

# Transport Planning and Mobility in Urban East Africa

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## 5 Adaptability, decarbonisation and accessibility

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transport planning in  
Dar es Salaam

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### Challenges for integrative transport planning in Dar es Salaam

*Nadine Appelhans and Fredrick Bwire Magina*

#### **Introduction: urban growth, climate issues and socio-spatial fragmentation in Dar es Salaam**

Transport planning is increasingly urgent in the growing cities of East Africa, as this book illustrates. Due to the dynamic development, there is a need to expand the provision of transport services in Dar es Salaam. However, transport planning cannot stand on its own and needs to be interlinked with wider urban development processes, environmental factors and foremost the population development in order to meet the current and future needs of transport provision in the respective cities (see Scholz in this volume). This chapter will, therefore, look at the status quo of transport for people in relation to integrated planning attempts in the city of Dar es Salaam. It makes suggestions on measures to further their interlinkage.

Dar es Salaam city has undergone a growth and expansion process in the past decades. It had high rates of population growth between 1978 and 2012 (see Table 5.1). According to the data in this table, the population of Dar es Salaam grew at an average rate of 5.6 percent per year in the most recent inter-census period from 2002 to 2012 (*ibid.*). Now in 2020, Dar es Salaam's population is estimated at 6,701,650 by the United Nations (cited in World Population Review 28.04.2020).

With the population increase and urban expansion, the need for transport infrastructure and mobility within Dar es Salaam is continuously growing. The transport system, meanwhile, has not grown proportionally in relation to the other sectors and has been deemed inadequate to fulfil transport needs (Appelhans and Baumgart 2019). Congestion, as has been pointed out by many scholars such as Kiunsi (2013a, pp. 94–95), JICA (2008), Bundara (2010) and Msigwa (2013), is a serious and key problem faced by most of the growing cities of Tanzania. The main drivers of traffic congestion here include, but are not limited to, urban population growth, morphologic structures of the city, the lack of development plans and development control, a rapid increase in cars, inadequate road infrastructure and parking facilities, and poor public transport (Kiunsi 2013a, pp. 98–101). Economic growth and globalisation are thereby further factors influencing transport patterns, due to shifts in the mobility patterns and increases in freight and travel,

*Table 5.1* Population trends in Dar es Salaam; 1978, 1988, 2002, 2012 and 2018 (\*projection).

<i>Year</i>	<i>Tanzania mainland population</i>	<i>Dar es Salaam</i>		
		<i>Population</i>	<i>Average annual growth rate (percent)</i>	<i>Percentage share in Tanzania mainland</i>
1978	17,036,499	851,522		5.0
1988	22,455,207	1,360,865	4.8 (1978–1988)	6.1
2002	33,461,849	2,487,288	4.4 (1988–2002)	7.4
2012	43,625,354	4,364,541	5.6	10.0
2018*	58,911,165*	6,041,000*	5.7*	10.25*

Source: The United Republic Tanzania Population and Housing Census, NBS (2013)

putting additional pressure on the current transport system. The rapid increase in population has resulted in a higher demand for land for transport facilities and infrastructure services and has shaped the city’s land uses along the transportation corridors (Ka’bange et al. 2014).

To manage transport development under these conditions of rapid urban growth, the Dar es Salaam Master Plan of 1979 was the last official master plan authorised by the Ministry of Lands, Housing and Human Settlements Development (MLHSD) and has not been replaced (Peter and Yang 2019). It was intended to structure the city’s urban growth and coordinate sectoral planning (ibid.). The basic concepts of the Master Plan are (i) to develop neighbourhood units and “self-contained” planning districts located in the outskirts of the city to accommodate urban population growth; and (ii) to develop a radial road network to render the Central Business District (CBD) accessible from all parts of the city (ibid.). The plan proposed a multi-centric city structure with satellite towns, which were, however, never realised. With the radial expansion pattern, the partial implementation of this plan established the monocentric city structure that has led to today’s concentration of traffic flows in and out of the centre, with particular congestion linked to CBD business hours (Kiunsi 2013b). The Master Plan planned for population growth from 0.9 million inhabitants in 1979 to 1.6 million inhabitants in 1989 and 2.5 million inhabitants in 1999, when its period was projected to end (Peter and Yang 2019). In September 2018, the Japan International Cooperation Agency (JICA) presented a new master plan draft to the Minister of State in the President’s Office, regional administration and local government, putting it at their disposal for implementation (ibid.). The draft covers four major areas (urban structure and land use, road transport, public transport and traffic management) projected to be implemented in three phases over a period of 21 years until 2040 (ibid.). The 2012–2032 Master Plan proposal picks up on the original multi-nodal proposals of the 1979 Master Plan and again suggests expanding the city in a radial fashion with new main roads, identifying “new metropolitan centralities” and new “satellite towns” to be established on the outer rings of the road expansions and at road crossings (MLHSD 2013). However, it increases the city scale

to a population number of 5 million and includes the development of Kigamboni into a dense neighbourhood with dense properties (*ibid.*).

