

# Evaluating Factors Affecting Bus Rapid Transit (BRT) Efficiency in Dar es Salaam

Emanuel G. Manase<sup>1</sup> | Julieth Koshuma<sup>2</sup>

<sup>1,2</sup> Dar es Salaam Maritime Institute, Dar es Salaam, Tanzania.

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## Abstract:

Dar es Salaam's Bus Rapid Transit (BRT) system, locally known as *Mabasi ya Mwendokasi*, started operations on 10 May 2016 to address the city's escalating traffic congestion and mobility challenges, stemming from rapid urbanization and population growth. Spanning approximately 21.1 km with 29 stations and operated by around 210 Golden Dragon buses. Despite early gains, significant disparities in access and ongoing operational challenges continue to raise serious concerns about Dar BRT System. The aimed at evaluating factors which affect BRT efficiency in Dar es salaam by determine the impact of current BRT infrastructure, determine the role of operational management practices of BRT and examine the impact of institutional support and public-private partnerships in BRT services. To comprehensively address the research questions, the study adopted mixed method research design employing these data collection tools Questioners, Interview, Observation and Literature Reviews. Data were analysed using thematic analysis and descriptive statistics for qualitative insight and quantitative insight respectively. Analysis yielded different factors infrastructure, bus frequencies, maintenance and Partnership with private sectors have strong relation to the efficiency of BRT system in Dar es salaam. Thematic analysis revealed that dedicated lanes are sometimes invaded by unauthorised vehicles reducing efficiency and in danger life of passengers, the introduction of dedicated lanes has reduced travel times hence increasing efficiency, also many BRT buses get Breakdown during rainy season which diminish operational efficiency, through Public-private partnership efficiency is increased through fleet expansion funds allocation and risk sharing. The study recommended that the infrastructure enhancement and regular maintenance, close management of fare and revenue collection and strong Public-private partnership significantly improve efficiency by reducing waiting time at station, reliability and increase ridership.

**Keywords:** BRT efficiency, BRT lanes, Public-Private Partnership, Passengers, reliability, ridership.

## 1. Introduction:

Transportation development is too rapid and uncontrolled causing various problems to the environment and human welfare. The study by (Adebiyi, 2022) enlightened that many people in urban areas depend on public transport as their major transport mode in traveling to their daily activities. They use public transport in traveling to school or college, work, shopping, leisure, and visiting friends. However, many cities especially in developing countries like Tanzania, are facing

various public transport problems such as severe traffic congestion, longer commuting times, delays, overcrowding, accidents, noise pollution and high vehicle emissions (Loyde, 2020). With rapidly growing population of the city of Dar es salaam, the government began to draw plans for the rapid transit system back in 2003 (African Development Bank, 2016). It was forecasted by 2015 the city population to be over 5 million therefore the government invited the Japan International Cooperation agency to design a

master plan for the transport around the city. The project was placed under prime ministers' office and a Dar Rapid Transit Agency (DART) was created through government notice.

DART is a bus rapid transit system that began operation on 10 May 2016 in Dar es salaam consists of 6 phases. DART system is expected to be completed with all six phases by the year 2030. Once completed, the DART system will have a total length of 130.3 km and expected to serve nearly 90% of all Dar Es Salaam population (Chengula and Kombe, 2017). Nikitas and Karlsson (2015) stated that BRT is expanding rapidly throughout the world because of its advantages of low cost, rapid implementation, operating flexibility, high performance, and the implementation of BRT system in Tanzania is expected to meet several benefits that make them a suitable infrastructural feature of modern metro cities.

BRT corridors shift sizeable commuter from individual vehicles to high-capacity bus system, which can carry a heavy multiple pf people at a time compared to the former. BRT corridors makes it possible for the city authorities to demolish old and polluting vehicles. the efficiency of traffic movement due to BRT corridors leads to a positive impact on greenhouse gas emissions and help to bring down air pollution. A well-structured BRT corridor system contribute to bringing down traffic-related accidents and reduces the number of fatalities on the road. the higher frequency of the bus service minimizes the waiting time for passengers which saves their travelling time.

