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PUBLIC TRANSPORTATION SOLUTIONS IN SOUTHERN AFRICA: CASE STUDY ZIMBABWE AND SOUTH AFRICA

Abstract

Our research investigates current challenges faced in southern Africa's public transport sector and proposes a possible solution to overcome these challenges. Using South Africa and Zimbabwe as case studies, we identify shared challenges experienced in both countries for which a universal solution may be adopted. It was found that these challenges could mostly be attributed to government actions. We propose a need for better integration of social outcomes within public transport policy at the strategic, tactical and operational levels throughout the region. Moreover, we suggest that technology-driven solutions can be introduced in the public transport realm, amongst other solutions, entailing a universal cashless payment system coupled with GPS technology.

Keywords: public transportation, urban development, sustainable transport, network reform, southern Africa

Introduction

Urbanisation over the last few decades has been one of the main contributors to economic growth in southern Africa. This trend is likely to continue, coupled with rapid population growth, it is projected by 2050 nearly two thirds of the world's population will be concentrated in urban areas with close to 90% of the increase from Asia and Africa (UN, 2018). As a result, the growth of informal settlements in the outskirts of metropolitan areas where land costs less will mean that commuters

will experience long travel times and increased travel costs. Public transport is the primary choice of travel in southern Africa and is a driver of economic growth. It, therefore, needs to be reliable, affordable, accessible, flexible and safe. This paper identifies challenges in two southern African countries (i.e., South Africa and Zimbabwe) by highlighting problems that transcend economic structures, geographic location and traffic – together with population movement. Solutions are presented for the identified challenges, however, for the better part of them active government implementation and constant monitoring and evaluation is needed.

Since the mobility of people is essential to their ability to participate in society, southern Africa's mobility in metropolitan areas assures the majority of the population the need for stable public passenger transport systems (Finn, Mulley, 2011). In most of southern Africa, public transport is provided by public or private operators who have medium- to long-term agreements with a transport authority for a defined set of services, enforced legal protection against interlopers and are usually subsidised to cover any losses due to the social, environmental, economic and political dimensions of the services.

1. Methodology

The methodology of the research is primarily based upon the review of literature. The methods to identify and assess was conducted systematically using the following electronic journal databases: Science Direct, Web of Knowledge, Scopus, Science Direct, Sage, Directory of Open Access Journals, Google Scholar and Google. We specifically searched for the following English language keywords including "transport + Africa", "transportation + Africa", "public transport + Africa", "public transportation + Africa", "urban development + Africa", "sustainable transport + Africa" and "network reform + Africa". Once the literature was compiled, publications were systematically analysed so as to identify those that presented specific findings that presented an overall review of the public transportation circumstances within southern Africa, focussing on South Africa and Zimbabwe, using strategic and critical reading methods (Matarese, 2013). From this original compilation of the literature we then identified and analysed the identified literature and relevant information regarding different public transportation reports and data. To better focus our research, we filtered out articles published before 1989 and omitted articles that did not discuss the nexus between public transportation and southern Africa, leaving us with approximately 20 publications that included literature published in the form of books and technical reports.

2. Public transport challenges in South Africa

In 2017, research conducted by the National Household Travel Survey (NHTS) reviewed the state of public transport in South Africa by assessing the extent to which public transport services are offered, facilities are provided and accompanied

costs and affordability are amounted for the traveller. The survey revealed that 34.1% of households in South Africa own a car while the other 66.9% rely on other transport modes (i.e., taxi (22.9%), walk (19.9%) and worked from home or none (11.9%)). A complete list of the varying modes of transport used by household members travel to school and work is illustrated in Table 1. Each of the available modes of public transport has its challenges. According to the NHTS in 2017, train users (41%) were generally more than satisfied (42%) with train services. Travellers placed key importance on punctuality of service, levels of crowding, distance from the station and security (NHTS, 2017). Metrorail trains have been marred by the constant lack of structure in terms of its scheduling and dependability; their website provides a timetable, but trains often do not comply with the schedule (i.e., 38.7% of train users claimed it was not available).