Thereby, a topic that urban planning has not systematically addressed is that Dar es Salaam has been undergoing the effects of climate change for a number of years. The coastal area on the Indian Ocean in East Africa has experienced warming of the near-surface temperature and an increase in the frequency of extreme warm events (Niang et al. 2014). Similarly, data from the Tanzania Meteorological Agency (TMA) cited by Kiunsi (2013b) show that temperatures in Tanzania have been rising in a trend similar to the global average and, in effect, Dar es Salaam has become warmer over the last 40 to 50 years. Currently, heavy rainfall in combination with river blockages due to solid waste are a major source of flooding and a notable effect of climate change in Dar es Salaam (World Bank 01.10.2019). At the same time, the exact future development of the climate, and thus precipitation and temperature patterns, is uncertain and has been modelled in a variety of scenarios. Kiunsi (2013b) notes that in Tanzania, climate change is predicted to lead to an increased occurrence of extreme weather events, including rainstorms, droughts and sea level rise. Meanwhile, he describes an analysis of the exposure of population and assets to coastal flooding which showed that eight percent of Dar es Salaam is in the Low Elevation Coastal Zone, below 10 metres above mean sea level (*ibid.*). Even without considering a sea level rise due to climate change, in 2013 more than 31,000 people were already at risk from the 1-in-100-year storm surge. These figures are predicted to rise sharply during the convergence of urbanisation and climate change trends (*ibid.*), even though most new settlements are not predominantly along the coastline but rather in the hinterland of the city (see Scholz in this volume). Already, many shoreline locations in Dar es Salaam have eroded due to sea level rise and/or storm surges, while rainstorms and sea level rise are likely to lead to increases in frequency and severity of flooding (*ibid.*; MLHSD 2013; Niang et al. 2014, p. 1209). This will have an effect on any sort of transport infrastructure operating and being installed in these areas. Climate adaptability and the decarbonisation of transport infrastructure for climate protection must be given high priority in the conceptualisation of urban transport, so as to acknowledge air pollution and the local situation and future developments of urbanisation under climate change in Dar es Salaam. Since Tanzania has a climate-change adaption plan only on the national level (URT 2012), it is vital for Dar es Salaam to consider how integrated planning can combine sectoral transport plans with the requirements of climate-change adaptation and decarbonisation strategies in an urban context.

Besides dynamic urban growth, densification in the city centre and suburban growth, Dar es Salaam is characterised by vast areas of small-scale urban structures (Kombe 2005; Magina 2016). Wilfred Kazaura et al. (2015) show how land-use change in the rapidly growing city directly influences the numbers of trip generated from the respective areas. Correlations between land-use variables and land use have hence been explored for Dar es Salaam (*ibid.*) and show that

there is great variability in trip numbers between neighbourhoods with different residential building typologies and population densities (*ibid.*). Thus the different neighbourhoods offer different qualities and options regarding the technical and economic options for transport provision. Many of the small-scale neighbourhoods cannot be serviced by MRT systems due to lack of space (Kanyama et al. 2005, p. 77; Ka'bange et al. 2014, 180f); here the transport system is in competition with land uses linked to livelihoods and survival (Ka'bange et al. 2014, p. 181). Furthermore, the remote outskirts do not have sufficient passenger volume to make MRT financially viable. MRT is also inadequate to cater for short-distance transport needs within neighbourhoods and the transport of goods (which is currently prohibited in Dar es Salaam's Bus Rapid Transit system). Due to the different rates of car ownership between neighbourhoods and access to individual transport means, as well as distance to vital institutions that have to be reached more or less frequently, the overall transport needs of neighbourhoods vary according to their location and relation to the CBD, as well as their socio-economic makeup and economic structure (as a basis of local livelihood). The city is, hence, facing questions concerning the general accessibility of transport means between neighbourhoods, but also concerning individual capacities to access transport means. These individual capacities include physical abilities, financial capacity and gender aspects (Ka'bange et al. 2014, 179; Rizzo 2015, 259; Nthoki in this volume). This means the transport system will have to cater to a diverse set of needs and abilities while remaining affordable (see Behrens et al. 2015, 2017; Appelhans and Baumgart 2019; Ehebrecht in this volume; Lukenangula and Baumgart in this volume).

Based on these and other findings, scholars largely agree that transport planning and urban development in Dar es Salaam have not been sufficiently linked. It is therefore worth looking at the situation in the city and considering how transport planning needs to be interrelated with and interrogated by larger urban development aims. After discussing the current transport situation, this chapter therefore questions how the city can move forward on transport policy and identifies post-BRT transport options in relation to urban development, as this special trajectory also holds lessons for decision making in other cities.

The findings from this article come from a research project on adaption and creativity in urban infrastructure systems, conducted using a case study approach (see Appelhans and Baumgart 2019 for further outcomes). Case studies have most comprehensively been described as a methodology by Yin (2009); the method was further prominently discussed by Robinson (2011). Data were collected using online and archival research and during various visits to Dar es Salaam between October 2016 and October 2017. This included a literature and secondary data review on transport provision and urban development policies, semi-structured interviews with key informants from municipalities, national ministries, local and international development organisations, members of transport associations, local residents, political representatives, academics and transport professionals in Dar es Salaam, as well as on-site research on the transport system in the form of maps and questionnaires for passengers. To verify the preliminary results, a focus

group discussion with stakeholders from transport provision and planning in Dar es Salaam was conducted.

Based on these results, the chapter outlines the key factors for transport planning, looks at the transport situation in Dar es Salaam and touches on measures for integrated transport planning before presenting a conclusion.

