Integrating Matatus in Nairobi's public transport future:

a study investigating how to include informal transport to Bus Rapid Transit (BRT) Projects

MSc Environmental and Infrastructure Planning

25th August 2024

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Abstract

This research focuses on Nairobi's public transport which consists of an informal matatu network and planned Bus Rapid Transit (BRT) project. Despite their essential role in Nairobi's transport and urban culture, matatus are not integrated into formal transport planning. This is also evident in the planning for the new BRT project. Current literature suggests there is a knowledge gap in understanding transport planning in relation to informal transport. Hence, the aim of the study is to investigate how to plan and design an integrative and inclusive public transport that blends existing informal transport networks to future formal transport networks in Nairobi. This was done through applying the Institutional Analysis Development framework to operationalise the case studies.

Through a literature review and document analysis, the historical context of matatus and their role in Nairobi's transport, and the BRT project was analysed. Semi-structured interviews with identified key stakeholders were carried out to further investigate the role of matatus. The future role of matatus will be in providing feeder lines for the BRT and current operators have been invited to form the BRT operating company. The biggest hurdles for BRT implementation was identified in acceptance from current operators which aimed to be mitigated through inclusion in the governance of BRT. Analysing the Rea Vaya BRT in Johannesburg, the Lagos BRT and the Dar Es Salaam BRT Rapid projects provided lessons, policy recommendations and conditions of institutional design to be applied to Nairobi. As a recommendation, Nairobi transport planners should develop clear institutional arrangements, paratransit strategies and active stakeholder engagement with paratransit operators and the public .

Keywords - *informal transport, paratransit networks, BRT, institutional design, Institutional Analysis Development framework.*

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List of Abbreviations

AfDB African Development Bank

AfD French Development Agency

BOC Bus Operating Company

BRT Bus Rapid Transit

CPR Common Pool Resource

DART Dar Es Salaam Rapid Transit

DUTA Dar Urban Transport Authority

EDCF Economic Development Cooperation Fund Korea Eximbank

EU European Union

FPTS Federation of Public Transport Sector

GIZ Deutsche Gesellschaft für Internationale Zusammenarbeit

IAD Institutional Analysis and Development

INTP Integrated National Transport Policy

ITDP Institute for Transport and Development Policy

ITP Integrated Transport Planning Ltd

JICA Japanese International Cooperation Agency

KeNHA Kenya Highway Authority

KeRRA Kenya Rural Roads Authority

KURA Kenya Urban Roads Authority

LAMATA Lagos Metropolitan Area Transport Authority

LUTP Lagos Urban Transport Project

MCC Millennium Challenge Corporation

MRTHS Mass Rapid Transit Harmonization Study

MRTS Mass Rapid Transit System

NaMATA Nairobi Metropolitan Transport Authority

NTSA National Transport Safety Authority

NURTW National Union of Road Transport Workers

PSV Public Service Vehicles

PWDs People With Disabilities

RTEAN Road Transport Employers Association of Nigeria

SACCO Savings and Credit Cooperative Organization

1. Introduction

There is a growing focus on planning for sustainable, reliable, and affordable public transport in the Global South context which often excludes the existing systems of informal public transport (Venter, 2013). This exclusion is evident in Nairobi's transport planning in Nairobi with the informal paratransit system matatus. Matatus is a term for the 14-passenger minivans and buses which are a solution to the lack of formal public transport (Klopp et. al, 2019). Matatus - identified with their distinct graffiti - operate independently from government regulation, with a flexible schedule and do not have traditional defined stops or drop-offs (Klopp et. al, 2019). Though currently, there has been data collected on the routes followed showcasing there are established routes. This was done by digitalmatatu (a collaborative project that develops open data for informal transport networks) which has developed route maps and mobile routing applications (Ma3route, Flashcast sonar, digitalmatatu, matatumap) (Ahn,2015). Despite evidence of established routes, matatus remain classified as informal due to the lack of recognition in the planning domain leaving the sector having control over fares, stops, and routes (Klopp et. al, 2019).

