SOUTHERN AFRICAN SOLUTIONS TO PUBLIC TRANSPORT CHALLENGES

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ABSTRACT

Transportation is an integral part of the development of any country. Against the backdrop of rapid urbanisation and lack of resources, African countries face an uphill battle to find viable transport solutions to tackle some general and local challenges. In South Africa, there have been considerable investments in transport, and there will continue to be. However, although necessary, most of these investments require enormous amounts of time and money. Certain transport management measures may be used to get the best out of the current infrastructure and systems that are already in place. Several of these measures are investigated in this paper and it was concluded that better transport management can help transportation operate more efficiently and also provide support for future infrastructure.

1. INTRODUCTION

A modern transport system aspires to be an environmentally sustainable network that is integrated, safe, reliable, affordable and intermodal (*Oszter, 2017*). A system like this facilitates the efficient movement of goods, people and services, thus improving a city's competitiveness as a destination for investment. It also acts as a medium that connects citizens to one another as well as to employment and other economic opportunities (*Oszter, 2017*).

Currently, South Africa's public transport network is made up of various modes, including (*Gov.za, 2017, Transport.gov.za, 2017*):

- Passenger rail - Rail commuter services, metro rail.
- Gautrain – An 80 km-long mass rapid transit railway system. It transports approximately 52 000 passengers a week.
- Minibus taxis and buses – More than 200 000 on the road carrying 68% of total daily commuters.

- BRTs – Four are currently functional (*MyCiTi*, *Rea Vaya*, *A Re Yeng* and *Go George*) and another is expected to launch shortly (*Harambee*). They have an estimated combined ridership of approximately 90 000 passengers per weekday.

Despite these, South African transport still faces several challenges. These include, low ridership, lack of public transport accessibility in rural areas, equity imbalances and congestion (*Jennings, 2015*). According to the National Household Travel Survey, average travel times in Gauteng across all modes of transport have increased by 44% from 32 Minutes to 46 minutes (*Statistics South Africa, 2013*).

To address these issues, a national transport master plan, the NATMAP 2050, was laid out. It aims at delivering a dynamic, long-term and sustainable transportation system framework that is demand responsive and provides a coordinated transport agenda for the whole country (*Gov.za, 2017*). Thus, massive investments are being made in new transport infrastructure with rail as the backbone. Plans to revitalise the PRASA network as well as the extension of Gautrain are already under way. In addition, all the South African BRT systems will expand in phases over the coming years and the expansion and construction of roads will continue (*Gov.za, 2017, Transport.gov.za, 2017*).

The implementation of infrastructures such as those mentioned is costly and time consuming, but the difficulties experienced in public transport are ever present and will not be fixed overnight (*Maparu and Mazumder, 2017*). Several, lower cost and less time consuming, measures can be put in place to better manage the current infrastructure to alleviate the strains of some transport challenges (*WCRTP, 2008*). This paper aims to discuss some of these practices.

2. TRANSPORT MANAGEMENT MEASURES

2.1. Travel Demand Management

Travel demand management aims to reduce vehicle trips by increasing travel options, providing incentives and information to encourage and help individuals to modify their travel behaviour and by reducing the physical need to travel through transportation efficient land uses (*Kutz, 2013*). Its focus is on the movement of goods and people rather than motor vehicles. Several strategies are used to try and achieve these goals. These include (*WCRTP, 2008, Fiorini et. al., 2015*):

- High Occupancy Vehicles (HOVs) – Single Occupancy Vehicles (SOVs) are the least efficient method of moving passengers. SOVs typically make up the majority of highway traffic, they generate a large amount of pollutants and tend to cost more than other alternatives. A variety of financial incentives can be implemented to convince travellers to move out of SOVs and travel by more efficient means. Individuals are incentivised to utilise carpooling and ride sharing schemes to save

on fuel and vehicle maintenance costs. Dedicated right-of-way also brings with it travel time-savings, which can be very powerful in certain markets.

- Parking Management - A limited parking supply at peak-hour creates a shortage of supply to accommodate parking demand. Strategies that encourage a more efficient use of existing parking facilities, reduce parking demand and promote a shift to non-SOV modes. Managing parking reduces the undesirable impacts of parking demand on local and regional traffic levels. Smart management of parking can improve economic activity in certain areas by ensuring access to retail businesses.