### Key factors for transport planning in Dar es Salaam

In the following, this chapter will discuss how each of the parameters for urban development identified in the data review presented earlier, namely urban growth, climate change and socioeconomic disparities, can be transferred into key factors for transport planning, allowing them to be addressed in the sectoral transport plans in Dar es Salaam. The identification and description of the key concepts for transport provision were, hence, based on analysis of the empirical data compiled for this study. While they are derived from the local context they are in line with the criteria of universal access, safety and green mobility named as aims for sustainable mobility by the Sustainable Mobility Report (see Sustainable Mobility for All 2017, p. 23). However, this discussion takes a critical stance on the aim of “efficiency” presented there (*ibid.*), as our research has revealed that redundancies are vital to maintain the system and reduce vulnerabilities. Our key factors can hence be described as follows:

- 1 The heterogeneous *urban growth* and changing environmental conditions resulting from *climate change* in Dar es Salaam require locally suitable and flexible transport solutions. The key factor to addressing this is **adaptability**, which allows the transport system to remain flexible in the face of shifting urban layouts, flooding and other impacts and thereby minimises the risks of path dependency in the field of investment-intensive transport planning.
- 2 In order to acknowledge the environmental footprint of transport systems and the need to contribute towards minimising the impact of transport on *climate change* and resource consumption, transport planning needs to opt for **decarbonisation**, as CO<sub>2</sub> emissions are currently causing high environmental costs (Niang et al. 2014). This encompasses the fuel systems of public transport, but also the footprints of infrastructure construction and the organisational aspects of running urban transport.
- 3 Socioeconomic disparities on a spatial but also individual level and the exclusion of certain population groups need to be addressed by making public transport inclusive. This includes accessibility for different individual physical needs, accommodating a variety of transport patterns, providing safe transport for a diverse population, affordability of transport fares, expanding reach to meet the requirements of all neighbourhoods, providing for the needs of different livelihoods such as commuters and hawkers, and connecting various institutions in the city, thereby increasing citizens’ access to economic and social opportunities, critical infrastructure and institutions. All of this can be summarised and furthered under the term **accessibility**.

We will continue by looking at the transport situation in Dar es Salaam, before outlining how the key factors can be implemented to improve the transport of people.

### **The transport situation in Dar es Salaam**

The majority of urban and rural transport in Tanzania is road-bound, carrying over 90 percent of passengers and more than 75 percent of freight traffic (URT 2003; JICA 2014; SUMATRA 2017). This is also the case for Dar es Salaam (Appelhans and Baumgart 2019). Road provision has, thereby, not only enabled the movement of people, goods and services between different points but has also strongly impacted on Dar es Salaam's urban development patterns (see earlier). However, the quality and supply of the road network in Dar es Salaam are deemed low and the road capacity is insufficient even for the current demand (Ka'bange et al. 2014). According to data from 2008, the road network within Dar es Salaam extended to roughly 1,700 km<sup>2</sup>, fairly equally distributed between the three municipalities that then existed in the city. Approximately one-quarter of the road network was paved (JICA 2008), but the quality of the roads differed across the city. Thus while the total amount of road kilometres is reasonably balanced among the three municipalities, the highest proportions of paved kilometres are concentrated in Kinondoni and Ilala (JICA 2008). In this regard, Mrema (2011, cited in Melbye et al. 2015) argues that the unpaved roads are poorly maintained and lack drainage, and hence create limited accessibility and traffic congestion.

Furthermore, there is a rapid increase in cars which results in prolonged traffic congestion especially during peak hours (Ka'bange et al. 2014, p. 178). Mrema (2011, cited in Melbye et al. 2015) observes that the total number of privately owned cars in the city increased from approximately 220,000 in 2000 to 600,000 in 2012 with a steady increase of 50,000 p.a. since 2009 (ibid.).

The public transportation system in Dar es Salaam, which serves a large number of people, has not been given special attention for an extended period (Ka'bange et al. 2014). For most of its development, it has been dominated by pedestrians, minibuses and vans (commonly known as *daladalas* and *vipanya* respectively), taxis and para-taxis (motorcycles, motorcycle-rickshaws or bicycles), ferries and a commuter train (see Appelhans and Baumgart 2019). The local transport systems have only recently been made the subject of scientific study aiming to establish differentiated accounts of their practice and to identify strengths in the prevailing systems (Behrens et al. 2015; Appelhans and Baumgart 2019). However, the evident interlinks between the providers of different modes of transport have so far mostly been framed as competing informal and formal systems. On behalf of the latter, Dar es Salaam has recently seen the introduction of a Bus Rapid Transit System (BRT), locally also known as *mwendokasi* buses or *DART* (Dar es Salaam Rapid Transit). These different transport means will be outlined in the following sections, to be included in the further assessments in this chapter.

***Daladalas and vipanya***

*Daladalas*, small buses and the even smaller minibuses called *vipanya* (mice) (Kanyama et al. 2005) are by far the most common way to travel in Dar es Salaam. They form a decentralised minibus system, with vehicles in private ownership, and provide 61 percent of all trips (JICA 2008 cited in Behrens et al. 2017). As the vehicles are all individually owned, the exact number of vehicles is unknown but is estimated in a range starting at 7,000 *daladalas* overall (Ka'bange et al. 2014: 178), up to a figure of 6,000 unlicensed buses plus 4,500 licensed buses, as suggested by the Dar es Salaam City Council (DCC 2008a). The Surface and Marine Transport Authority (SUMATRA) assigns routes to *daladala* operators (Ka'bange et al. 2014, p. 179). There are, however, unlicensed vehicles and registered *daladalas* that operate off the designated routes informally (Ka'bange et al. 2014, p. 178). Vehicles also operate without transport schedules and begin the trip when a sufficient number of passengers have boarded, while stops can be requested by passengers on the routes (ibid.).