## 2. Literature Review:

### 2.1 Infrastructure factor

Infrastructure is the basic physical systems of a business, region, or nation. Also is the physical systems and structures, such as transportation and communication networks, that support a community or nation. Examples of infrastructure include transportation systems. Transportation infrastructure significantly impacts the efficiency, accessibility, and overall effectiveness of a transportation system. Well-developed infrastructure facilitates smoother, faster, and more reliable movement of people and goods, while inadequate or poorly maintained infrastructure can lead to delays, increased costs, and safety concerns. Also, well-maintained BRT lanes significantly improve safety by reducing

accidents and injuries, allow for faster travel times and reduced congestion, leading to greater efficiency of the system. Sustainable transport infrastructure, such as cycling paths and public transport networks, can reduce reliance on private vehicles, leading to lower emissions and a smaller environmental footprint (Yannis & Chaziris, 2021).

### 2.2 Maintenance practices

Effective maintenance practices are essential for ensuring the efficiency and reliability of Bus Rapid Transit (BRT) systems. Studies across 44 BRT systems worldwide confirms that reliability driven by well-maintained infrastructure and fleet directly influences user satisfaction and system speed (Cats & Ishaq, 2020). Neglecting maintenance can trigger serious issues such as breakdowns, increased costs, and diminished service quality. Unplanned service disruptions from poor maintenance not only impede schedules but also degrade passenger satisfaction and trust, leading to higher operational expenditures (Mo et al., 2022) while proactive upkeep remains far more cost-effective than emergency repairs (NBRTI, 2023).

Proper maintenance ensures that infrastructure, vehicles, and operational systems function optimally, minimizing disruptions and maximizing service availability. Conversely, inadequate maintenance can lead to breakdowns, delays, and increased operational costs, ultimately reducing the overall efficiency of the BRT system. Effective maintenance is a cornerstone of successful BRT systems. It ensures operational efficiency, reduces costs, enhances safety, and maintains high service quality. Therefore, investing in comprehensive maintenance strategies is vital for the sustainability and success of BRT systems (Msumanje, 2021 & Kazaura, 2023).

### 2.3 Financial support

Large-scale international financing via concessional loans and grants was instrumental for constructing infrastructure and procuring buses. These investments allowed DART to establish segregated lanes, dedicated terminals, and a modern fleet core components that underpin reliability and speed (AfDB, 2016). Adequate funding has enabled the government and DART authority to increase fleet size from 140 to 210 buses, reducing overcrowding and shorter waiting times (ITDP). These enhancements directly improve service reliability and operational

consistency. Shared financing and risk allocation between government and private partners have helped DART remain operationally resilient (ITDP). Public-Private Partnership through a partnership with private sectors enhanced investment in infrastructure and fleet expansion and securing financial funding will increase the efficiency of the BRT and performance at large.

Long-term sustainability of BRT depended on the consistent funding, efficient management and well-structured institution. Failure to invest on the BRT led to poor service and overall drop of the performance of the BRT.

## 2.4 Theoretical Framework

### 2.4.1 Transport Efficiency Theory (1956)

The origin of transport efficiency theory is traced to early economic and transport geography models, particularly developed by Walter Isard (1956) and William Alonso (1964) in spatial economics. This theory suggests that an effective transport system should optimise resource use, reduce congestion, and improve travel time while maintaining affordability and accessibility (Banister, 2018). Basing in this study, in the context of evaluating factors influencing BRT efficiency, the theory contributed to the increase efficiency when there is proper utilisation of resources, thus hold significant relevance. Optimisation of resources like proper allocation of funds, increasing number of buses, regular maintenance, drivers training will reduce the congestion at the bus terminals, increase reliability, comfortability and passengers' satisfaction. Weakness of the theory was it ignored environmental and social factors focusing only on cost and time. Failed to address accessibility issues for marginalized groups, and does not consider behavioural aspects such as user preference and modal shift barrier. Due to these weakness study adopted System Theory in Public Transport for more reliable information on the aspect of Public transport.

### 2.4.2 Systems Theory in Public Transport (1968)

The theory was derived from General system theory by Ludwig Von Bertalanffy in the year of 1968 and later applied to transport by Kenneth Button and David Hensher in (1980s-1990s). The theory supported the study since BRT system also is interconnected infrastructure network, with passengers as operation users, and regulators

which guide safe travels. When one of these components fail to perform effectively it will affect the efficiency of BRT at large since they depend on each other. BRT efficiency depends on well-integrated infrastructure, reliable operations, and effective governance (Hensher & Li, 2022). This theory also emphasized on balancing environmental, social and economic aspect of transportation.

