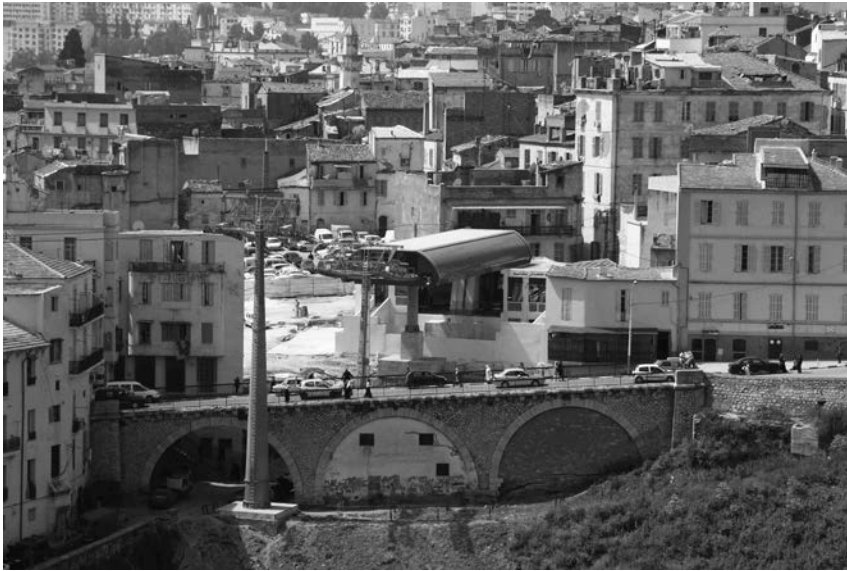
By design, ropeways are highly energy-efficient transport systems, for a number of reasons:

- A single stationary electric engine moves the entire system at a steady, efficient pace.
- The gondolas do not have to carry engines, fuel, wheels or-, suspensions, and do not require a rein-

▲ **Figure 1:** Base station of the Koblenz (Germany) gondola system with relatively large cabins (38 passengers). Note the gapless level entry and large doors. Image onnola <www.flickr.com/photos/30845644@N04/5537846340/in/photostream/>

Figure 2: Capacity pphd of typical urban transport systems. Source: CERTU STRMG CETE (2011) Aerial cableways as urban transport systems ▼





▲
Figure 3: Constantine end station, place Tatache Belkacem. Note the compactness of the station (1400 m²). Photo: joni580 <www.flickr.com/photos/jmitch700/2441297060/in/photostream/>

forced chassis, and thus are of relatively low weight and drag.

- Descending gondolas help pulling up ascending gondolas; hardly any additional energy is required for acceleration of individual cabins or is lost when slowing down cabins in (rare) stations.
- And, apparently, the aerial ropeway does not suffer rolling resistance.

However, ropeways do not provide a free ride and a number of energy consumptions do contribute to the operating bill:

- The revolving cable itself represents a considerable moving weight and it also suffers rolling resistance and torsions when passing through the guiding and revolving wheels.
- The numerous flying cabins meet manifold wind resistance.
- In gondolas, like in all other vehicles, the ancillary systems such as heating and cooling consume a large part of the total energy required.

Figure 4: Medellín K Line, small (8 seats) gondola with single rope. Image by Steven Dale (the Gondola Project)



Despite the inevitable losses, ropeway energy efficiency is significantly higher than that of other electric or combustion energy-driven transport systems, provided that the number of passengers is significant.

Indeed, more than for transport modes using individual self-propelled vehicles, patronage is absolute key to the efficiency of the ropeway system: in order to transport the first few passengers, a bus operator only needs to mobilise a single vehicle, while the remainder of the fleet can be held back until patronage swells. In a ropeway system, however, the entire cable and the entire fleet of gondolas attached must be mobilised for the first passenger. This is horrendously inefficient. But very little energy is required for every additional passenger and, when approaching a reasonable occupancy rate, the gondola becomes the most energy-efficient transport system of all.

A similar arithmetic of high fixed costs and low variable costs applies to the other operating expenditures: all staff required for running the system must be present for the first passenger, but no additional drivers are required as patronage rises. The only possibility for the ropeway to adapt operating costs to patronage is to reduce or increase speed, within the margins of customer acceptance (do not go too slowly) and technical efficiency (do not fly too fast).