The large number of vehicles, the liberty taken in servicing routes, the far reach, flexible stops and demand-based scheduling make the “paratransit” system highly flexible. In the face of unprecedented events, such as flooding, congestion, road works etc., the *daladala* system proves its great flexibility and remains in operation, with apt changes in response to the incident at hand. Nonetheless, the *daladala*



Figure 5.1 *Daladala* on the streets of Dar es Salaam.

Source: Image by the authors.



system has issues. In Dar es Salaam, there is little enforcement regarding the maximum passenger number and travellers frequently stand in the corridor space of overloaded *daladalas*. It is also a prevalent practice for *daladala* drivers to cut trips short, forcing passengers to alight and pay another fare to complete the journey on another bus (DCC 2008a). This public transportation system has, hence, been widely criticised for poor standards of comfort, safety and convenience for bus travellers (Kanyama et al. 2005, p. 73; Ka'bange et al. 2014, p. 176; Rizzo 2015, p. 258). *Daladalas*, further, have a reputation for competitive driving (over-speeding, jostling and accidents), impacting on the safety of general traffic. Despite the crowded conditions, long waiting and commute times (Ka'bange et al. 2014, p. 178), the cost of travel relative to income levels can be high for many citizens (up to 24 percent of the passenger's income according to Rizzo 2015, p. 259). Commercial operators claim the fares are too low to generate enough revenue. Ka'bange et al. (2014, p. 179) describe the way in which most bus owners devolve the operating risk to the driver/conductors by contracting out the bus for a fixed daily fee, leaving the driver to earn sufficient revenue to retain a surplus to live on after paying the owner the daily fee. This leaves the drivers with little option but to increase the number of journeys by speeding or cutting routes, to inflate the fares, to cram in passengers to increase trip loads, or to increase hours of operation (Ka'bange et al. 2014, p. 179). In other cases, drivers contract for a bus and then subcontract it to another unqualified person to operate (for a middleman fee), thus adding to the desperation (DCC 2008a). In order to raise the income margins, vehicles are therefore often poorly maintained and consequently suffer breakdowns (ibid.).

It is because of these issues that decision makers have repeatedly stated the wish to "phase out" the *daladala* system in favour of safer, cleaner and more reliable transport (Kanyama et al. 2005, p. 73). Efforts to upgrade the technology of the buses, create designated stops or use digital technology for scheduling have largely been left unconsidered in this binary stance on the *daladalas*.

### *Non-Motorised Transport (NMT)*

The World Bank (2011) notes that Dar es Salaam's four primary roads and arterial roads are dominated by public transit and walking. Walking is the cheapest mode of transport and, with almost 26 percent of all trips, is the second most common mode of transport in Dar es Salaam (JICA 2008 cited in Behrens et al. 2017; Lukenangula 2017; Lukenangula and Baumgart in this volume). However, walking has not yet been sufficiently considered in transport policies in Dar es Salaam (ibid.), which – unlike Nairobi – does not have a Non-Motorised Transport Policy to date. Kanyama et al. (2005, p. 77) note that building permits have encroached further onto the road space over time so that parking, cycling and walking have increasingly lost their designated areas in the city's roads. This also means that the 1.5 percent of all trips conducted by bicycle (JICA 2008 cited in Behrens et al. 2017) are not adequately catered for and the potential of this transport mode remains unexplored.

### *Taxis and para-taxis*

Taxis (with white license plates) and so-called para-taxis (*bajajis*, the three-wheeled motorcycle-rickshaws that carry two to three passengers, motorcycle-taxis



Figure 5.2 *Bajaj* on a road with storm-water overflow in Dar es Salaam.

Source: Image by the authors.

called *bodabodas* and the recently introduced Uber taxis) are gaining importance in urban transport (see Rizzo 2017; Appelhans and Baumgart 2019; Ehebrect, in this volume). Formerly, *bajajis* and motorcycles operated purely on an informal basis without any form of control or jurisdiction (Rizzo 2017, p. 39). Recently, however, SUMATRA has formally recognised their operations through the issuance of licenses, making them a source of revenue for the municipalities. Yet, there is no actual wish to promote their use, and they are not explicitly mentioned in official transport data. The motorcycle-taxis and *bajajis* have been repeatedly banned from the CBD due to their bad reputation (ibid.). Nonetheless, the para-taxis play a part in ensuring accessibility, especially for those unable or unwilling to walk long distances to bus stops, particularly when wet weather renders many of the walking tracks unusable. The main challenges in the operation and use of taxis and para-taxis, with the exception of Uber taxis, are safety, unregulated fares and carrying capacity (ibid.). Drivers dictate how much each passenger should pay and how many passengers each type of vehicle can accommodate. Here, our observations show that a single motorcycle can carry up to three passengers – a practice that is likened to a grilled kebab (traditionally called *mshikaki*). Likewise, a *bajaj* can be made to carry up to four or five passengers.