## 3. Research Methodology:

The study used mixed method approach and design combining quantitative analysis for objective insights and qualitative analysis through interviews to capture subjective experience. Study focused on understanding the various factors that influence the efficiency of BRT in Dar es salaam. The efficiency is assessed through several dimensions, this focuses the study to use both qualitative metrics and quantitative insights into the daily experience of commuter and operator (Kruger et al. 2021). The research is centered in Dar es salaam, Tanzania. This urban area with population estimated at over 6.7 million people, is experiencing rapid urbanization and severe traffic congestion. The study specifically focused on the Bus Rapid Transit corridor. Studying this area provided critical insights into how infrastructural, environmental and socio-economic factors interact in fast growing city.

The study focused on various groups associated with Bus Rapid Transit in Dar es salaam such commuters and BRT users these are individual who use the BRT system daily for work, education, or other travel purposes. BRT staff and operator such bus drivers, maintenance crews, station personnel and operational managers responsible for the day-to-day functioning of the BRT system. Also, local business owners and street vendors who are located in proximity to BRT stops and terminals, and who are impacted by changes in accessibility and passenger flow. Considering the three categories of the targeted population of 200,000 users, the study allowed the researcher to identify key respondents where about 390 respondents were selected and Stratified Random Sampling was used for selecting BRT commuters, staffs, business owners and street vendors to ensure all stakeholders are well-represented in the study while maintaining statistical validity.

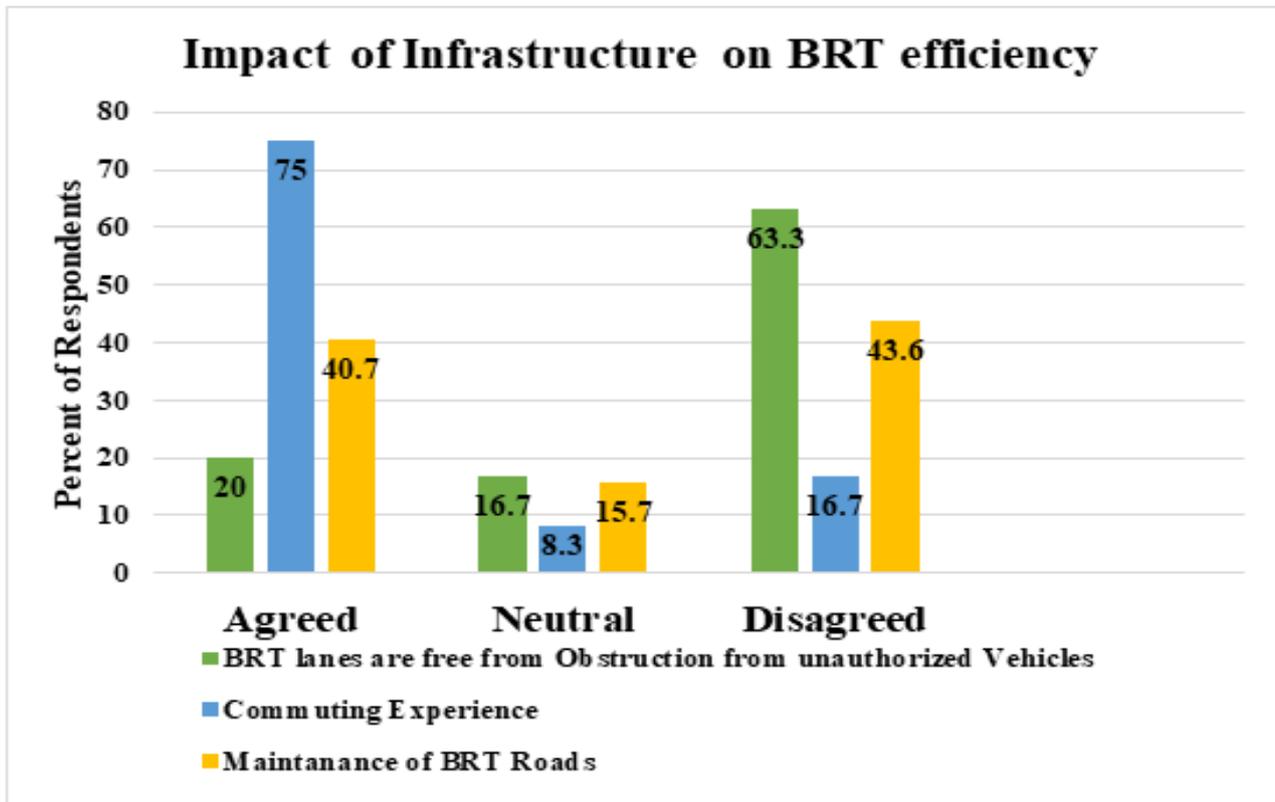
The study employed different data collection tools such as Interviews with BRT Staffs and officials,