Figure 5, comparing the operating costs of bus, tram and ropeway with the hourly patronage in the context of Grenoble, France, is purely indicative. The position of each line on the graph depends on the local cost structures of each mode. However, the general picture is the same in any context: in its domain of excellence of about 2000 to 5000+ passengers per direction and hour, the ropeway is probably the most-efficient operation of all. For smaller volumes, buses are probably the more-efficient solution and where larger volumes need to be carried, rail-based systems can be the better option.

These considerations regarding operating costs apply in cases where there is a choice between different modes, for instance, a ropeway being operated above an avenue which could also have a bus or tram service. Ropeways may well be the most-rational choice, even where buses or trams could do the job on the same itinerary. But in many cases, ropeways can go the shortest way where buses or trams would have to go long detours. In these circumstances, their overall cost in relation to effective passenger x km is simply unbeatable.

Physical barriers and investment costs

Ropeways are best known for coping with, and even taking advantage of, hilly terrains. This feature alone already provides for a variety of applications. However, ropeways do not require hills. Even on flat land, they can be used to overcome many other types of natural and man-made obstacles, such as rivers, lagoons and estuaries, harbours, railways and motorways. Depending on the possibility to place intermediate masts, obstacles of several hundred metre width can be overcome without physical interference with surface or underground infrastructures.

Cities usually grow gradually and organically around these barriers, integrating them into their fundamental structure

and habits. Consequently, many barriers are not constantly seen as such, because city dwellers and planners have grown up living with them. But growth changes urban patterns. Formerly peripheral neighbourhoods may gain in importance and formerly neglected barriers may become real obstacles to social and economic development. The ropeway may well be the appropriate solution in these situations.

Rivers, estuaries and lagoons probably are the most common example for such situations: ferryboats may no longer provide satisfactory service to increased demand and bridges are very costly and intrusive infrastructures. Ropeways may well provide the most elegant connection between urban centres and passenger transport systems on both sides of the water, while ferries and, possibly bridges, can be optimised for vehicle and goods transport.

Overcoming obstacles is useful and will probably lead to the creating of several (dozens) modern urban ropeways in the coming years.

But the more fundamental challenge is the urban fabric itself. On the one hand, dense housing and narrow streets of historic or "informal" organically grown, car-free neighbourhoods are obstacles to high-capacity transport systems. They also often lack other basic infrastructure and services.

The traditional technocratic answer to this infrastructure challenge is to erase and re-build. On the other hand, these urban structures should not be erased, because they are often well adapted to modern forms of urban cohesion and efficiency. They need to be rebuilt and upgraded. But this can and should not be done in the traditional way, for economic and social reasons. It should be done gradually, preserving functioning structures and leaving space for constant renewal.

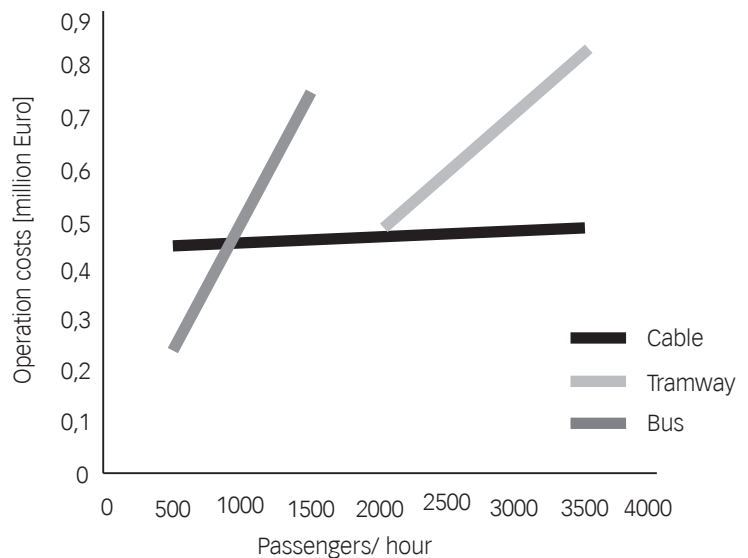


Figure 7, showing a ropeway under construction in Rio de Janeiro, perfectly illustrates this point. The base and intermediate stations are built more vastly, as is necessary for the transport function, in order to accommodate additional services that will be ideally located at these central places. A temporary access road for the construction of an intermediate mast is clearly visible.

