



Original Article

Inclusive and Sustainable Public Transportation in Nairobi

Winnie Vutagwa Chore^{1*}, Prof. Sixtus Kinyua Mwea, PhD¹, Dr. Simpson Nyambane Osano, PhD¹ & Miracle Wachira¹

¹ University of Nairobi P. O. Box 30197, GPO, Nairobi, Kenya.

* Author for Correspondence ORCID: <https://orcid.org/0000-0001-9902-9652>; Email: winniechorefaria@gmail.com

Article DOI: <https://doi.org/10.37284/eaje.5.1.864>

Publication Date: **ABSTRACT**

29 September 2022

Keywords:

*Sustainable Transport,
Socially Just,
Urban Emission,
Public Transport.*

Public transport is a service rendered by the government to its citizens for moving people and goods from one point to another. Sustainable transport refers to systems of transport whose impacts are environmentally and socially acceptable. Sustainable transport is ideally a system that is beneficial to the community environmentally - low- and zero-emission, economically - affordable modes of transport and socially – accessible to everyone. Firstly, a sustainable public transport system is environmentally just when the system endeavours to reduce the amount of Greenhouse Gas Emissions (GHG) emissions being emitted into the atmosphere. It is reported that globally transportation systems account for approximately 25% of carbon dioxide emissions and world energy consumption. Secondly, it is socially just when it is readily available and is able to cater for the need of the vulnerable in society such as the elderly, Persons with Disabilities (PWDs), children, and even women. Thirdly, it is economically just when the system does not lead to the government losing huge chunks of money due to time lost in traffic congestion, being affordable to commuters, and saving them time. Therefore, Public transport is ideally a public good and should be a public service to the citizens of a country just like education and health. The Kenyan Road-based public transport system is not really a public transport but rather a profit-making private transportation business that serves the transportation needs of the society.

APA CITATION

Chore, W. V., Mwea, S. K., Osano, S. N., & Wachira, M. (2022). Inclusive and Sustainable Public Transportation in Nairobi *East African Journal of Engineering*, 5(1), 156-162. <https://doi.org/10.37284/eaje.5.1.864>

CHICAGO CITATION

Chore, Winnie Vutagwa, Sixtus Kinyua Mwea, Simpson Nyambane Osano and Miracle Wachira. 2022. "Inclusive and Sustainable Public Transportation in Nairobi". *East African Journal of Engineering* 5 (1), 156-162. <https://doi.org/10.37284/eaje.5.864>.

HARVARD CITATION

Chore, W. V., Mwea, S. K., Osano, S. N., & Wachira, M. (2022) "Inclusive and Sustainable Public Transportation in Nairobi", *East African Journal of Engineering*, 5(1), pp. 156-162. doi: 10.37284/eaje.5.1.864.

IEEE CITATION

W. V., Chore., S. K., Mwea, S. N., Osano & M., Wachira, "Inclusive and Sustainable Public Transportation in Nairobi," *EAJE*, vol. 5, no. 1, pp. 156-162, Sep. 2022.

MLA CITATION

Chore, Winnie Vutagwa, Sixtus Kinyua Mwea, Simpson Nyambane Osano & Miracle Wachira. "Inclusive and Sustainable Public Transportation in Nairobi." *East African Journal of Engineering*, Vol. 5, no. 1, Sep. 2022, pp. 156-162, doi:10.37284/eaje.5.1.864.

INTRODUCTION

Transport as we know is the act of moving goods and people from one place to another using the different available modes such as road, air, rail, or water. This therefore makes public transport a system of trains, buses, etc. that is paid for or run by the government (Merriam-Webster, 2022). Sustainable transportation systems are also measured by their effectiveness and efficiency (Mihyeon Jeon, 2005).