Table 1. Mode of transport used by household members to travel to school and work, 2017

Mode of transport	Usual transport to school		Usual transport to work	
	N	%	N	%
Walking	10 033	64.8	3 466	19.9
Bicycle/motorcycle	133	0.9	196	1.1
Minibus taxi/sedan taxi/bakkie taxi	1 028	6.6	3 982	22.9
Bus	558	3.6	812	4.7
Train	83	0.5	448	2.6
Minibus/bus provided by institution/ government and not paid for	436	2.8	na	na
Vehicle hired by a group of parents	1 713	11.1	na	na
Own car or other private vehicle	1 471	9.5	5 922	34.1
Lift club	na	na	440	2.5
None, studies/work from home	na	na	2 059	11.9
Other	22	0.1	57	0.3
Subtotal	15 478	100.0	17 382	100.0
Unspecified	263		238	
Total	15 741		17 620	

Source: (NHTS, 2017)

Taxis were the most commonly used form of public and subsidised transport in South Africa as 37.1% of households had at least one household member who used a minibus or sedan taxi or bakkie taxi during the week preceding the NHTS survey (Figure 1). While approximately two-thirds (66.8%) of individuals that attended an educational institution walked there, only 20.5% of individuals walked to work. Only 9.4% of individuals travelling to school travelled by private car while a further 7.1% used taxis. Private vehicles remained the most common source of transport (NHTS, 2017).

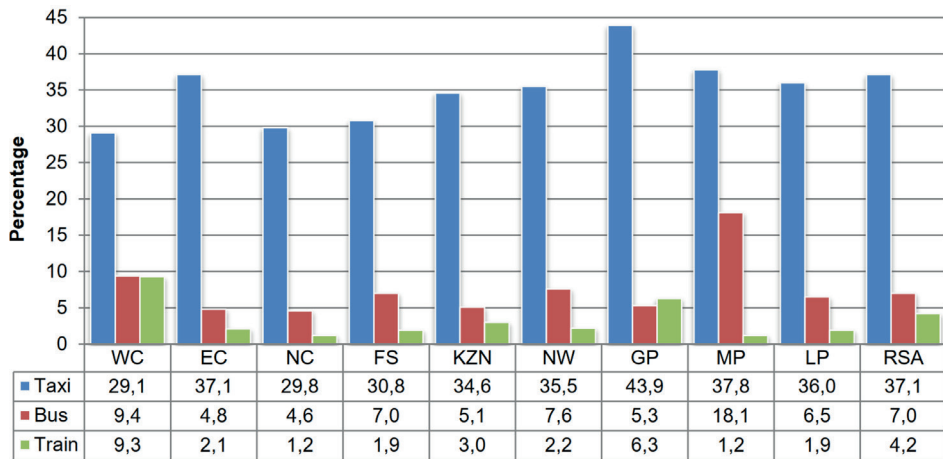


Figure 1. Percentage of households who made use of public transport during the week preceding the survey by province, 2017
Source: (NHTS, 2017)

There is an abundance of the low capacity vehicles (i.e., 16 seaters), which provide a door-to-door service and flexibility to many travellers. There are more accessible than trains, due to the route and network flexibility (NHTS, 2017). Several taxis operate without licenses, in some cases, they are driven by unlicensed drivers. This has been followed by complaints from travellers, who are affected by the violence associated with this transport mode. Taxi fares alternate due to peak time and weather, and the driving behaviour of most taxi drivers is usually reckless. Problems with the bus service are largely attributed to infrequent bus service during off-peak hours. Bus services do not cover certain routes leaving travellers with the option to walk or use another form of transport to get to their destination. Buses are a safer option, compared to the other transport modes.

For the average commuter, these challenges translate to longer travel time which has a significant impact on their transport costs. In addition, the availability of travel information for all the modes of transport continues to be a challenge. There is a need for greater regulation in this industry because most issues raised by travellers highlighted the absence of policy and universal guidelines that facilitate information sharing among the different players in the public transport sector.