If necessary, such intrusion can be limited by choosing an itinerary causing the least damage, or be avoided completely through the use of helicopters. It can also be transformed into an opportunity to create pleasant public spaces, with safe pedestrian paths and mini-parks.

In comparison, the construction of a tramway or BRT with similar transport capacity would have cost the destruction of many hundreds of houses and created a new barrier

Figure 5: Operating costs vs number of passengers in <<http://telepherix.free.fr/data/livreblancdutramwayaerien.pdf>>

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Figure 6: London gondolas over the Thames river. London is rather flat and the masts are much higher than technically required by the gondola, in order to leave space for big ships and to offer a nice view on the entire city. Photo from <www.greenwich.co.uk> through the Gondola project)



▲
Figure 7: Rio de Janeiro is preparing to host the Olympics and the Football World Championship. This new gondola system is not designed to serve these sites, but the favelas at the Northern edge of town. Photo of the construction phase. Note a base station (top left), a intermediate angular station (top right) and a pole (bottom left). Image from <www.buzzecolo.com/rio-de-janeiro-adopte-un-tramway-aerien/>

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for pedestrian movements and source of noise and air pollution. One considerable advantage of ropeway system thus lies in their reduced so-called external costs. But the system infrastructure costs themselves are also considerably lower than those of surface or underground systems of comparable capacity:

- The cable itself is rather inexpensive compared to rail or tarmac tracks of the same length. Not to mention bridges or tunnels. Traffic lights are obsolete. But of course, masts are required every couple of hundred meters (very variable according to terrain and the number of cables). The masts are solid infrastructures and their cost cannot be neglected. But, in any case, they are considerably less expensive than the foundations of a new road or rail track, especially if you include the need to refurbish, redirect or create all sorts of underground infrastructures for water and electricity. Orders of magnitude, in Europe, for mono-cable gondolas, such as the systems mentioned in this paper: cable: 70 EUR/metre; masts: 100,000 EUR/mast.
- The stations, on the one hand, need stronger foundations than those of BRT and LRT. On the other hand, they are much more compact since they do not need to provide berths for several long vehicles. The machinery is a considerable investment. Order of magnitude: 2.5 million EUR for station with engine, 1 million EUR for station without engine. A gondola may cost up to 30,000 EUR.

Hence, as a rough estimate of order of magnitude, a monocable gondola system similar to those described in this paper of 2 km, with 3 stations, 10 masts and 30 gondolas, may infer investment costs of around $0.14 + 1.0 + 4.5 + 0.9 = 6.54$ million EUR (estimates from Clément-Werny/Schneider 2012).

Even if it were as costly as the equivalent bus or tramway capacity, its life cycle costs are necessarily much lower than those of individually motorised vehicles, because the maintenance costs are drastically smaller for the very robust stationary engine and all other moving parts that are heavily and solidly built and operated in a controlled, safe, environment. Anybody familiar with the difficult task of rolling stock maintenance knows the benefit of this.

Intermodality & governance

The principal point made in the chapters about operating efficiency and overcoming physical barriers of all kinds, including urban structure itself, is that the real of modern urban ropeways is not limited to short, steep, low-capacity point-to-point services, like, for instance, the first-generation installations in Algiers, the cross-harbour gondola in Barcelona, etc.

On the contrary, modern installations are several kilometres long, feature several stops and are integrated into an intermodal public transport network at the metropolitan scale. Furthermore, ropeways are not only a possible alternative to surface and underground transport, they

also offer totally new opportunities to access neighbourhoods which cannot reasonably be reached otherwise and which can, thanks to improved accessibility and urban structure created by the ropeway, gradually evolve to become particularly sustainable neighbourhoods.

As mentioned above, thanks to very large vehicles, rail and BRT systems outperform ropeways as we know them today on lines with 6000+ passengers per direction per hour. Standard or smaller buses, on the other side, are more flexible physically and economically and, therefore, are relevant on less-frequented routes.