Developed public transportation systems are usually managed and operated effectively per schedules, on specific routes with a pre-defined amount that is charged. Examples of public transport include city buses, trolleybuses, trams (or light rail) and passenger trains, rapid transit (metro/subway/underground, etc.) and ferries. (CDC, 2018)

The transportation system in Kenya, and more specifically Nairobi, was not always so disorganised. In the 1970s all through to the early 1990s, the transportation system was organised. In 1966, the Nairobi City Council (NCC) partnered with Kenya Bus Services Limited (KBS) to ensure affordable and regular public transport provision on all city routes irrespective of route potential and would utilise cross-subsidies within the network. In 1973 matatu was declared a legal form of public transport; the matatu mode neither needed any public transport licence to operate nor were they required to pay any taxes to the city or central government. In 1986, the government started operating a parastatal (called Nyayo Bus Services Corporation) providing public transport in Nairobi. At the same time, the Kenya Railways Corporation introduced commuter trains for urban and peri-urban transport during peak hours. At this juncture, the public transport system was somewhat organised, and the commuters had

several reliable options to choose from. But this did not last because the competition between the KBS, Nyayo Bus, matatu and railways was not fair. There were low financial and regulatory barriers to entry into the Nairobi city transport market, and a quick return was expected only if they kept their operating costs low (Opiyo, 2002).

This ultimately led to road public transport being operated by private operators who to them transportation is business like any other and therefore should generate a good stream of income and have a nice profit.

Justification

Public transport systems are meant to improve mobility and provide social and economic connections and people quickly take up the opportunities offered by increased mobility. Socially, poor households can benefit greatly from having a variety of reliable options to choose from. The advantages of increased mobility need to be weighed against the environmental, social, and economic costs that transport systems pose.

The role of Public Transportation in the day-to-day life of citizens is one that is very critical and an important basic need. Public transport gives individuals access to mobility, jobs, neighbourhood services, health care, and recreational possibilities. The Integrated Urban Development Master Plan for the City of Nairobi (NIUPLAN) 2014 reported that a majority of our population uses public transport which is approximately 6.8 million person-trips per day out of which 40% of the population walking, 40% on public transport, 15% on private vehicles and the remainder on 2-wheelers (NCC, 2014). The Matatu buses, which are run by private companies, are the closest thing to public transportation in Kenya

For the most vulnerable in our society, public transit policies are a crucial component. People with disabilities have frequently noted how they are limited in many areas of their lives that need them to move around in public transport vehicles noting that this limits them in what they can do on a day to day and what they can achieve (Institute of Medicine (US), 2007). In general, our knowledge of disabled people's travel habits is limited. The statistics that we do have tend not to differentiate travel by a person's level of handicap severity, household income, possession of a driver's license, ownership of a car, and other key factors that may affect mobility, such as sex and age.

EVALUATION OF OUR TRANSPORTATION SYSTEMS.

Are our systems Inclusive and Sustainable?

To respond to whether the system in Kenya is inclusive and sustainable, it is necessary to understand that a sustainable transportation system is one that allows people, businesses, and society basic access, is affordable, runs fairly and efficiently, provides a variety of modes of transportation, and promotes a competitive economy and balanced regional development, limits emissions of air, water, and noise, as well as trash and other contaminants (Black, 2005). In addition to the time spent away from the family while commuting and vulnerability to fuel price increases, the social costs of transportation also include traffic accidents, air pollution, physical inactivity, and time taken away from families. The majority of those severely affected are the citizens who are not able to buy personal vehicles and drive cars and are disproportionately affected by several of these negative effects (Social Exclusion Unit, 2003).

This article provides a general overview of Kenya's transportation options, with a focus on Nairobi and the surrounding counties. In order to determine if the system is inclusive and sustainable, it seeks to emphasise the current situation.

The majority of Nairobi residents cannot afford to take matatus or buses, therefore they move around primarily by walking to reach their destinations. Whether it is to work, school, the market, hospital, or social visits to family and friends, many Nairobi residents walk. More precisely, walking accounts for 39.7% of all urban movements. (NCC, 2014) This is highly attributed to poor transportation systems, infrastructure, and the high cost of transportation. Despite being the most common form of transportation, non-motorised transportation facilities and infrastructure are not readily available and where provided, they are usually in a terrible state and hardly maintained. It is a common occurrence to see cyclists fighting for road space on the highways because they do not have dedicated cycling facilities that are safe.