a structured Questionnaire containing five-point Likert-scale items, observation and documentary reviews to examine the factors influencing the efficiency of BRT in Dar es salaam. Quantitative responses were analyzed using descriptive statistics. Concurrently, qualitative transcripts and field-notes underwent thematic content analysis to ensure a comprehensive understanding of the research problem.

**4. Results and Findings:**

**4.1 The Impact of Current BRT Infrastructure on BRT efficiency in Dar**

The study aimed at determine the impact of the current BRT infrastructure in the efficiency of BRT System in Dar es salaam. The study finding reveled that BRT lanes are occasionally facing blockage, the presence of dedicated lanes improved the commuting experience, still many BRT lanes need maintenance during rainy season after suffering rapid degradation and the dedicated lanes needed enforcements. These findings are presented in the figure 1 below:



Source: Field Data, 2025

**Figure 1: Impact of Infrastructure on BRT efficiency**

The findings presented in Figure 1 indicate that majority of respondents 63.3% disagree that BRT lanes are not free from obstruction from unauthorized vehicles, while 20% agree and 16.7% are not sure. These findings indicate occasional blockages in the BRT bus lanes by street traders, motorcyclists (*Bodaboda*), tricyclist (*Bajaji*) and even private cars. As one of the respondents said: “*During peak hours some of the bikes and scooter riders sometimes use the BRT lanes which not only is not safe for them but also it is not safe for the passenger onboard the BRT buses*”. This increase risks of road accidents which significantly reduce efficiency of the system. Without strict measures like automated

cameras and well-defined red-lane markings the perceived legitimacy of the BRT weakens.

The results from figure 1 above show majority 75% agreed that presence of dedicated lanes has improved commuting experience, 16.7% disagreed while 8% remain neutral. These findings implied that travel time has been drastically reduced from over 4 hours when using *daladala* to under 1 hour when using BRT lanes (from kimara to kivukoni) therefore many commuters perceived BRT as faster, more reliable, and more comfortable than *daladala* minibuses in commuting.

These findings align with many literature reviews from different scholars. Mchome and Nzoya