It is interesting to note how urban ropeway projects are often linked to rail transport projects: In one group of large cities, metropolitan railways have been operating for decades and urban ropeways were introduced in order to complement that existing metropolitan rail network (Medellin, Caracas, Rio de Janeiro, London, etc.).

In Lagos, a project comprising several lines has been announced for opening in 2015 (Channels Television 2013). In other, smaller, cities such as Constantine and Oran, the ropeway was introduced first and tramway implementations followed. Brest in France has decided to go ahead with a new gondola connecting to its historic centre to a new tramline in 2015.

But many developing cities do not have any mass-transport system installed. BRT is being promoted as a solution, but many cities that want to implement it meet serious obstacles and we must face the fact that BRT implementations are still very rare in Africa and elsewhere in the developing world.

The ropeway may well be an alternative to BRT projects, because it overcomes a series of typical BRT (let alone LRT) project obstacles in developing metropolises:

- The physical barrier: it is extremely difficult or almost impossible to secure several kilometres of right-of-way for BRT in the right place. If a corridor can nevertheless be found, it most likely is at the expense of handicapping concessions leading to unsatisfactory situation, access, priority, robustness. Ropeways can be built in the wrong place, too. However, it is relatively easy to find and secure the right spot for a first ropeway implementation across a water or relief barrier. For the rest, bad compromises are not allowed.
- The governance barrier: BRT projects often suffer the opposition of well-organised, informal road-transport operators, because, after all, BRT, buses and taxis compete for the same customers on the same lines. Only massive BRT schemes that include a total recreation of the entire road-transport governance and market structure can overcome this obstacle. Ropeways that go where public transport services could hardly go before are not competitors. On the contrary, they bring new customers to the market.
- Cost is the ultimate obstacle. BRT infrastructure is expensive and if it is built cheaply, it makes operations expensive and unattractive. BRT infrastructure investment must be massive, because BRT corridors shorter than 10 km are unlikely to make a difference

in the transport system. BRT rolling stock is expensive and many projects are proposed with an operating subsidy. Developing cities cannot afford loss making public transport. A relatively short ropeway at the right place, on the contrary, can be less costly to implement and generate profit thanks to its efficiency and unique service.

These arguments do not pretend that urban ropeways should be implemented instead of BRT or LRT schemes, although, indeed, in some cases this could be considered.

The point is that in many developing metropolises, it will be more appropriate to begin the implementation of modern, high-quality public-transport services with the ropeway projects, because:

- Ropeway projects are easier to implement and to operate than BRT projects.
- Ropeway projects provide greater added value and less financial risk.
- Ropeway projects act as a catalyst for public transport, creating public support, institutional and technical know how as well as economic resources for further projects, including the necessary BRT or LRT projects.

Conclusion

Ropeways have always been highly efficient. They also have become comfortable, high-capacity public transport systems. They can create direct links where other modes require long detours or massive infrastructure. And the gondolas still offer an enchanting experience with each ride.

Ropeways are becoming an important complement to established metropolitan transport systems, as feeder lines, for access to entire neighbourhoods, as landmarks and icons. They are also pioneers in cities that do not yet have rail or BRT systems.

The relevance and feasibility of ropeways vary greatly between cities. It is least obvious in spacious cities built on flat and sandy terrain. In all other cities, ropeways will not be able to weave a full net of public transport for the entire city. But:

- They offer unique opportunities to provide public transport where it was deemed to be impossible.
- They offer a sound technical and economic model for mass public transport at a fair and inexpensive price.
- They well can be the first high-level public transport system in many developing cities, opening the minds and creating the environment for entire multi-modal systems.

Hence, ropeways will not "take over" urban transportation, but we can expect to see them develop in many cities where they will make decisive catalytic contributions to the development of integrated public transport systems.