3. Public transport challenges in Zimbabwe

In recent history, the economic conditions in Zimbabwe have proven to be the principal challenge to the public transport system. After deregulation of the transport industry, the state-owned bus service provider fleet depleted by 45%, and routes decreased from 450 to 270 (Mbarara, 2006). The only buses operational in the country are for long distances between cities and towns and not within. The metro train services have since stopped operating. This has seen a rapid

growth in minibus taxis as the primary mode of transportation. Without regulation, the taxis have a monopoly of the public transport sector. There is an inequitable allocation of routes, resulting in an overproduction of transport services in one area, excluding other routes. The fares are not set and fluctuate according to economic conditions, weather and “feelings” of the driver. Overcrowding in the minibus taxis is another problem. Because operators need to make as much profit as possible they overload their vehicles, which results in faster degradation of road infrastructure and accidents.



Figure 2. (left) Steet blocked by minibus taxis; (right) Minibus loading and unloading in the middle of the road

Source: (Mbara, 2015).

The absence of government intervention in providing a policy to guide and regulate public transport provision means they have less influence in the management and planning of the public transport sector. This unfortunate situation comes from a lack of capacity in terms of personal resources as well as institutional arrangements at the various levels of authority, in addressing problems facing urban or commuter transport users. Another challenge in the public transport of the country is the payment system. The cash crisis and cash flow problems are leaving people with more electronic money rather than physical. This crisis demands a different ticketing system rather than paying for the taxi.

4. Common public transport challenges in southern Africa

South Africa and Zimbabwe have different public transport structures resulting in different challenges experienced by travellers in each country. Notwithstanding the differences, the countries in southern Africa do experience the similar problems. With the use of the two diverse countries, the five following challenges are common:

(1) infrastructure, (2) access to rural areas, (3) government and politics, (4) access to fuel prices and (5) safety and pollution.

4.1. Infrastructure

A good transport system depends on a reliable transport infrastructure. Transport infrastructure requires large investments and regular maintenance to prevent it from being unsuitable for motorists to use. The high cost of paved road construction tends to limit most major road interventions to the public sector (Porter, 2007). In southern Africa, especially in Zimbabwe, the road infrastructure has deteriorated at an alarming rate, with the roads becoming narrower and pot holes damaging vehicles and increasing the maintenance cost to road users. There is a disparity between rural and urban transport infrastructure. Road infrastructure in rural areas is not as sophisticated as in urban areas, creating a public transport challenge in those areas. Another challenge infrastructure presents is its availability. For transport modes such as trains, the tracks are already in place and the challenge is managing the trains that are running on tracks daily, and minor maintenance of tracks.

4.2. Access in rural areas

Workers in the primary sector (i.e., mining and agriculture) are in remote rural areas as are seasonal workers of certain crops. Rural areas are often overlooked in transport planning which presents a great challenge for passengers in those areas. On the other hand, rural areas present a spatial problem of people being sparsely situated and the infrequency of their travels. This makes it difficult for a solution to be introduced that satisfies transport providers, government and passengers. Overlooking rural areas in transport planning is a serious challenge that many southern African countries face.

The scholar and general practitioner transport issue in rural areas is another challenge within the region. Certain transport operators can be subsidised by the government to transport scholars and general practitioners to and from schools and medical clinics because there is usually only a single provider, no accountability, responsibility or follow up from the government. It brings to light a transport failure related to poor access in rural regions and lack of efficient and reliable public transport for those communities.

4.3. Government and politics

In Africa, corruption and politics play an immense role in public transport decisions. Nigeria is an example, despite the massive expansion of its inter-urban paved road system during the 1970s and early 1980s oil boom, inadequate construction quality (i.e., corrupt road contractors) and failure to maintain roads soon led to severe deterioration (Filani, 1993). Politics influences who is awarded road contracts, resulting in the exclusion of certain areas which do not benefit

the contractor, and maintenance for a particular area whilst neglecting others. The decision to improve roads is based on politics rather than merit, making efficient public transport a bigger problem.

The regulation and policies of transport are also politically determined. For example, in South Africa the African National Congress (ANC), the ruling party, released a National Development Plan with a Vision 2030. If the ruling party were to change, they would bring their own development plan which affects the transport policy. There is no set transport policy that is not affected by political parties or influential people's opinions, which is a challenge to overcome.

