Transformation through transportation: Some early impacts of Bus Rapid Transit in Orlando, Soweto

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In August 2009 Johannesburg became the first city in Africa to implement a full Bus Rapid Transit (BRT) system named Rea Vaya (or ‘we are going’). Largely based on the South American model, which includes exclusive bus lanes, enclosed bus stations and high service quality, the first 26 km-long trunk line connects eastern Soweto with the CBD, while feeder buses extend its reach into other parts of Soweto. Simultaneous with the construction of the bus corridor, the City of Johannesburg has been upgrading bus station precincts, including landscaping public spaces and redeveloping buildings (CoJ 2009).

Rea Vaya can thus be read as another instalment of the City of Johannesburg’s efforts to transform Soweto through a combination of infrastructure and policy interventions (as described in more detail in Chapter 15). But Rea Vaya is also more than this: through the incremental roll-out of further bus corridors across the city, the intention is to provide a network of metropolitan public transport that ‘improve[s] access and reduce[s] travelling time for residents to employment, education, recreation and markets’ (CoJ 2010: 241). The BRT is intended both as a sustainable transport option, capable of attracting car users and reducing congestion, and as an affordable option for low-income users. This dual mandate makes BRT a potentially important tool in the transformation of space in post-apartheid Johannesburg.

In this chapter we ask how successful BRT has been in achieving its second mandate, namely leveraging economic advancement for the poor. If BRT is to be instrumental in achieving social objectives in Johannesburg in years to come, the question is worth asking even at this early stage. The success of the Rea Vaya experiment is, however, also relevant in the context of national policy, as BRT has become an important element of the South African government’s
efforts to transform cities through spatial integration and provide ‘equitable basic access for all citizens’ (DoT 2007: 3). BRT systems are operational or under construction in at least four other South African metropolitan areas. Early lessons from the Rea Vaya experience could be valuable in assessing and perhaps adjusting the trajectories of these developments.

By many measures Rea Vaya can be considered a success: passenger numbers have steadily increased, new services have gradually been added and the taxi industry seems to be co-operating and participating in the transformation of public transport. It is still too early to assess Rea Vaya’s success in attracting car users and improving city efficiency, as these shifts take a longer time to manifest. Our analysis focuses on the benefits Rea Vaya delivers in terms of travel time and costs, especially to marginalised users; on its role in changing patterns of accessibility in the city; and on its effects on community perceptions. We show that the mobility benefits of Rea Vaya are real and significant, but that they are skewed towards middle-income rather than poor travellers, suggesting that more specific targeting might be needed for BRT to be a pro-poor transport intervention.

Our case study focuses on one area being served by the Rea Vaya trunk line, namely Orlando in Soweto. Orlando is bisected by the trunk line; three trunk stations (Orlando

**FIGURE 22.1.** Case study areas and BRT routes in Orlando, Soweto

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Stadium Station, Orlando Police Station and Boomtown Station) are located within its boundaries. Residents also have access to existing bus, taxi and train services. Housing consists of a mix of formal self-built houses, state-subsidised low-cost houses, backyard dwellings and informal shacks. In terms of its socio-economic diversity, Orlando is typical of Soweto neighbourhoods, although its location gives residents better access to a variety of public transport services than the typical South African township.

Data were collected in 2010 and 2011 by means of a face-to-face household survey with 150 randomly selected households located at varying distances from the trunk line (see Figure 22.1). The survey questionnaire collected data on household composition and demographics, housing, transport and travel patterns, and perceptions and satisfaction. Comparison of the sample with Census data for Orlando showed that the sample was representative of the general population, except that it is skewed slightly towards working persons and therefore towards the higher-income end of the population. The median monthly income was between R2 500 and R8 000 per household.

BRT impacts on accessibility and public transport use

Does Rea Vaya improve residents’ access, in general, to public transport? Respondents were asked to estimate the walking time to the nearest train, bus, BRT and taxi stop. The results showed that taxis are widely accessible within a five-minute walk from most homes. The BRT has a similar accessibility to the regular bus services (Metrobus and Putco), with the majority of households located within a 15-minute walk from either a BRT station or a feeder route. Given the already high levels of public transport access in the area, it is clear that Rea Vaya does not in general provide any better accessibility within the neighbourhood than existing public transport services. This is to be expected, as BRT routes by design follow major arterials which are also typically used by existing taxi and bus routes.

The popularity of BRT (versus other modes) is important as it indicates the extent to which it fulfils a need among would-be travellers and provides an attractive alternative to existing modes. About 75 per cent of workers in the sample use public transport to get to work. Of these, a good 30 per cent use Rea Vaya, making it the second most used mode after the taxi (Figure 22.2).