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Architektur



Hasso Hohmann. Mediterranes Ökosystem: Kultur- und Naturlandschaften der griechischen Insel Tinos. 271 Seiten, ISBN 978 3 901519 28 4. 2012. Academic Publishers, A-8010 Graz (Johann-Loserthgasse 16)

Diese Publikation stellt die bisher vollständige Dokumentation zu den verschiedenen für die griechische Insel TINOS charakteristischen Gebäudetypen und ihrer Bautechniken dar. Sie zeigt, dass trotz der seit einer jeher intensiven Kommunikation zwischen den zahlreichen Inseln der Ägäis eine eigenständige Architektur auf Tinos entstehen konnte, die auf lokaler Überlieferung und Optimierung der vor Ort verfügbaren Ressourcen aufbaut. Die wissenschaftliche Bedeutung der Arbeit wird zusätzlich dadurch verstärkt, dass sich die zu Grunde liegende Feldforschung über viele Jahre erstreckte, was beim heutigen – projektorientierten – Forschungsbetrieb kaum noch möglich ist. So konnten auch zahlreiche Bauten analysiert und dokumentiert werden, die inzwischen durch Verfall oder Umbau zerstört worden sind. Bisherige wissenschaftliche Publikationen zur Architektur der Ägäis beschränken sich in der Regel auf einen einzigen Bautypus – was die gegenseitige Wechselwirkung in einem eng und genau begrenzten geografischen Gebiet (hier einer Insel) unberücksichtigt lässt. Als innovativ kann auch die Anreicherung der trockenen wissenschaftlichen Daten mit persönlichen Stellungnahmen des Autors bezeichnet werden, was nicht nur dessen außerordentliches Engagement für die Erkundung des Forschungsgegenstandes (und dessen Erhaltung) unterstreicht, sondern auch die Bedeutung des dargestellten kulturellen Erbes deutlich macht, die den lokalen Entscheidungsträgern leider in den wenigsten Fällen bewusst ist. Allein die Gründlichkeit der Untersuchungen und Dokumentation besitzt Vorbildcharakter für die Forschungskultur der in Griechenland ausgebildeten Architekten. Praktisch betrachtet, stellt die Publikation eine vielschichtig angelegte Fibel für all jene dar, die bereit und interessiert sind, die lokale Bautradition von Tinos weiterzuführen und ggf. in moderne Bauformen zu überführen. Last but not least könnte die Publikation als wissenschaftliche Grundlage dazu beitragen, eine Aufnahme der Inselarchitektur von TINOS in die Liste schützenswerter Kulturgüter durch die UNESCO wissenschaftlich zu hinterlegen und voranzutreiben.

Kosta Mathéy

Stadtentwicklung

Fassil Demissie (ed.): Colonial Architecture and Urbanism in Africa. Ashgate Publishing, Farnham, ISBN 978075467512. GBP 70.–, 2012.

Der Sammelband führt die Manuskripte einer Vortragsserie an der St Pauls Universität in Chicago aus den Jahre 2005–2006 zusammen, die durch weitere Papers aus einem offenen Call ergänzt worden sind. Die so gesammelten 16 Kapitel wurden drei Abschnitten zugeordnet, und zwar:

1. einer historischen Analyse der gegensätzlichen Interessensfelder, welche die faktischen Resultate städtebaulicher Entscheidungen im kolonialen Afrika erklären können;
2. Beispiele von Gebäudetypologien mittels derer sich die europäischen Kolonialmächte eine Disziplinierung der lokalen Bevölkerung und ihren eigenen Machterhalt zu sichern suchten; und
3. Experimente einer modernen Architektur, für deren Realisierung die Architekten die Zeit in Europa noch nicht reif genug erschien. Alle drei Aspekte sind für sich gesehen spannend und wurden in der Literatur bisher noch nicht in einem vergleichbaren Spektrum wissenschaftlich aufgearbeitet und veröffentlicht. Zusammengekommen illustrieren sie die häufig widersprüchlichen Erwartungen, denen koloniale Gebäude- und Raumgestaltung ausgesetzt waren und denen sich letztendlich auch die Planer und Architekten in den Kolonien unterordnen mussten. Zu den kolonialen Aufgaben gehörte beispielsweise die auf das Besetzerland gerichtete Identitätsbildung, welche die politische Zugehörigkeit zur gegenwärtigen Kolonialmacht stärken sollte. Gleichzeitig durfte die kulturelle Zwangsjacke auch nicht zu eng geschnürt sein, da dies leicht zu Aufständen führt, wie das algerische Beispiel zuerst lehrte. In der Konsequenz wurden später z.B. lokale Motive als dekorative Elemente in die Fassadenebene eingefügt. Persönliche Vorlieben der kolonialen Statthalter wie lokaler Häuptlinge mussten bedient werden. Und da nie genug expatriate Arbeitskräfte zur Erledigung von Verwaltung und Güterproduktion zu Verfügung standen, musste die schwarze Bevölkerung diszipliniert werden, wozu Schulen, Kirchen und Gefängnisse gebraucht wurden. Die ethnische Fragmentierung der Wohngebiete, in fast allen Kolonialstädten zu beobachten, wurde unter dem Vorwand hygienischer Argumente durchgesetzt, folgte aber selbstverständlich anderen strategischen Zielen. Nicht zuletzt verhiessen die Kolonien aber auch Luxus und andere Freiräume für Abenteuer und Utopien. Die kolonialen Hafenstädte wurden von Ozeandampfern angelaufen, welche reiche Händler und Touristen beförderten. Architekten fanden die Möglichkeit, neue planerische Konzepte in die Realität umzusetzen. So gelang es einer Reihe von CIAM Mitgliedern, Pilotprojekte moderner Architektur in großen sozialen Wohnungsbauprojekten in Casablanca zu bauen, bevor sie in Europa

Gehör fanden – oder auch nicht. Einige Beiträge des Buches verdienen es, besonders erwähnt zu werden. Ein solcher ist gleich das erste Kapitel von Hassan Radoine, über ‚French Territorialities and Urbanism in Morocco 1912–25‘. Ebenso bemerkenswert ist der Aufsatz von Kai Gutschow über die Bau- und Stadtplanungsprojekte in Afrika gleich nach dem zweiten Weltkrieg. Die Beiträge des Mittelteils des Buches über die Architektur disziplinärer Institutionen tendieren stärker zu deskriptiven Abhandlungen und alle Kapitel hätten mehr Abbildungen zur Veranschaulichung der beschriebenen Bau- und Siedlungsformen vertragen.

Kosta Mathéy

Gesellschaft und Politik



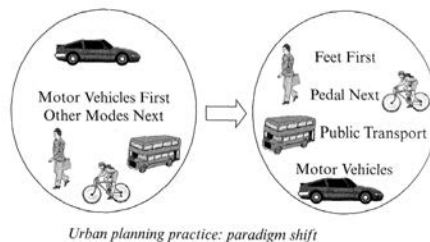
Florencia Almansi et al. Los Limites de la Participación. 206 S. ISBN 978-987-330088-2, IIED-AL, Buenos Aires, 2011. Zweisprachig Spanisch-Englisch.

Die Broschüre dokumentiert die Aktivitäten und Erfahrungen eines 2005–2010 vom IDRC (Canada) geförderten Projektes zur städtischen Umfeldverbesserung (Ciudades Focales). Projektträger war die NRO ‚IIED-AL‘ in Buenos Aires und Zielgruppe waren verschiedene Nachbarschaften der Gemeinde Moreno im Großraum Buenos Aires. Anders als in den meisten anderen Projektdokumentationen stehen hier nicht die publikumswirksamen Erfolge des Projektes im Vordergrund, sondern eine selbstkritische Auseinandersetzung mit den gemachten Erfahrungen – hier insbesondere in Bezug auf den für alle Beteiligten neuen partizipativen Ansatz. Die wichtigsten drei Projektpartner waren die Bewohner der betroffenen Stadtteile, die Stadtverwaltung und IIED-AL. Die Bewohnergruppen sahen sich durch den Prozess gestärkt in Hinblick auf künftige Kooperation untereinander, aber nicht notwendigerweise mit den Vertretern der Stadtverwaltung, deren Kooperationsbereitschaft die Bewohner in mehreren Aspekten enttäuschte. Als größte Herausforderung erwies sich die terminliche Abstimmung für gemeinsame Projektbesprechungen, gefolgt von Interessenkonflikten bei der Vergabe von Consulting- und Expertenverträgen. Die Vorzüge des integralen Planens wurde auch von den Technikern der Behörden verstanden – nicht jedoch von ihren Abteilungsleitern, die offensichtlich um ihre Autorität bangten. Auch hat es sich ein weiteres Mal gezeigt, dass Beteiligung den Planungsprozess verzögern kann – in diesem Fall um 25% der Zeit. Die Dokumentation könnte ein wichtiges Referenzwerk für künftige Projekte sein, die

partizipative Planung anstreben. Allerdings sollten hierfür die aufgetretenen Probleme weniger abstrakt vermittelt werden – und die Beschreibung des Projektes selbst weniger tagebuchartig.