### **Ferries**

Although neighbourhoods such as Kigamboni traditionally relied on ferry services before the construction of Kurasini Bridge, boats have not been strongly promoted

as a means of transport in the city. Consequently, the two prominent ferries that still operate between Kivukoni and Kigamboni remain the most important aquatic inner-city transport to date, and are still in frequent use by pedestrians crossing to and from the city centre.

### ***Commuter train***

Railway transportation has seen a recent revival in Dar es Salaam. From 2007, the former Tanzania Railways Corporation (TRC) started operating as the Tanzania Railway Limited (TRL), following a concession agreement (AfDB 2013, p. 11). The Dar Commuter Trains, which are currently run by the TRL and the Tanzania and Zambia Railway (TAZARA), constructed from 1970 to 1975, started operating officially in 2012. The trains provide their services on two routes on six days, Monday to Saturday. The first route, which runs along the central railway operated by TRL, is from the City Railway Station to Ubungu Maziwa (covering about 12 kilometres), while the second, the TAZARA commuter train, covers about 34.5 kilometres, from Mwakanga to Kurasini.

### ***BRT***

As a way to address the challenges caused by the traditional transport system, the Government of Tanzania established the Dar Rapid Transit Agency (DART) (GN. No. 120 of 25 May 2007 under the Executive Agency Act, No. 30 of 1997) to plan and operate the Dar Bus Rapid Transit (DART) system (see Wood in this volume). The Dar Rapid Transit (DART) project consists of six phases to implement the Bus Rapid Transit (BRT) system and the construction of flyovers along the main



*Figure 5.3* BRT Corridor in Dar es Salaam.

Source: Image by the authors.

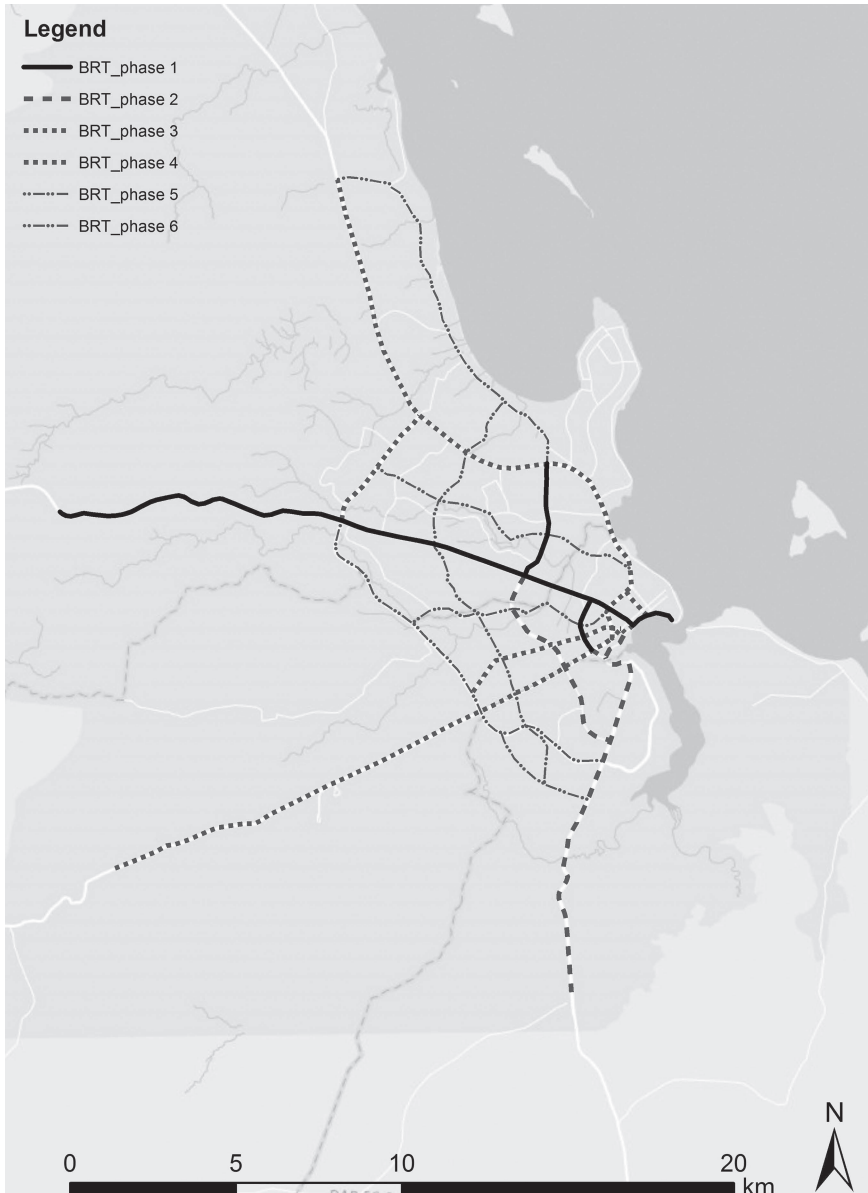


Figure 5.4 BRT System Dar es Salaam – implementation phases.