About two-thirds of Rea Vaya commuters from Orlando previously used taxis, and small numbers also used buses and the Metrorail train (Figure 22.3). This indicates that BRT is competitive with the minibus taxi, as indeed it was designed to be (the Phase 1A BRT trunk routes replaced about 580 minibus taxi vehicles from the Soweto-CBD corridor). But it also seems to offer an attractive alternative to some other public transport users and even to some who walked to their destinations before. Significantly, no Rea Vaya users switched from travelling by car to using BRT.

One reason why Rea Vaya does not (yet) simply replace another transport mode entirely is that its limited network enhances access to only some areas. When we compared the percentage of commuters using Rea Vaya versus other modes to get to specific work...
destinations, we found that areas located close to the BRT trunk line – including the Johannesburg CBD and the industrial areas just to the south of the CBD – attract the highest BRT usage (between 25 per cent and 36 per cent of trips), and thus benefit the most in terms of enhanced access from Soweto. These areas are, however, traditionally well served by other modes of public transport; they are located close to rail lines or bus routes from Soweto. The marginal increase in accessibility to these areas provided by BRT is likely limited.

It is, however, significant that BRT carries a relatively high share (36 per cent) of trips made to workplaces within Orlando or other parts of Soweto. This is somewhat surprising given the fact that BRT is typically described more as a way of enhancing longer-distance connectivity within an urban area – as indicated by the flat fare pricing (the same fare applies to all destinations along the trunk line), and the provision of an exclusive bus way between Soweto and the CBD. These design elements generate travel cost and time benefits, especially for longer trips. It appears that BRT might have a role as a local mobility mode within former township areas that might be very beneficial for the future integration of these areas into the CBD.
and economic development of these areas. Key to this is the fact that the Rea Vaya trunk service is priced competitively with the taxi, even for short-distance local trips.

For more remote destinations such as Rosebank, Sandton and Midrand, Rea Vaya captures 16 per cent of work trips, although commuters have to make multiple-trip journeys, taking BRT to the CBD where they transfer to another bus or taxi for the rest of the trip. This suggests that, even with a spatially limited starter network, BRT can provide accessibility enhancements to destinations much further afield.

It is important not to focus on work trips only, but to assess the extent to which BRT enhances access to non-work destinations. Given the fact that public transport in South Africa traditionally tends to prioritise work access, mobility options to other livelihood activities such as shopping and leisure are typically more constrained. BRT, however, operates throughout the day, seven days a week, and is designed to serve work and non-work destinations. The data showed that not insignificant numbers of trips for education (28 per cent) and shopping purposes (16 per cent) are made on BRT. Neither health trips (typically made to local clinics) nor social trips (typically made to destinations outside the city) make significant use of BRT. The overall implication is that BRT has become more than a dormitory township-style home-to-work transport service – and thus succeeds in moving away from the traditionally more restricted role of public transport as a labour service. It serves a more varied transport demand, and thus contributes towards achieving a wider set of livelihood objectives.

Travel time and cost impacts

Work trip data from the surveys were used to compare the door-to-door travel time between BRT trips and trips by other public transport modes. Figure 22.4 shows the results. Many Rea Vaya users clearly have shorter travel times than users of other modes. The spike at 50 minutes corresponds to the travel time from Orlando to the Johannesburg CBD (including access time at both ends).

However, these travel time differences could result simply from the fact that BRT serves a different set of (closer) destinations than do other modes. To get a more accurate idea of whether BRT offers travel time advantages to the same destinations, Rea Vaya users were asked to recall their travel time via the previous mode they used before switching to BRT. The responses indicated that, on average, Rea Vaya users saved 13 minutes per one-way trip to work at the same destination. As the survey area is near the inner edge of Soweto, the travel time savings delivered to travellers from other parts of Soweto (who would benefit from the exclusive bus lane for even longer distances) are likely higher than for this sample. So it seems very likely that, on average, Rea Vaya provides significant benefits to its users in terms of travel time savings of between 10 per cent and 20 per cent. The BRT does this by running in exclusive bus lanes devoid of congestion, and by offering higher frequencies and shorter waiting times – which more than offsets any additional time spent transferring from a feeder to a trunk bus.
The average travel cost for Rea Vaya users comes to R10.20 per one-way trip to work, as compared to R11.70 for other modes. Once again, controlling for destination differences by comparing Rea Vaya costs to the cost of the previously used public transport mode, Rea Vaya is reported to be a modest 20 cents per one-way trip cheaper on average. This amounts to less than a 2 per cent saving in fare, which is insignificant.