Kosta Mathéy

Infrastruktur



Harry T. Dimitriou; Ralph Gakenheimer (eds). Urban Transport in the Developing World. 631 S. ISBN 978 1 84720 205 5. GBP 165,-. 2011. Edward Elgar Publishing Ltd. Cheltenham.

Dieser als ‚Handbuch‘ angekündigte Sammelband enthält 20 Kapitel von durchwegs renommierten Verkehrsexperten zu Mobilitäts- bzw. Erreichbarkeitsstrategien in Ländern des globalen Südens. Die Themen der einzelnen Beiträge sind, anders als beispielweise in Konferenz-Dokumentationen, gezielt in Auftrag gegeben worden, um systematisch möglichst alle relevanten Aspekte der Problematik abzudecken und behandeln, u.a.: Prognosen des künftigen Energieverbrauchs, Beeinträchtigungen der Umwelt, Zahlen und Kosten der Straßenverkehrsoffer, institutionelle Analyse, nicht-motorisierte Mobilitätssysteme; Armut als Rahmenbedingung, Hinterfragung von Wirtschaftlichkeitsberechnungen, Innenstadt-Sperrungen und Straßennutzungsgebühren, Light Rail und Bus Rapid Transit Systeme, Verkehrsbetreiber des informellen Sektors, soziale Gleichberücksichtigung etc. Eine Querschnittserkenntnis der unterschiedlichen Beiträge macht deutlich, dass unsere derzeitigen Verkehrsprobleme in den Ländern des Südens keine technischen Fragen sind. Die größten Herausforderungen liegen im Bereich der politischen Entscheidungsfindungen und dem Fehlen von ganzheitlichen und ortsspezifischen Ansätzen. Übergreifende Handlungsempfehlungen gehen vornehmlich in Richtung von mehr öffentlich kontrollierten Betreibern, besserer Ausbildung des Management- und Betriebspersonals sowie transparenten und demokratischen Entscheidungsprozessen. Erstaunlich ist, dass diese Stellungnahmen gerade von den Verkehrsexperten kommen, denen häufig noch konservative und autobesessene Verkehrsplanungen nachgesagt werden. Trotz des hohen Preises stellt diese Veröffentlichung eine empfehlenswerte Anschaffung für Institute und Bibliotheken dar. Den Verlegern sollte eine Ergänzung mit mehr und informationsreicherem Bildmaterial sowie eine für Studierende erschwingliche digitale Ausgabe ans Herz gelegt werden.

Kosta Mathéy

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APNHR Conference 2013 – Global Housing Dilemmas: The ways forward. Organised by the Asian Pacific Network on Housing Research (APNHR). Contact: APNHR 2013 Conference Secretariat, Faculty of Built Environment, University of Malaya, 50603 Kuala Lumpur, Malaysia. Tel: +603 79675216. Email <secretariat@apnhr2013.com>; <www.apnhr2013.com>

August 28–31, 2013 in Turin, Italy

ESA 2013 – Crisis, Critique and Change. 11th Conference of the European Sociological Association (ESA). Venue: University of Turin, Depart. of Culture, Politics & Society, Campus “Luigi Einaudi”, Lungo Dora Siena. Contact: Local Organizing Committee, Email <info@esa11thconference.eu>; <www.esa11thconference.eu>

August 29–31, 2013 in Berlin, Germany

ISA – RC 21 Conference 2013: Resourceful cities. Organised by the Research Committee 21 (Sociology of Urban and Regional Development) of the International Sociological Association (ISA). Venue: Humboldt University, Institute for Social Science, Dept. for Urban and Regional Sociology. Contact: <www.rc21.rg/conferences/berlin2013>