To address the affordability of motorised transport, the National Transport and Safety Authority (NTSA) in the NTSA Act of 2012 was tasked, among other duties with the task of fare regulation as stated in the act as follows "Subject to the provisions of this Act, the Authority may attach to a road service licence such conditions as it may consider fit for the purposes of ensuring that:

- The fares imposed for the carrying of passengers are reasonable and ensure fair competition within the transport industry.
- Copies of the timetable and fare table are carried and available for inspection; and
- The safety of passengers and in particular, that they alight and are picked from such areas as may be designated for that purpose." (NTSA Act, 2012)

This, however, has not been enforced and implemented by the regulator as fare prices are very much influenced by market forces.

Road transport accounts for the majority of motorised transport despite having a rail system. A huge chunk of Nairobi's mobility needs can easily be solved by having a mass transit system and our rail service if improved can be an instant

relief to the public. The rail service currently is only available during peak hours and between the city's central business district and its eastern and southern regions. With the introduction of the newly procured Diesel Multiple Units (DMUs), the service has tried to include some services during the off-peak hours of the day (Business Today, 2021).

On our roadways, traffic is quite congested due to matatus and private vehicles. If no action is taken, Nairobi's accessibility and viability will be threatened by this congestion, which has grown significantly over the previous few years. Peak hours are when traffic is at its worst, which is bad for the city's and its residents' social and economic development. The traffic involved comes from a region with a radius of at least 30 kilometres, even though the CBD is where the congestion is most noticeable. As evidenced by the Thika Highway, increasing the number and width of roadways will not alleviate the issue (Ingerop, 2018). Road space itself is not an important factor; rather, it is how it is allocated and utilised.

A 2017 report by the Kenya Institute of Public Policy Research and Analysis (KIPPRA) found that the cost of traffic is considerable (Gachanja James, 2012). The country's economy incurs a massive loss because of traffic congestion; this can be attributed to the lost time by commuters, the delaying of supply of products and services, commuters having to endure the hike in fare prices by the operators etc. The authority that is tasked with regulating public transport has not been successful in implementing and enforcing fare policies.

There are 4.5 million premature deaths worldwide attributed to air pollution, and Nairobi is no exception. Additionally, the use of motorised transportation is associated with non-communicable diseases like cancer, obesity, diabetes, and cardiovascular problems. On-street parking spaces that have been transformed into matatu termini are a common sight in Nairobi's central business district. As the matatus are waiting for passengers to board, they keep the

engines running throughout. (Ingerop, 2018). This action alone made the PM_{2.5} concentrations measured in the past around these matatu stops range from 50 to 128 g/m³. These criteria exceed what is deemed acceptable globally.

People with disabilities (PWDs) must have access to the transportation system in order to participate fully in society on both a social and economic level, and this participation is hampered by the absence of universal accessibility of the transportation system in both urban and rural areas. Therefore, safe mobility requires PWDs to be able to use a mode of transportation on their own. The "hidden" additional cost that PWDs must pay for their mobility is one way how mobility for them is not affordable as it should be. For instance, PWDs frequently have to use taxis rather than the available public transportation, and they may even pay more than the other passengers. PWDs in rural areas may be less mobile because the cost is higher there and there are fewer transportation options for them. (Mutuku et al., 2020)

INTERVENTIONS

What Can Be Done to Make the Systems More Inclusive and Sustainable?

In sustainable transport, the connotation Avoid-Shift-Improve (ASI) is widely used to express the strategy in developing or improving transportation systems. This strategy seeks to appeal more to the commuters to choose public transport, which is deemed to be environmentally sustainable rather than focussing on the infrastructure and facilities (Bongardt D, 2019). It is however good to note that the availability of good infrastructure and transport facilities goes hand in hand with commuter acceptability and therefore public sensitisation is important.

The three elements are considered hierarchical, with avoiding being considered as the most critical in the hierarchy and therefore it is given priority.

The three elements that make up the strategy are expounded as follows (Bongardt D, 2019)

- Avoid, which is also identified as a reduction measure, aims at encouraging the user to use none of or less of a resource. In transportation, this could mean consolidating or eliminating vehicle trips.
- Shift, which is also referred to as the maintaining element, is where the main agenda is to switch from a less sustainable method of consumption to a more sustainable one, e.g., using a bicycle instead of an automobile and/or if the more sustainable option is already in use, it is maintained.
- Improve, which is the last element on the hierarchy, seeks to increase the resource efficiency of the existing service. In transportation, it is concerned with increasing the operational effectiveness of the public transportation system while also emphasising vehicle and fuel efficiency. In context, a person may decide to use smaller cars or cars with better energy and carbon efficiency in the medium or long run

Other than Avoid-Shift-Improve (ASI) above, other interventions that are relevant to our context are:

- To invest in Cycling Infrastructure by having high-quality and safe street design standards for sidewalks, cycle paths, and crossings.
- Draft and enforce Policies that discourage private car use like high parking prices.