It is instructive, however, to differentiate between Rea Vaya users who save money when using it and those who do not. About two-thirds of Rea Vaya users are in the first category; on average, they save R2.50 per trip, which is a significant 21 per cent saving in travel cost. The remaining third of Rea Vaya users indicated that they pay more for their Rea Vaya trip than for the previously used mode. These might be non-price-sensitive users (probably with higher incomes), who switch to Rea Vaya for reasons other than to save money. While it cannot be assumed that cost saving is a significant benefit to all Rea Vaya users, it could certainly be of benefit to lower-income passengers by offering a more affordable travel option, thus effectively improving their retained income.

We found a lower likelihood of Rea Vaya use in areas requiring a feeder trip to the trunk line. An additional fare is payable for the feeder trip, increasing the fare by about 50 per cent. In fact, it was evident that some residents prefer to walk long distances to the trunk line station (in excess of 1 km) rather than board a feeder bus closer to home. This suggests that the location of the BRT route relative to a community is an important determinant of its impact and likely usage, and that lower-income users might be willing to accept longer access times in exchange for lower fares.
Benefits to lower-income residents

The question that remains is whether low-income passengers actually do benefit from these potential time and cost savings. Figure 22.5 plots the income distribution of the entire sample and of Rea Vaya users only. Clearly, some people with low incomes do use BRT and potentially realise travel cost savings. But persons living in households earning less than R2 500 per month are under-represented on Rea Vaya. By far the majority of Rea Vaya users are in the mid-income range of R2 501 to R8 000 per month. The conclusion drawn from this is that Rea Vaya does not seem to attract lower-income people as much as medium- and higher-income passengers.

One explanation for this is that lower-income people – including more unemployed persons, for instance – are simply less mobile and are therefore less likely to travel at all; they would thus be under-represented on all transport modes. To test for this, we repeated the above calculation only for mobile households – households with either workers or scholars using public transport on a daily basis. The results were substantially the same: even among mobile households, Rea Vaya is relatively less popular among lower-income groups. This is broadly in line with similar results found in other BRT systems, such as Bogotá’s TransMilenio (Hidalgo and Yepes 2005) on which Rea Vaya is largely modelled.

Another explanation might be that lower-income passengers prefer to use another mode for reasons of affordability. This is plausible, as Rea Vaya fares are higher than those of the rail (when using a weekly or monthly pass), and it is known that rail is used by many low-income commuters. Rea Vaya serves many of the same destinations as the rail, but does so
at a higher level of service quality and at a higher price – a price which is not attractive to many price-sensitive low-income passengers with access to cheaper alternatives.

Impacts of BRT on community perceptions and satisfaction

The perception questions aimed at determining levels of satisfaction among Orlando residents with the public transport services at their disposal, and with life in the neighbourhood in general. Construction of the Rea Vaya trunk line through Orlando was accompanied by significant upgrades to streets and public spaces around stations (see for instance Figure 22.6). The majority of residents (between 50 per cent and 70 per cent) did feel that transport had improved for them over the preceding two years. These perceptions were strongest among residents living within 1 km of the trunk line and stations, where street improvements were concentrated.

However, such positive perceptions do not extend to satisfaction with life in the neighbourhood in general. About two-thirds of respondents felt satisfied with the area, but there is no strong indication that either proximity to or use of the Rea Vaya contributes to an enhanced sense of community satisfaction. Satisfaction with the area is driven more by other factors, most notably the type of housing occupied. Households living in informal settlements or backyard shacks are much less likely to feel satisfied with living in this place (only 11 per cent felt satisfied) than households in formal houses (79 per cent).

FIGURE 22.6: The BRT station precinct at Orlando Stadium, 2010
Conclusion

In this chapter we have attempted to open an early window into some of the poverty impacts of Johannesburg’s Rea Vaya BRT system. Even though Rea Vaya is young – at the time of this study it had been in operation for only two years – some useful findings emerge that might help point the way towards appropriate transport responses to the urban poverty problem here and elsewhere.

Taken in sum, Rea Vaya seems to realise some of the user benefits typically associated with the BRT concept, specifically cost and time savings that are gained through its explicit emphasis on speed, network connectivity and a progressive fare policy. Focusing on the Orlando area in Soweto as a case study, we find that on average Rea Vaya users save between 10 per cent and 20 per cent of their travel times, which is a significant benefit. Cost savings of about 20 per cent accrue to a majority of BRT users, but this is not universal: about a third of users pay more than they did before. The implication is that BRT serves a variety of people, including those less sensitive to price.