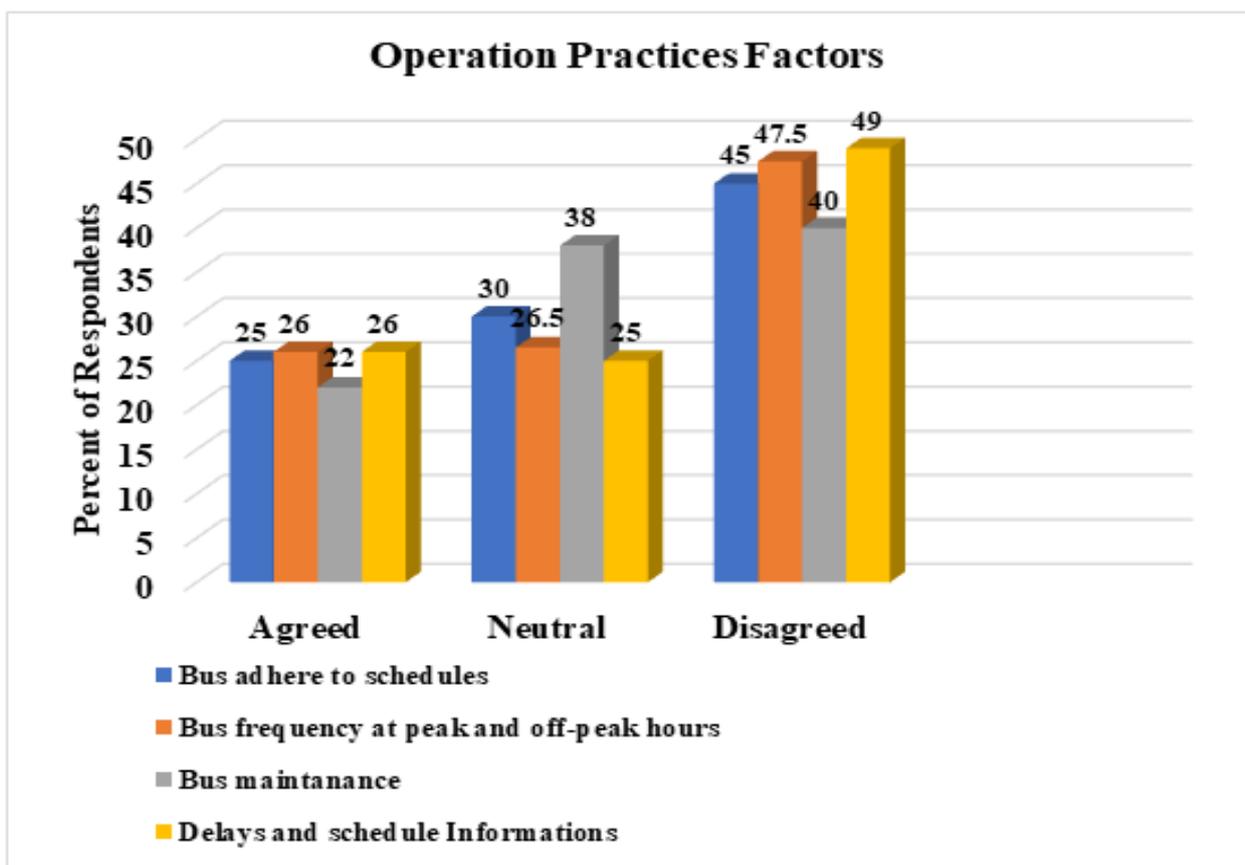
(2023) analysed that majority of the BRT users spend less than 30 minutes on board. As one of the respondents said that: “Before introduction of BRT we used to spend up to 4 hours to get to our destinations, but now we use less than 1 hour in traveling with BRT to the same destination”. Also, the study by Said (2022) align with the study revealing that most respondents (81.1%) agreed that the DBRT system offers faster travelling speed compared to *daladala*. The presence of BRT lanes indicates enhanced efficient commuting system for many passengers of BRT Dar es salaam who move from one place to another for different purposes

The finding presented in Figure 1 above indicate that 43.6% of respondents argued that many BRT roads in Dar es salaam suffer from poor drainage, 40.7% agreed to did not suffer maintenance issues and 15.7% remained neutral. These findings implies that BRT roads they are not regularly maintained which directly affect the efficiency of

the BRT. The study findings are supported by key informat claiming that: “In Rain season many of buses get mechanical breakdown due to the road condition flood which reduce the number of buses in the road technically reducing the efficiency”. This level of uneven surfacing and flooding impede service reliability causing breakdowns and delays, discouraging ridership and increasing maintenance needs.

#### 4.2 Operational Practices of BRT System

The study aimed at determine the role of operational management practices of BRT System in Dar es salaam. The study finding revealed that many of BRT Buses do not adhere to their schedule consistently, the frequency of buses during peak hours and off-peak hours do not meet their demand, the maintenance of BRT buses is not regularly, while the information about schedule and delay are regularly not available. These findings are presented in the figure 2 below:



Source: Field Data, 2025

Figure 2: Operation Practices factors

From the figure 2 above findings showed that 45% respondents disagreed that the adherence of schedule of BRT buses is consistently followed, 30% not sure and 25% agreed to buses schedule adherence. This implies inadequate bus supply,

traffic interference, and mechanical breakdowns facing BRT system affect operational efficiency at large. The study by Msumanje (2021) supports the findings that BRT Buses did not depart on time and did not arrive on station in time showing