Nairobi's informal transport (matatus) is a response from the lack of formal public transport that emerged from colonial rule. The advantages are in the flexibility of routes, schedules and remain affordable based on market demand. In cases such as Kenya, it also provides the government a source of income through licensing and permitting (Klopp et. al, 2019). The informal transport is established as a paratransit network that serves a key element to mobility in urban areas in contexts with absent formalised public transport. Paratransit refers to transport that operates with flexible routes and timings and to cater for the transport gap that is present due to the lack of formal public transport (Foster, 2019). The term is academically used interchangeably with informal transport (Boutueil, Lesteven and Nemett, 2020).

The issue with informal transport is as it is self-governed, it is difficult to regulate. Consequently, informal transport is prone to delivering unsafe driving practices, sexual harassment cases, bias in fare allocation, high car emissions and overall is still unable to cater to vulnerable populations (Foster, 2019). In Nairobi, these consequences are still occurring with unsafe driving, leading to increased traffic congestion due to overtaking and accidents. This pushes for the need of planning and policy intervention to alleviate the negative attributes associated with informal transport.

The development in transport planning attention in Africa has been towards formalising transport such adopting BRT (Bus Rapid Transit) to replace the established networks to solve the issues present in informal transport. BRT is a public transport system that operates on dedicated bus lanes that are under operated under BRT companies with the aim of increasing capacity and reliability through established routes, schedules, and stations (Spooner and Manga, 2019). Adopting BRT is a growing trend in African cities which in turn has led to a growing research interest in analysing the successes, lessons and problems faced. The case of Nairobi's BRT project views matatus as a problem to be solved

therefore excluding matatus in the planned 5 BRT corridors despite the reality of matatus having to cater for transport demands beyond the planned corridors (NaMATA, 2022; Venter, 2013). Thus, excluding them from the planning process does not solve the current issues faced in informal transport. To assess the approach and planning of Nairobi's BRT project, a comparison can be made between other BRT projects in sub-Saharan Africa due to the similarities in context which makes the lessons transferable. Based on the criteria of projects already operating and presence of informal transport in the context, the case selection includes Rea Vaya in Johannesburg, Lagos BRT project and Dar Es Salaam Rapid Transit (DART) BRT project.

There is a **knowledge gap** in understanding transport planning in relation to informal transport. There is a fragmentation in transport policy making in Nairobi's transport planning. The fragmentation has led to the project lacking clarity on what the institutional framework will be. Instead, the project is focused on the planning and designing infrastructure of the BRT dedicated lanes and stops (Klopp et. al, 2019).

This **research elaborates on** Nairobi's public transport which has an established informal network of matatus (14 passenger minivans) and buses and a Bus Rapid Transit (BRT) project which ignores its presence despite the reality of the coexistence of the two systems. The **research problem** is how to develop an integrative public transport that includes both matatus and Nairobi's BRT project. With the distrust between the government and the matatu industry, conflicting interests due to ownership of matatus and lack of inclusion of matatus in planning have led to a complex arena. The reality is there will be a coexistence of the two types of transport networks. Therefore, there is a clear need for an integrative approach in planning Nairobi's public transport domain.

Therefore, the **research question** is *How to develop an integrative and inclusive public transport design and policies for Nairobi that includes Nairobi's BRT project and the Matatu informal transport network?*

To answer the research questions, the following sub questions will be addressed:

- *What stakeholders are present, what influence do they have on Nairobi's public transport arena and what relationship do they have with each other?*
- *What roles do matatus play in Nairobi's transport system and urban culture?*
- *What lessons can be learned from the implementation of BRT projects in other cities with established informal transport networks?*
- *Which policy recommendations and conditions of institutional design can be used to implement Nairobi's BRT project to the existing public transport arena?*

The **aim of the study** is to investigate how to plan and design an integrative and inclusive public transport that blends existing informal transport networks to future formal transport networks in Nairobi.

This study has **high societal relevance** as the implication of the BRT project replacing matatus is met with high social unrest. Matatus has a complex governance with it being owned by individuals including politicians and police officers and employs a large number

of people. The loss of employment is the highest concern regarding the implementation of the BRT which in similar case studies has led to protests. Matatus also play a role as a symbol for Nairobi's urban culture with exteriors decorated with graffiti and interiors retrofitted with loud sound systems. Additionally, they serve as the primary transport option for many commuters.