In the minibus taxi industry, there are no strict laws or rules to guide their activity, and the with government officials owning taxis, regulation is not prioritised. There are high rates of sexual harassment reported from taxi drivers, reckless driving and traffic crimes committed. Law enforcement needs to be held more accountable during road blocks so that they can actually enforce the law. Police officers set up illegal road blocks in order to collect money from road users. The increase in the number of traffic offenders getting off using bribes is another government challenge. Weak enforcement of traffic regulations, vehicle inspection and driver behaviour and traffic management is a common practise in many southern African cities (Kumar, Barrett, 2008). Finally, financial resource allocation is another government related challenge of public transport. When taxes are collected and government spending increases, there are other sectors that are of importance other than transport. In most instances, more funds are spent on healthcare, housing, and education.

4.4. Access to fuel and prices

Fuel costs and availability is a critical challenge for public transport in southern Africa. Access to fuel at an affordable price is a crucial factor in transportation and politically very sensitive. Fuel costs commonly account for 10% to 40% of overall vehicle operating costs (Porter, 2012; Vilakazi, 2018). Fuel is a determinant of the fare paid for the transport service – when adjusted it affects the passengers mostly. Fuel levies and taxes, which also affect fuel price, are used for the road maintenance and improvement, connoting the existence of them is a necessity.

4.5. Safety and pollution

Most forms of transport are ill-maintained and are old, making them a danger to people and the environment. Buses have a speed limit and operate at low speed for long hours. Minibus operators usually cause noise pollution by the calling and hooting for passengers. Environmental consciousness is something several public transport operators are ignorant about; these examples are grave challenges for future public transport in much of southern Africa. Moreover, transport has emerged as the highest single energy-consuming human activity in most countries. This means transportation needs to pay attention to climatic events and take appropriate measures to reduce pollution by investing in cleaner and alternative options.

5. Viable solutions to challenges

To be beneficial to a wide sector of the continent's population, transport planning also requires a detailed understanding of the economic, social and political environments in which transport takes place and interventions are made (Porter, 2007). Solutions are needed for the public transport challenges presented above.

5.1. Intermediate means of transport

There needs to be extensive planning that increases accessibility and provides an integrated transport system for people in rural areas. People in remote areas require less motorised forms of transport, highlighting the importance of strengthening non-motorised transport. The emphasis on using vehicles such as bicycles can improve access of people in rural areas. Cycling will not require a large investment in infrastructure, with the advantage of being environmentally-friendly is an important option to consider. In countries throughout Africa (e.g., Kenya), there has been a reduction taxes placed on bicycles which has increased their use (Porter, 2007).

5.2. Apolitical transport policies and regulation policy

The government has the challenge to create an enabling environment and to provide a clear policy framework for the provision and operation of public transport (Mbara, 2006). The main problems are a lack of effective policy implementation, mainly due to: (1) lack of sustainable funding to achieve the ambitious policy objectives; (2) huge financial demands to replace ageing bus, rail and taxi fleets; (3) lack of skills to effectively implement and monitor policy initiatives; and (4) complex political and policy relationship between the three levels of government dealing with public transport (Walters, 2013). Politics present itself as a key decision maker for many transport related issues. Governments need to produce transport policies that benefit the people, irrespective of income, race or political affiliations. Insinuating a policy that remains constant irrespective of the ruling political party and party member sentiments. Policies ought to have specific goals and guidelines that transcend modes.

In the minibus taxi industry, stricter guidelines need to be put in place for taxi drivers. There needs to be a taxi driver registry, indicating the licenses (i.e., validity of licensing), roadworthiness of vehicles; and drivers should require training in terms of defensive driving and first aid training. With the increase in accidents and floods in southern Africa, drivers need to be aware of how to save passengers' lives and be accountable to their passengers. The policy should also include GPS devices placed on taxis, to monitor speed and driving behaviour.

5.3. Adequate urban and rural planning

The local authorities have the responsibility to provide infrastructure and services to residents in urban areas. The location of physical infrastructure such

as houses, industries and commercial centres have implications on transport costs. The appropriate land use planning policies that integrate residential and employment places will significantly solve some of the public transport challenges (Mbara, 2006). Transport infrastructure usually follows after the development of an area has taken place, instead, developments need to be along already existing transport infrastructure to reduce the need of huge capital investments required to build transport infrastructure.