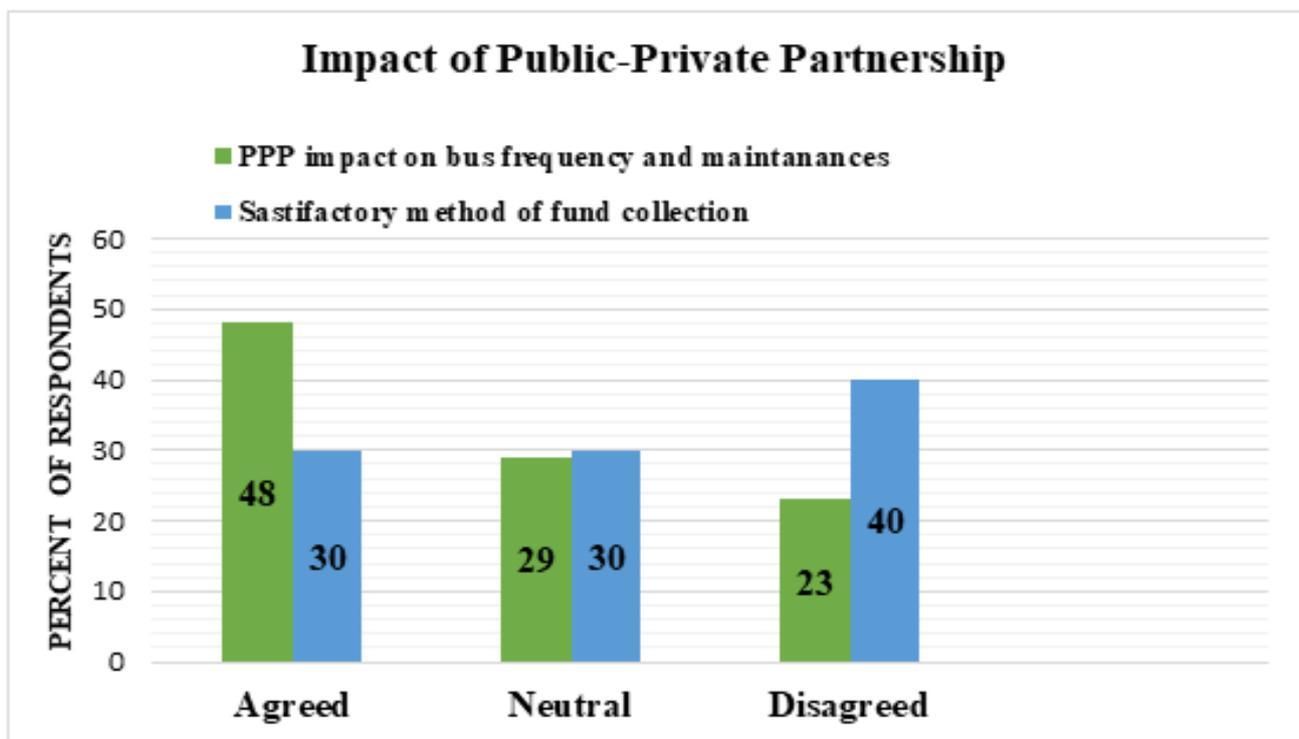
dissatisfaction of passengers which is caused by inadequate bus supply.

Study findings highlighted that peak-hour and off-peak hour bus frequency didn't meet passengers demand this was declared by 47.5% of respondents. This shows bus supply shortages during rush hours lead terminals to be overcrowded and station congested. These findings align with study by Said (2022) which revealed that 58.9% of respondents disagreed on that bus services offered by BRT are not frequent which led to dissatisfaction with the services offered by BRT. They are also supported by key informant who claimed that: *“The (DBRT) frequently operates with longer-than-ideal intervals, largely because too few buses are in service. This situation is made worse by a portion of the fleet being sidelined by mechanical breakdowns, and further compounded when repairs are delayed.”*. This implies that many passengers will end up choosing faster alternatives like taking a *bodaboda* or *bajaji*—to save time reducing ridership and efficiency at large

Similarly, insufficient information about schedule and delays were mentioned by 49% of respondents and 26% of respondents agreed to get different kind of information while they are stations. Lack of information on delays and schedules implies that there is poor customer experience, inefficient processes, and ultimately, dissatisfaction as visitors and daily commuters alike to express frustration. The study by Munishi, Hamidu & Shayo (2021) highlighted poor information strategies used by BRT on timely update and on changes of routes and stops implying unresponsiveness of BRT service Quality.