Source: Image by the authors.

roads (at TAZARA and Ubungo) and intersection points (ibid.). Phase 1 has been completed with financing from the World Bank and the Government of Tanzania (Ka'bange et al. 2014, p. 179; Rizzo 2015, p. 257). The first line is completed and has been operating since 10 May 2016, with 29 stations and five large terminals. Until September 2017, DART had 147 vehicles with an estimated 170,000 daily ridership at a fixed fare of TZS 650 for non-students and TZS 200 for students. The number of buses has varied, as 79 were damaged in the flooding of the Jangwani Bus Terminal in 2018 and further buses have been acquired by the operator since (The Citizen 24.05.2018).

The main objective of the project is to deliver fast, cost-effective and comfortable mobility, increase reliability, safety and capacity, and reduce carbon emissions (Ka'bange et al. 2014, p. 179; Rizzo 2015, p. 249, Appelhans and Baumgart 2019; Wood in this volume).

The DART Agency Implementation Status Progress Report for the 2015/16 to 2016/17 financial year showed that with the operation of the BRT, the average travel time from Kimara to the city centre was reduced to 40 minutes (Daily News June 13, 2017). Despite the achievements attained through the implementation of the DART project (see Wood in this volume), there are several challenges towards the realisation of its self-set goals and the expectations it has raised.

While the capacity for transport has been increased on the routes that the bus services, its reach is limited because of its vast use of space (Kanyama et al. 2005). The main corridors on which it operates are able to accommodate the priority lanes for the BRT at a cost for individual road-bound transport. Hence, the small-scale neighbourhoods with their narrow roads cannot and will not be serviced by the BRT. As such, it has taken DART a long time to get title deeds from the responsible authorities in areas with high population densities (Daily News June 13, 2017). So as to avoid going through this process elsewhere, it will rely on a feeder system to the neighbourhoods and suburbs made up of all the other transport modes described earlier. This means that phasing out *daladala*s will not be feasible, even though they have been banned from operating on the BRT corridor (Ka'bange et al. 2014, p. 180; Rizzo 2015, p. 258).

While the system has been advertised as climate-friendly due to the assumed modal shift from individual car use and the international standard fossil fuel engine technology (see Appelhans and Baumgart forthcoming), the system is not climate-adaptable. The main BRT depot was located on a flood plain (Ka'bange et al. 2014, p. 182) and has been inundated, putting the entire BRT bus fleet in jeopardy. Its lack of flexibility is, thus, a problem in facing the aforementioned floods. Additionally, the flood-prone shore areas cannot be serviced by the BRT during floods and have been left out of route designations. The river crossings on the routes are inoperable during inundation (World Bank, 2019). Unlike the flexible *daladala* systems, the BRT cannot shift its stops and re-route, so it then has to halt its service and its increased capacities fall short.

The urban transport system that emerged over time can be described as a heterarchical system with many different actors connected through loose couplings and shifting hierarchies (Appelhans and Baumgart 2019). Despite its deficits in safety, emissions and capacity, this system had two strong points: first, its flexibility

regarding schedule and routes, and, second, its reach, which extends deeply into even the densest neighbourhoods and furthest suburbs. However, due to the limited capacity of such a decentralised system, the growing city needed a strategy for mass transportation to address the growing transport needs of an increasingly big population (see Wood, in this volume). While the BRT was introduced to raise the capacities, the various transport modes are still not comprehensively coordinated or sufficiently linked to wider urban development, as will be demonstrated in the following. Furthermore, they are only partially integrated into the urban surroundings.

### **Institutions, regulation and governance of urban transport in Dar es Salaam**

A multitude of different authorities govern urban transport in Tanzania (Appelhans and Baumgart 2019). The 2003 transport policy highlights several authorities involved in regulating road transport (URT 2003, p. 7). However, none of them is explicitly responsible for land-use planning for transport planning and transportation issues. Instead, the Ministry of Communication and Transport is basically concerned with road transport licensing; the Ministry of Works is solely responsible for axis roads and safety control; and the Ministry of Finance controls motor vehicle registration. Other authorities, such as the Ministry of Regional Administration, is concerned with regional transport licensing; the Planning Commission deals with key transport utilities, while the Trading and Industry is in charge of vehicle licensing (JICA 2008). Thereby, there is a strong focus of activities on road construction and management, which is divided between national and local roads. Responsibility for these roads is split between the Ministry of Works, Transport and Communications (MoWTC) and the Tanzania National Roads Agency (TANROADS), which is a semiautonomous agency under the Ministry of Works, and the local municipalities. Thereby the national, trunk and regional roads are the responsibility of TANROADS, and the district, urban and feeder roads are the responsibility of Local Government Authorities (LGAs) which are under the oversight of the President's Office – Regional Administration and Local Governments (PO-RALG).

Further, the Surface and Marine Transport Authority (SUMATRA), which was established in 2001 (Parliamentary Act No. 9 of 2001), is responsible for the regulation of public transport. They monitor the various transport providers regarding quality of service and compliance to legal regulations. Traffic management is in the hands of the police.

This reflects the contents of the *Road Traffic Act Cap. 168 (1974)*, which puts emphasis on motor vehicle control, traffic control and traffic management and neglects transport (land-use) planning. Hence, Parts II and III of the Act (Sections 8–18) assume their responsibilities on the registration of motor vehicles. Part II concentrates mainly on prohibiting the use of motor vehicles without registration, classification of motor vehicles, application for registration of motor vehicles, registration of motor vehicles, notice of change of ownership, exemption

from registration and licensing, and offences and penalties. Part III proclaims on driving licences whereby drivers are prohibited from driving without driving licences. Other issues include types of driving licences, offences of applying for or obtaining a driving licence or driving while disqualified.

