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Abstract

The evolution of transport has primarily been driven by fossil fuel energy, resulting in multiple adverse impacts, including traffic congestion, urban sprawl, depletion of natural resources and air pollution. These negative externalities have necessitated a shift towards sustainable mobility, characterised by the use of energy efficient public transport that incorporates non-motorised transport and is supported by compact, decentralised and multi-functional urban layout.

The current study evaluated the sustainability of Johannesburg's road public transport, consisting of taxis, Metrobus, private buses, and the bus rapid transit system, Rea Vaya. The evaluation focused on public transport sustainability from a commuter perspective and thus assessed the efficiency of the service provided. To achieve this, four efficiency parameters were selected, they were accessibility, travel time, non-motorised transport, and reliability. The study utilised qualitative research data gathering tools in the form of questionnaires and interviews; and for rigour results were analysed using the thematic data analysis approach.

Study results revealed a deficiency in the availability of multiple modes throughout the study area, consequently the most accessible public transport option, taxis, had higher patronage and the least accessible mode, Rea Vaya had limited users. Furthermore, results indicated that urban residents walked long distances to access transport, and that local travel was easier than regional travel due to the dense urban form in townships. The incorporation of non-motorised transport lagged as Rea Vaya was the only mode with cycling infrastructure. However, walking was found to be inherent in the system due to commuters needs to travel rather than choice.

In assessing travel time, findings revealed that extended travel duration resulted from system inefficiencies such as waiting periods, multiple connections, winding routes, and vehicle mechanical failure. These inefficiencies were more pronounced in taxis and private buses, and further contributed to the energy inefficiency of the system by increasing vehicle kilometre travelled and fuel consumption. Additionally, commuters found public transport unreliable, especially taxis, as a consequence of extended waiting periods and unavailability during non-peak periods. Beyond system inefficiencies, commuters were concerned with public transport vehicle maintenance and infrastructure provision, such as adequate roads and traffic lights.

Overall, Johannesburg road public transport system comprises all four sustainability indicators; however, these are not integrated but rather spread across the different modes. Taxis are the most accessible transport mode, though not most sustainable. Inversely, Rea Vaya is the most sustainable mode, but it is inaccessible. In conclusion, the accessibility of a public transport system was valuable to commuters than overall sustainability.