- Work Practices and Schedules - Trip congestion generally occurs during peak periods. Alternative work schedules may allow travel demand to be spread out throughout the day. These might include staggered hours, flexitime or a compressed work week. Telecommuting and teleconferencing can allow employees to work remotely by using technology thereby eliminating the physical need to be in an office.

- Congestion Pricing - Charges are used to disincentives the driving of vehicles in certain areas or on particular roadways during periods of peak congestion. Congestion pricing differs from traditional tolling in that tolls are generally fixed amounts charged on a single roadway whereas congestion pricing involves a variability in charges based on levels of congestion or time of day. They can also be charged over a wider area instead of a single roadway as is seen with tolling. Public transport and carpools are exempt from paying the toll, thus discouraging the use of SOVs. Where carpools are not exempt, riders can still benefit from being able to share the toll.

2.2. Intelligent Transport Systems

Intelligent transportation systems (ITS) include technologies for collecting, processing, dissemination or acting on information in real-time to improve the operation, safety and convenience of the transportation system (*Lu, 2016*). It aims to achieve this through the following policies (WCRTP, 2008):

- Expanding the use of advisory radio, variable message signs and roadway weather information to alert motorists to changing traffic conditions.

- Employing the use of adaptive and special event traffic controls to minimise traffic congestion.

- Implementing traffic flow monitoring and incident detection devices as funds allow.

- Investigating the development of a traffic management centre to monitor the transportation system and allow adaptive responses to maintain optimal traffic flows

during peak periods, construction detours, transient incidents, accidents and emergencies.

Intelligent transport systems process and share information that can prevent potential crashes, keep traffic moving and decrease the negative environmental impacts that the transportation sector has on society (Fiorini et. al., 2015). The ultimate benefits of a transformed transportation system through ITS are a fully connected, information-rich, safety and mobility oriented system with wide-ranging potential to adopt (Lu, 2016).

2.3. Multimodality

A key component of improving a city's transit experience is increasing the performance and attractiveness of alternate travel choices, especially in more compact areas where public transport can operate cost-effectively *(Hirohisa, 2015)*. This can be achieved through improved payment methods, improved schedule coordination, circulatory services and real-time information *(Hirohisa, 2015)*. Another aspect of this is the improvement of non-motorised transit schemes (*Rahul and Verma, 2013*). These modes, such as walking and cycling, are broadly used and have low operation costs. They provide environmental benefits, in that they are non-polluting modes, and their infrastructure requirements are far less intense than other modes (*Rahul and Verma, 2013*). They can also be supported through existing infrastructure.

2.4. User Information

Supply and demand is based on the assumption that people will choose the shortest and cheapest routes. Users need to be provided with timely and accurate information regarding transportation conditions in order to continuously make informed decisions (*Mulley et al., 2017*). These decisions revolve around modal choice, routes choice and when to travel, if at all. Traveller information brings with it a greater level of awareness and predictability of services that can result in a greater and more efficient travel experience (*Abenoza et. al., 2017*). Informed decisions result in a supply and demand curve that is more representative of the public's choices, resulting in more effective design from planners and engineers. Added benefits include safety and congestion avoidance. Also, accidents and injuries can be reduced by informing the public when road conditions are unsafe. User information is also crucial in diverting traffic or passengers during a road incident and through adverse weather and active work sites (*Mulley et al., 2017*).

2.5. Enforcement

A regulatory system must be enforceable. Transport management strategies must be properly enforced for the intended added benefit to be realised (ESCAPE, 2003). Enforcement can come in the form of on-the-ground officers at select locations and technology driven surveillance schemes. Effective enforcement requires penalties. Generally, financial penalties are used, however these must be sufficiently severe to deter possible offenders. Alternative penalties may include the revoking of licenses, sanctions

and prison time. The appropriate kind of enforcement can improve user compliance, thus improving safety and system effectiveness (ESCAPE, 2003).

3. CONCLUSION

Transportation must add value. It should be a driver of economic growth, have a strong user focus and should respond to market demands. These goals must be factored in at every level of decision making regarding the development of transportation networks. It is clear that no amount of capital investment will improve transportation unless there is a change in operating inefficiencies. A good transportation network requires large investments, however these investments should not be seen solely in shape of large, new and exciting infrastructures. The systems in which they operate can prove to be just as important, if not more, in providing efficient transport. As we have seen, certain management strategies can get the best out of current infrastructure while still laying the foundation on which future interventions can comfortably rest.

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