When it comes to social considerations, Kenya made strides with the Persons with Disabilities Act, 2003 and the 2010 Constitution to ensure that the differently abled persons (PWDs), the elderly, women, youth, and children who are often excluded in public transport are catered. The Act states that “Persons with disabilities are entitled to a barrier-free and disability-friendly environment to enable them to have access to buildings, roads and other social amenities, and assistive devices and other equipment to promote their mobility

with disabilities” (Persons with Disabilities Act, 2003). Despite all these Persons with Disabilities (PWDs) still face challenges in various modes of transport.

BENEFITS

Why is it Important to Have a Sustainable Public Transport System and Whom Does it Benefit?

Benefits that are derived from having a sustainable public transport system are vast, both tangible and intangible and are not only focused on individual benefits but at a city and national level too such as;

- Cost savings on fuel and vehicles
- Reduced carbon emissions from burning fossil fuels, resulting in less air pollution
- Job creation with increased vehicle and battery manufacturing and fuel production
- Job creation for BRT operators and associated workers such as conductors, cleaners, security etc.
- Improved accessibility to reliable, affordable transportation options.

The incorporation of public transportation options and considerations into broader economic and land use planning can also help a community expand business opportunities, reduce sprawl, and create a sense of community through transit-oriented development. Such development fosters a sense of neighbourhood safety and security by providing a hub for public activity.

Cities with effective public transportation networks are prosperous economically and provide location benefits to companies and people deciding to locate their offices or homes there. Additionally, in times of catastrophe, public transit is essential for a quick and safe evacuation. (FHWA, 2002)

CONCLUSIONS

For economic and social progress to occur, efficient, organised urban transportation is a necessity. A mass rapid transit system (MRTS) for Nairobi is required, and it should include buses, commuter rail, light rail, and the metro. The main goal is to transfer the current matatu and bus sector while also introducing Bus Rapid Transit (BRT).

For the lowest socioeconomic strata to flourish economically and socially, there must be accessible, inexpensive urban public transportation (three-quarters of the population). Affordability and accessibility are important factors for the success of an integrated public transport system.

Traffic control is essential for maintaining city accessibility as well as for the effective operation of Bus Rapid Transit (BRT), which could provide a convenient substitute for private transportation.

The emission issues discussed in this write-up that are directly related to the current transportation systems can be solved by a modal shift. Moving to and maintaining walking and cycling modes in particular is very essential as they are the most efficient and ecologically friendly ways to enhance sustainable mobility. Despite the fact that public transportation, i.e., Bus, rail etc also produces emissions, the corresponding carbon dioxide (CO₂) emissions per passenger-km are believed to be lower compared to cars due to lower specific energy consumption per passenger-km and higher occupancy levels. Government initiatives and incentives such as tax reprieve on importation of electric vehicles and the availability of charging infrastructure will persuade people to shift from using Internal Combustion Engine (ICE), i.e., cars running on fossil fuels to electric vehicles.

There is a great gap in the transport resources that are provided to travellers with disabilities by public transportation systems. It takes active collaboration between planners in the transportation field and a variety of other policy and program areas to meet the transportation demands of such vulnerable users. Urban

designers, educators, doctors, career counsellors, and land use planners are just a few examples of relevant professionals. Depending on how they are built, transportation infrastructure can either make it easier for people with disabilities (PWDs) to participate in a variety of social and economic activities or make it more difficult for them to do so. While safety depends on the transportation system's capacity to shield the most vulnerable users from accidents and injuries, accessibility depends on the built environment's capacity to acknowledge the variety of demands of PWDs along the travel chain.

Implementation of the existing policies in place. There are a number of existing policies that are yet to be implemented and enforced many years after they were adopted by policymakers. There are needs to have clear guidelines for implementation and enforcement right from the drafting stage to enforcing these policies.