To the extent that low-income passengers can spend time and fare savings on other goods, Rea Vaya contributes to poverty reduction. However, it seems that the poor benefit less from these savings than might be supposed. In the case study area, Rea Vaya seems to be used disproportionately by middle-income users. The fact that it does not attract as many low-income users is largely due to one factor: Rea Vaya is priced higher than the cheapest available public transport alternative, the commuter rail, which remains the mode of choice for the poorest commuters. Overall, therefore, the direct benefits of Rea Vaya are skewed in favour of the less poor. Can this be expected to be a general characteristic of BRT in South African cities? Clearly not: local specifics, such as the availability of other modes, pricing policy and destinations served, would determine its impacts on the poor. But it does caution against claims that BRT is automatically an effective vehicle for achieving poverty-reduction goals.

Transport interventions might also help reduce poverty by enhancing the range of opportunities that poor communities can access. Here Rea Vaya’s main achievement lies in the realisation of its vision of being a basic mobility service rather than just a conventional township-to-work service as exemplified by conventional bus and rail services. The evidence shows that BRT serves a diverse user population with varied travel patterns, including school, shopping and leisure activities during peak and off-peak hours. It thus contributes towards achieving the City of Johannesburg’s efforts at normalising life in Soweto. There is little evidence that Rea Vaya directly enhances access to work opportunities. This is not surprising: the first Rea Vaya routes follow the existing high-volume corridor between Soweto and the Johannesburg CBD, which is already well served by minibus taxi, bus and rail modes. In fact, this is likely to be the case for most BRT services in South African cities, as BRT by its nature requires relatively high passenger volumes to perform optimally, and is thus more likely to be placed along existing public transport corridors. Many of the long-term access-enhancing benefits will be realised only once networks become more integrated and well developed.
Rea Vaya seems to be an unexpectedly popular mode for travel within Soweto itself: it captured about a third of public transport trips to workplaces within Soweto. The long-term implication is that BRT might be a valuable strategy in supporting the development of more mixed land uses within former township areas and along priority corridors, thus supporting the diversification and strengthening of local economies by knitting together areas that were formerly divided. The planning and design of future BRT systems – including route selection, station placement and fare policy – might do well to keep this possibility in mind, and avoid focusing on long-distance mobility only.

In terms of more wide-ranging benefits of Rea Vaya on community perceptions and satisfaction, it seems to make a modest contribution to people’s satisfaction with the area in general, satisfaction being driven more by other issues such as housing and employment. Significant, however, is the sense of local improvement that people in Orlando seem to associate with the Rea Vaya – a majority of people feel that transport has improved for them in recent years, and this feeling is strongest among those who actually use the Rea Vaya. This implies that Rea Vaya, with its associated streetscape upgrading, is perceived as a positive intervention by the city in people’s lives – a perception that might contribute to greater local pride and cohesion within Soweto, and leverage further social benefits in the future.

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Notes
1 The term ‘Integrated Rapid Transit’ is used as an alternative to ‘BRT’ in other parts of South Africa.
2 Mokonyama and Mubiwa discuss the genesis of Rea Vaya in more detail in Chapter 10 of this volume.
3 For a description and assessment of the impacts of Rea Vaya on local minibus taxi operators, some of whom were displaced and became contracted operators of Rea Vaya’s first phase, see McCaul and Ntuli (2011) and Venter (2013).
4 Other poverty impacts of BRT that have been studied internationally include employment benefits to workers in the transport industry, and impacts on land values. Studies have found that employment benefits depend on the extent to which BRT replaces existing public transport services and re-employs low-wage workers at better pay scales or under better working conditions (e.g. Gilbert 2008). There is evidence that property values rise in the vicinity of BRT corridors, which may benefit home owners but disadvantage renters (e.g.
Rodriguez and Targa 2004). The data are not yet available to study these poverty impacts in the case of Rea Vaya.

5 These results match those, in general, of other studies on the equity impacts of BRT systems in South America and Asia. In many cases BRT systems improve access by reducing the time and money required to get to work, especially compared to the slow and expensive public transport alternatives that low-income commuters usually depend on (EMBARQ 2011; Hidalgo and Yepes 2005). Where BRT is implemented together with significant sidewalk and bike path improvements, these benefits are further enhanced. However, several authors have noted that these benefits are not necessarily spread equally across the population, and the poor may still find themselves excluded from the wider urban economy (Gilbert 2008; Hidalgo and Yepes 2005).

6 Since the time of this research, Rea Vaya has implemented a distance-based fare linked to a smart card payment system. As this raises the cost of long-distance trips relative to short-distance ones, it would reduce the advantage previously given to longer-distance travellers.

7 The shift to a different pricing structure would change these results. In fact, the move away from a flat fare structure can be expected to significantly reduce the potential poverty benefit of Rea Vaya, given the fact that poorer users tend to travel longer distances in South African cities.

References