### 4.3 The Contribution of Institutional Support and Public-private Partnerships in BRT

The study aimed at determine the impact of institutional support and public-private partnership in BRT. The study finds revealed that public-private partnership had a positive impact on the bus frequency and maintenance practices and many respondents are not satisfied with method of funds collection. The figure 3 below revealed the findings:



Source: Field Data, 2025

Figure 3: Impact of Public-Private Partnership

The findings from figure 3 above indicate 48% of the respondents agree to the Public-private partnership as important factor influencing the efficient BRT operations. The findings implies

that partnership with private sectors plays a vital role in increasing bus frequency and maintenance practices. From aspect of literature review The Citizen Newspaper (2025) reported from one of

the BRT informant claimed that: “*Private sector would supply 177 buses for the Kimara route and 755 buses for the Mbagala route with service to begin in March 2025*”. But Delays has plagued the procurement of buses for Dar es salaam BRT project under DART for its first and second phases. The BRT informant also assured that effort are underway to address the transport challenge and Dar es salaam will benefit near future. The support of PPP is crucial in expansion of BRT fleet, allocating necessary financial and human resource and also split sharing of Risk, which foster efficient process.

The study revealed 40% of the respondents disagree with Manual fare collection which leads to long queues, especially during peak times, 30% agreed with fund collection to be fair. This implies that manual paper tickets cause revenue loss, boarding delays and passenger frustration. Revenue leakage increases operational budget pressures and diminishes service sustainability, destroy BRT image and efficiency at large.

These findings align with literature from ITDP, (2022) which indicated that at the beginning the system generated up to TZS 130 million but by 2020 fare collection had fallen significantly, prompting the government to take action. This implies that there is revenue loss which increases operational costs and diminishes efficient operations, quality of service and reliability of BRT system. The study suggests the use of automated fare cards which intends to introduce independent fare collection and moving to a gross-cost contract to improve transparency.

Although PPPs in Dar es Salaam have modestly improved service frequency and maintenance through fleet expansion and operational integration but the system needs strengthening computerized maintenance systems and depot infrastructure, and incorporating feeder services within performance-based PPP arrangements could significantly boost BRT efficiency and passenger experience.

## 5. Conclusion and Recommendation:

The general objective of the study was to evaluate the factors affecting Bus Rapid Transit (BRT) efficiency in Dar es salaam by focusing on the criteria of infrastructure, operational management practices and role of Public-Private Partnership. The study concludes that implementing a Bus Rapid Transit (BRT) system in Dar es Salaam is a feasible and beneficial initiative, especially when

managed effectively. This conclusion is supported by various studies and reports highlighting the positive impacts of the BRT system in Dar es Salaam. For instance, the first phase of the BRT, which began operations in 2016, has several significance reductions of Travel time saving residents substantial time, Employment Measurable gains in jobs and earnings, especially among women also Safer, healthier, and happier urban mobility (World Bank DIME, 2019).

Respondents generally agree that the BRT improved commuting, but enforcement and infrastructure gaps persist. Unauthorized vehicles and obstructions, poor maintenances of Roads and buses, fewer operational buses, lack of information about schedules and delays are most of the factors which affect the efficiency of the BRT system. Nevertheless the system is likely to thrive in near future due to the Public-Private Partnership in different aspects of buses frequency, maintenance and even employment opportunities.

## Recommendations:

To address the constraints and enhance existing transportation services, a multifaceted approach is essential. Below is a comprehensive recommended strategy:

Infrastructure enhancements will lay the foundation for a modern, reliable, and inclusive BRT. By building robust lanes, stations, depots, drainage, and integrated infrastructure, Dar’s BRT not only boosts service efficiency and effectiveness, but also catalyzes environmental, social, and economic gains.

Expand fleet and establish an integrated scheduling system with buffer times. By modernizing service scheduling and embedding reliability into operations, Dar’s BRT can transform from a promising transit backbone into a world-class, data-driven system delivering punctual, user-centric mobility and reinforcing public trust in urban public transport.

Implementing strategic funding reforms such as legal strengthening, PPP expansion, performance-based contracts, and compensation frameworks ensures Dar es Salaam’s BRT evolves from a fast-constructed pilot to a resilient, city-wide mobility backbone. By aligning financing with service delivery and urban growth, Dar can benefit not only from reduced congestion and commuting times, but also from sustained economic and social returns.

Introduce real-time information displays at stations and mobile apps for tracking schedules and delays to users and weaving together networked systems, Dar's BRT can drive higher ridership, better funding, and enhanced operational reliability transforming urban mobility across the city. By empowering riders with reliable, real-time information and integrating BRT into a broader mobility system, Dar es Salaam can enhance trust, grow ridership, and foster a modern, cohesive transit network.

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