September 05–06, 2013 in Lisbon, Portugal

IPHS International Conference: Colonial and Post-colonial Urban Planning in Africa. Organised by the International Planning History Society (IPHS) and Institute of Geography and Spatial Planning, University of Lisbon. Further information: <<https://sites.google.com/site/cpcup2013/conference/>>

September 05–07, 2013 in New Delhi, India

6th Global Studies Conference: Social Development in South Asia – international conference to explore an interdisciplinary view on globalisation. Organised by the Global Studies Knowledge Community, co-hosted by Ambedkar University, Delhi. Venue: India International Centre, New Delhi. Contact / call for papers: <<http://onglobalisation.com/the-conference/call-for-papers>>

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8th International Academic Conference - IIES Naples Conference. Organised by the International Institute of Social and Economic Sciences (IIES) and the University of Economics in Prague, Czech Republic. Contact / information: <iises@iises.net>; <www.iises.net/conferences/naples-conference-september-16-19-2013/>

September 20, 2013 in Berlin, Germany

European Research Conference: Housing first. What's second? Organised by the European Network for Housing Research (ENHR), working group WELPHASE and FEANTSA. Hosted by Alice Salomon University of Applied Sciences, Berlin. Contact / information: <research@feantsa.org>; <www.enhr.net/documents/CVP_Berlin2013.pdf>

September 27–28, 2013 in Berlin, Germany

Urban commons: Moving beyond state and market. Organised by Humboldt Universität zu Berlin, Germany, Georg Simmel Centre for Metropolitan Studies Urban Research Group. Contact: <<http://hszkult.geschichte.hu-berlin.de/termine>>; <urbanresearchgroup.blogspot.de>

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European Transport Conference (ETC) 2013. Organised by the Association for European Transport. Contact / information: <<http://etcproceedings.org/>>

October 01–04, 2013 in Brisbane, Australia

49th Annual World Congress of ISOCARP: Frontiers of Planning: Evolving and Declining Models of City Planning Practice. Organised by the International Society of City and Regional Planners (ISOCARP). Contact / further information: ISOCARP, P.O. Box 983 2501 CZ The Hague, The Netherlands. Phone: +3170-3462654, Fax: +3170-3617909. Email <isocarp@isocarp.org>; <www.isocarp.org>

October 14–16, 2013 in Tilburg, NL

ECSR Conference 2013: Developments in Social Inequality and Social Cohesion. Organised by the European Consortium for Sociological Research (ECSR). Contact / information: <www.ecsrnet.eu> or <www.tilburguniversity.edu/about-tilburg-university/schools/socialsciences/departments/soc/ecsr-tilburg2013/>

October 14–19, 2013 in Colombo, Sri Lanka

ICCPP 2013 - International Conference on Cities, People & Places. Organised by the Department of Architecture of the University of Moratuwa in Sri Lanka. Venue: Sri Lanka Foundation Institute. Contact / call for papers: <iccpp2013@uom.lk>; <www.mrt.ac.lk/archi/ICCPP2013/>

October 17–18, 2013 in Cracow, Poland

The Idea of Creative City and the Urban Policy Debate. Organised by the Department of European Studies at the Cracow University of Economics and the Jagiellonian Club. Contact / information: <<http://creativecities.uek.krakow.pl/>>

November 04–06, 2013 in Istanbul, Turkey

CUI'13: Contemporary Urban Issues Conference on Informality: Rethinking the Urban. Organised by DAKAM (Eastern Mediterranean Academic Research Centre). Contact: <www.cuiconference.org>

November 20–23, 2013 in Munich, Germany

Symposium 2013: Metropolis Nonformal – Anticipation – Launching the UN-HABITAT Hub on Informal Urbanism. Organised by the Technical University Munich (TUM), Institute for Advanced Study, in collaboration with UN-Habitat. Contact / information: <www.tum-ias.de/metropolis-non-formal-symposium/>

November 21–24, 2013 in Baltimore, USA

56th Annual Meeting of the African Studies Association (ASA): Mobility, Migration and Flows. Contact: <<http://africanstudiesassociation.org/annual-meetings>>