5.4. Integrated payment option

Government needs to provide a universal form of payment for all modes of transport and only allow passengers to pay cash for emergencies. This reduces the time people spend paying instead of a 'tap and go' mechanism. For a country like Zimbabwe, this would be an appropriate solution considering the current cash crisis, passengers can use a prepaid card which allows them access to public transport.

One innovative solution that might tackle most of the public transport challenges is a travel application. The introduction of a travel application that uses GPS devices on minibus taxis and maps out routes, times and distances of a taxi. This development can possibly facilitate cashless payments, use a scan or card mechanism completely removing conductors in minibus taxis. Another benefit from it would be, the ability to record passengers in a taxi and prevent overloading. Such an application can notify passengers of the nearest taxi or passengers can take themselves to the nearest route. It can also show traffic conditions, provide routes and allow the driver to be aware of potential traffic jams or any interference in the road.

Conclusions

We have identified the challenges related to public transport with the use of two countries in southern Africa to develop solutions to public transport problems. There is a need for better integration of social outcomes within public transport policy at the strategic tactical and operational levels. Governments need to play a key role in decentralising places of business and make policies that promote an integrated approach to public transport planning within southern Africa, in order to achieve full regional integration. The aim is to establish a sustainable public transport plan that can satisfy short term demand at a reasonable cost without replicating mistakes from developed countries. With access to emerging transport infrastructure and technologies, southern Africa can become the test-bed and breeding ground for tomorrow's urban transport systems. New mass transit systems can be introduced to replace or work alongside existing services. Cape Town and Johannesburg have been successful in implementing Bus Rapid Transit services that work together with existing public transport services. This shows that it is possible to accommodate a range of transport types to account for all means of public transport services.

More focus needs to be put into developing mobile public transport applications that will assist commuters and law enforcers and regulators together with transport operators in achieving a sustainable public transport service.

References

- Filani, F.M. (1993), Transport and rural development, *Journal of Transport Geography*, 1(4), pp. 248–254.
- Finn, B., Mulley, C. (2011), Urban bus services in developing countries and countries in transition: A framework for regulatory and institutional developments, *Journal of Public Transportation*, 14(4), pp. 89–107. Available from <https://doi.org/10.1093/sysbio/sys107>.
- Kumar, A., Barrett, F. (2008), *Stuck in Traffic: Urban Transport in Africa. Africa Infrastructure Country Diagnostic (AICD)* (Vol. 1). Available from <https://doi.org/2.7>.
- Matarese, V. (2013), Using strategic, critical reading of research papers to teach scientific writing: the reading–research–writing continuum. In: *Supporting Research Writing* (pp. 73–89). Elsevier. Available from <https://doi.org/10.1016/B978-1-84334-666-1.50005-9>.
- Mbara, T.C. (2006), *Coping With Demand for Urban Passenger Transport in Zimbabwe: Challenges and Options*. Harare, Zimbabwe: Department of Rural and Urban Planning, University of Zimbabwe.
- Mbara, T.C. (2015), Achieving Sustainable Urban Transport in Harare, Zimbabwe: What are the Requirements to Reach the Milestone? In: *CODATU 2015*. Istanbul, Turkey: Department of Transport and Supply Chain Management, University of Johannesburg.
- NHTS (2017), *General household survey. Statistics South Africa*. Available from <https://www.statssa.gov.za/publications/P0318/P03182017.pdf>.
- Porter, G. (2007). Transport planning in sub-Saharan Africa. *Progress in Development Studies*, 7(3), pp. 251–257. Available from <https://doi.org/10.1177/146499340700700305>
- Porter, G. (2012). *Transport services and their impact on poverty and growth in rural sub-Saharan Africa: Literature review*, London.
- UN (2018), *2018 Revision of World Urbanization Prospects*, New York.
- Vilakazi, T.S. (2018), The causes of high intra-regional road freight rates for food and commodities in Southern Africa. *Development Southern Africa*, 35(3), pp. 388–403. Available from <https://doi.org/10.1080/0376835X.2018.1456905>.
- Walters, J. (2013), Overview of public transport policy developments in South Africa. *Research in Transportation Economics*, 39(1), pp. 34–45. Available from <https://doi.org/10.1016/j.RETREC.2012.05.021>.

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