With a vision of creating efficient and cost-effective domestic and international transport services within the country, a National Transport Policy was therefore introduced by the Ministry of Communications and Transport in 2003 (URT 2003). The mission of the National Transport Policy is to develop safe, reliable, efficient and fully integrated transport infrastructure and operation (URT 2003, p. 1). The policy provides statements on the management of urban roads and other infrastructure, road services, traffic flow, land-use planning and transport for disadvantaged groups. However, pedestrians and other non-motorised transport are not considered regarding the implementation of policies.

The policy stipulates that the ostensible transport problems are directly related to the existing land-use planning practices and land-use plans. As such, these have situated most services in the CBD rather than in residential neighbourhoods; which gives rise to high concentrations of population and vehicles in the centre (URT 2003, p. 18). It also outlines the persistent journey delays due to traffic congestion on roads, the rush for vehicles which arises from the shortage of equipment and low capacities, and the unfriendly, hostile behaviour of bus crews as common features in urban areas, particularly in Dar es Salaam city (URT 2003, p. 6). It further blames road accidents mainly caused by non-adherence to and a lack of enforcement of rules and regulations, a disregard of proper infrastructure for NMT and a concentration of transport services along the major arterial roads (*ibid.*).

Despite this varied specialisation between the institutions involved, there is currently no overall coordinating body to manage Dar es Salaam's urban transport (see Appelhans and Baumgart 2019).

In an attempt to coordinate transport issues, an urban transport study was completed by JICA for Dar es Salaam in 2008 (JICA 2008). It identified a wide range of project solutions for the city, covering road plans, truck routes, public transport and traffic management. The study placed high priority on promoting public transport and the movement of people and goods and recommended a BRT plan at the core of the city's transport system (*ibid.*). While the first phase of a six-phase BRT system is now operating, a traffic-demand management scheme has been prepared for the central business district based on the study.

### **Proposed measures**

The material presented previously reveals that current transport planning in Dar es Salaam appears highly technocratic and the discussions on developing transport infrastructures are rarely linked to urban settings or individual user needs. Additionally, the approaches conventionally discussed continue to circle around expanding road-bound infrastructures. Although decision makers in transport

planning recognise some challenges with traffic congestion and the impact that poor land-use planning and inadequate transport technology have on the quality of transport, the stakeholders and authorities involved in transportation planning combine their efforts towards building a way out of congestion by increasing road width in cities. This usually encourages private capital to bring more cars to the road, thereby levelling the effect.

From the empirical evidence in this study, it has further become evident that the BRT cannot function as a standalone public transport system (see also Wood, in this volume and Appelhans and Baumgart 2019). The technology itself lacks certain properties that would ensure the necessary adaptability, decarbonisation and accessibility of a functioning transport system under conditions of rapid urbanisation, climate change and socioeconomic disparity. By emulating the standards set by donor organisations with the BRT technology, Dar es Salaam is neglecting more creative, locally contextualised approaches to transport planning.

When tackling the transport issues, contrary to the attempts of coordinated regulation described earlier, it has to be acknowledged that the governance voids in transport planning are also an opportunity. They allow the flexible, decentralised and self-regulated forms of transport provision currently dominating the city's urban transport to function under circumstances of uncertainty (Appelhans and Baumgart 2019).

Any measure to expand regulation on urban transport in Dar es Salaam will, therefore, have to be sensitive to the requirements of a needs-based system and acquire a more holistic understanding of transport to accommodate the variety of requirements. It is in this frame of mind that we make the following proposals to address the key factors adaptability, decarbonisation and accessibility:

**Coordinated governance of urban transport:** A major deficiency in managing urban transport is the lack of a coordinating institutional authority (see Kanyama et al. 2005; Ka'bange et al. 2014, p. 182; Appelhans and Baumgart 2019). Other cities, such as Nairobi (with its NAMATA agency) and Lagos (with the LAMATA agency) have recently introduced such bodies to function as umbrella organisations. Dar es Salaam could gather valuable insights from their experience, to assess whether such a governing body has positive effects on transport provision. Currently, such a "Dar es Salaam Urban Transport Authority" (DUTA) has been proposed (JICA 2008) with the purpose of integrating and coordinating efforts between decision makers and extending this into cohesive planning carried out by professionals within the authority. This would require a wide representation of stakeholders through a Board of Management so the will to cooperate is fostered through the joint ownership of programmes and a single line of accountability to the authority can be established. DUTA would be the facilitator of the strategic policy setup by the central government, and would translate this strategy into a set of coordinated policies across the sectoral agencies involved in urban transport and across the (sometimes competing) considerations of economic, social and environmental factors. Given that DUTA would be established to bring cohesion to the planning and execution process, this would entail a discussion on



the nature of the execution agencies that deliver services at ground level. Unless there is a significant change in the way these agencies operate, the DUTA will either make little real difference at service level or will compete with existing organisations (see Appelhans and Baumgart 2019).

When such an agency is conceptualised, it should not only consider how to restructure governance, but should also ask how the organisation and infrastructure can avoid being overly rigorous so as to remain flexible and adaptable, thereby including itself in such considerations. It should also expand its outlook to include the transport modes that have so far not been sufficiently considered in the transport concepts, such as NMT and water-bound transportation modes.