Enforcement agencies need to be empowered in road asset protection. There has been laxity with our road agencies and county government departments in road asset furniture protection. Where footpaths have been beautifully and functionally constructed, we find cars parked in the middle of the footpaths destructing the pedestrians, we find hawkers displaying their good right in the middle of the walkway. Because of such scenarios, many pedestrians are forced to walk on the carriageway and try to evade the cars on the roads.

In order to improve the efficiency of the transport system as a whole. The industry needs to collect, analyse, and interpret data in order to generate a wholesome transport demand management system.

REFERENCES

- FHWA. (2002). The Importance of Public Transport. In T. F.-U. Transportation, *Status of the Nation's Highways, Bridges, and Transit:2002 Conditions and Performance Report*. Retrieved from <https://www.fhwa.dot.gov/policy/2002cpr/pdf/ch14.pdf>

- Black, W. R. (2005). Sustainable Transport: Definitions and Responses. *Symposium on Sustainable Transportation*. Retrieved 7 28, 2022, from <http://onlinepubs.trb.org/onlinepubs/archive/conferences/sustainability/black.pdf>
- Bongardt D, S. L. (2019). Sustainable Urban Transport: Avoid-Shift-Improve (A-S-I). *New Urban Agenda*. Retrieved from https://www.transformative-mobility.org/assets/publications/ASI_TUMI_SUTP_iNUA_No-9_April-2019.pdf
- Business Today. (2021). *Hourly Train Rides for Nairobi Commuters After New DMUs Arrive*. Retrieved from Business Today: <https://businesstoday.co.ke/hourly-rides-on-nairobi-commuter-rail-after-new-dmu-trains-arrive/>
- CDC. (2018). *Public Transportation System: Introduction or Expansion*. (O. o. Strategy, Producer) Retrieved from Centers for Disease Control and Prevention: <https://www.cdc.gov/policy/hst/hi5/publictransportation/index.html>
- Gachanja James. (2012). *Evaluating the Impact of Road Traffic Congestion Mitigation Measures in Nairobi Metropolitan Region*. NMA: The Kenya Institute for Public Policy Research and Analysis (KIPPRA).
- Ingerop. (2018). *BRT Line 3 design*. Nairobi.
- Institute of Medicine (US). (2007). The Future of Disability in America. In C. o. America, *The National Academies*. National Academies Press, US.
- Mihyeon Jeon, A. A. (2005). Addressing Sustainability in Transportation Systems. doi:[https://doi.org/10.1061/\(ASCE\)1076-0342\(2005\)11:1\(31\)](https://doi.org/10.1061/(ASCE)1076-0342(2005)11:1(31))
- NCC. (2014). *Integrated Urban Development Master plan for the city of Nairobi*. Nairobi.
- NTSA Act. (2012). *Kenya Law*. Retrieved from http://www.kenyalaw.org/lex//actview.xql?actid=No.%2033%20of%202012#part_IV
- Opiyo, T. (2002). The Metamorphosis of Kenya Bus Services Limited in the Provision of Urban Transport in Nairobi. *SSATP*. Retrieved from University of Nairobi research archive: <http://www.ssatp.org/sites/ssatp/files/publications/Presentations/KenyaBusService.pdf>
- Persons with Disabilities Act. (2003). *Kenya Gazette Supplement No.111 (Acts No.14)*. Retrieved from <https://ncpwd.go.ke/download/personswithdisabilitiesact-pdf/>
- Social Exclusion Unit. (2003). *Making the Connections: Final Report on Transport and Social Exclusion*. Social Exclusion Unit. Retrieved from https://webarchive.nationalarchives.gov.uk/ukgwa/20100907154242/http://www.cabinetoffice.gov.uk/media/cabinetoffice/social_exclusion_task_force/assets/publications_1997_to_2006/making_transport_2003.pdf
- Stella Mutuku (Young Professional), V. M.–K. (2020). Enhancing Accessibility in Transport Infrastructure by PWDs. Retrieved from KiPPRA: <https://kippra.or.ke/enhancing-accessibility-in-transport-infrastructure-by-pwds/> Webster, M. (n.d.). Encyclopedia.