**Linking transport planning and urban development goals:** Transport planning in Dar es Salaam needs to be firmly rooted in the urban realities. It has to cater to range of different needs (see earlier) while keeping a high standard of service under volatile environmental, economic and resource conditions. Therefore, in close consultation with other sectoral decision-making bodies, it should conceptualise larger urban development goals, also using socio-spatial data and environmental assessments as a basis. Given the dynamics of development in Dar es Salaam, the resulting transport needs and acknowledgement of the impact of transport infrastructure on urban functionality and the quality of the built environment, transport planning and urban development will have to align and interact more closely in the future. Thereby, a multi-institutional and trans-sectoral approach will be necessary. The conceptualisation of transport planning therein should be based on the coordinated use of data available from cooperating institutions, allowing the responsible authorities to make informed decisions for long-term strategies. Points to address in this setup are, first, how to shift the current monocentric city layout into a multi-nodal pattern with the help of transport infrastructure, and, second, how to consider local transport patterns largely based on small-scale economies as the fundamental basis for designing transport technology. In the 2012–2023 Master Plan proposal, the Dar es Salaam Municipality therefore suggests delegating coordination powers to the Metropolitan Authority (MLHDS 2013). The municipality requests, in their document, the

power to veto decisions, physical plans or activities of the Municipal Councils that are inconsistent with the Metropolitan Authority Development Plan, the metropolitan structural plan or land use policy, power to ensure that land use in the City and the metropolitan area follow designated plans, powers to prepare comprehensive and integrated development plans incorporating the plans of the lower municipal councils, provide for appeal to the Minister by a municipal council aggrieved by a decision of the Metropolitan Authority.

(*ibid.*)

By following these measures, a clear institutional responsibility could be established, one that oversees the course of consideration between sectoral plans and transport policies. This will further require political negotiation with donor

agencies whose development schemes currently favour the transfer of standardised transport technologies that are insufficiently adapted to the context (see BRT section earlier).

- **Accommodating dynamic local mobility patterns:** In order to provide transportation systems that can address local needs, further research needs to be conducted in the field of mobility patterns, so as to gain knowledge on the diversity of needs for mobility assessments. Currently, the transport needs of small-scale traders who can no longer transport their goods on the BRT or gender-specific transport requirements have not found sufficient consideration. The current demand-based projections further need to be adjusted to the changing urban layouts and population concentrations in space, as capacities have to be oriented towards future needs.
- **Hybrid transport system:** Maintaining a multi-modal transport system is essential to ensure that all areas of the city remain accessible. As can be seen today, rapid spatial developments are taking place at the urban fringes, particularly in the vicinity of the currently operating BRT infrastructure. To reach these urban structures, to allow transport within particularly dense neighbourhoods, and to react to extreme weather conditions, transport planning should use and guard a variety of modes able to function in these spaces and on such occasions. By maintaining a diverse and hybrid transport system, redundancies can be created that allow for flexibility and resilience in the face of differentiated transport needs and changing environmental conditions. Thereby, a hybrid transport system needs to move beyond sanctioning and rendering certain transport modes informal in order to arrive at regulations for a safe, diversified transport system consisting of MRT and small-scale solutions equally.
- **Climate-friendly transport:** Although this might seem like an obvious point, transport provision in Dar es Salaam will need to look into climate-friendly technologies and NMT as low-emission modes. While the narrative currently suggests that the less pollutant BRT buses are replacing the less carbon-efficient *daladalas* with fewer vehicles (see earlier), the buses themselves are in fact also operating on fossil fuels. While experimenting with alternative fuel systems on the BRT would raise the risk of the investment and possibly the cost of the system, there are currently no examples of non-fossil BRT being rolled out. Donor agencies have not reacted to this situation by providing funding for innovative technologies in Dar es Salaam.

Additionally, a decarbonisation strategy needs to look at the strengths and potentials of NMT (see Lukenangula and Baumgart in this book). While infrastructure for motorised transport, though inadequate, has been a catalyst for the movement of people and goods within the city, non-motorised transport in the form of bicycles and walking has not been given due concern on the existing road infrastructure. With the exception of the roads along which the BRT operates, all roads lack extensive pedestrian and cycleway

components to encourage non-motorised transport options, thereby making urban accessibility and mobility difficult (ibid.). So, while proposing carbon-neutral alternatives, regulations and exemptions for all the motorised modes, the full spectrum of transport provision should be considered in the policies to reduce carbon emissions.

### **Conclusion: linking transport planning with integrated urban development**

Dar es Salaam has taken major decisions to upscale its transport system in recent years. Yet, decentralised forms of transportation, such as walking, cycling, motorcycle-taxis, regular taxis or minibuses will remain relevant and, due to the dynamic urbanisation, transport is in need of further strategic planning. Within this planning, Dar es Salaam needs to accept its local realities regarding the built environment, institutional settings and resources and base transport concepts on local needs rather than on universal standards. Instead of pursuing further policy transfer, the key factors of adaptability, decarbonisation and accessibility can be put at the centre of policies to arrive at innovative and sustainable concepts suited to the local context. Thereby a coordination of sectoral transport planning with overall urban development aims is necessary. The lead in this process of negotiation has to be taken by a democratically legitimised organisational body, which needs to use its position to coordinate the various interests and arrive at a comprehensive strategy.

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