2. Theory

2.1 Defining informal transport networks

Informal transport networks arise from the absence of state-owned public transport which are falling short and are often left unregulated (Agbiboa, 2020; Falchetta, Noussan and Hammad, 2021). Informal transport is acknowledged as being able to meet the travel needs of the low-income population and achieve efficiency through flexibility in stops, fares, routes and timetables (Agbiboa, 2020; Kerzhner, 2022). Informal transport plays a major role in daily life as the primary source of transportation and an economic field but, has theoretically been limited in its research on its effects on cities, particularly African cities (Agbiboa, 2020; Kerzhner, 2022).

The informal sector provides job opportunities, particularly to the youth, as it serves many users (Agbiboa, 2020). In Nairobi, for example, only 12 percent of the population has private transport, leaving informal transport to cater as a primary source of transportation (Agbiboa, 2020). Informal transport mainly serves lower-income populations as the middle class opts for car use. Therefore, investments in the public transport system cannot be made from passenger fares (Venter et al., 2020). It requires intervention from planning officials and the government to increase investment in public transport. However, planning officials and government investment tend to be focused on investing in physical infrastructure dedicated to car use (Venter et al., 2020).

A strong influence of culture has emerged from informal transport. This can be partly due to the youth in the industry projecting ideas that are influential to politics and popular culture which, for example, is expressed in the exterior designs through images and slogans (Agbiboa, 2020). Another factor is that informal transport provides meeting points and responds to the urban environment which faces sub-optimal service due to road conditions, missing infrastructure, financial constraints and interactions of bribery and corruption (Agbiboa, 2020). The reflection is present in Nairobi where the historian Kenda Mutongi described matatus as embodying "the era of cosmopolitanism, multiparty politics, neoliberalism, and global hip-hop." This is reflected in the graffiti-covered exteriors of the matatus often adorned with references to popular culture and updated frequently as a form of marketing and individual expression. Individual expression is evident on the sides of

many Minibus-taxis in African cities through adorning slogans such as “Man Proposes God Disposes,” “No Money, No Friend,” and “It Still Moves,” as reflections of transport workers' thoughts and beliefs (Agbiboa, 2020).

The common perceptions of informal transport are often linked to being dangerous and unreliable. Unreliable regarding the limitation in knowing stop times, schedules, and stopping at undesignated stops. Additionally, pricing can be altered which increases its unreliability. For example, in the case of Nairobi, periods of high traffic congestion can increase the fare price. The danger of informal transport is unsafe driving practices such as speeding, overloading and unlawful overtaking (Agbiboa, 2020).

Moreover, inefficient land use has led to network development that is suboptimal and deviates from urban planning standards (Venter et al., 2020). These negative perceptions of the informal network are pushing to replace informal transport with new public transport. In 2017, Lagos Governor Akinwunmi Ambode spoke of yellow danfos (minivan taxis) contradicting the city's image as a megacity (Agbiboa, 2020). The dislike is reciprocated by informal transport towards city officials which has the potential to lead to conflicts. This stems from the lack of inclusion in formal planning based on the negative perception of informal transport (Mokoma and Venter, 2023).

Regarding the documentation of routes, there is a growing trend in the development of community mapping which can aid in filling the knowledge gap on how routes are formed. The description of routes is often associated with being reflexive to transport demand which has resulted in flexible and reactive routes (Kerzhner, 2022). A predominant figure in African transportation mapping is Digital Transport 4 Africa (n.d.) which collaborates with several institutions to develop an open-source data centre to help produce sustainable, affordable, safe and accessible transport systems. A better understanding of existing routes can be used as input to model current and future transport networks. Understanding the behavioural response to the introduction of BRT projects is argued to be case-specific but it is suggested that it leads to competition between paratransit and formal transport (Joubert and Venter, 2020).

2.2 Institutions of transitioning informal public transport

Regarding the institutional arrangements, there is fragmentation between state agencies and institutions in African cities (Cirolia and Harber, 2021). As a lens to look at this fragmented relationship the concept of urban statecraft can be used. Urban statecraft can be defined as “the construction, deconstruction and reconstruction of the urban state – reflects overlapping, on-going, contested and multi-scalar processes” (Cirolia and Harber, 2021). It can better represent the complexity of the relationships in play regarding the

flows and practices present in infrastructural systems of transport governance in African cities (Cirolia and Harber, 2021; Goodfellow and Huang, 2020; Rode et al., 2020).

Urban statecraft is visible on three levels in the arena of African transport governance which are.

1. Sectoral agency
2. Metropolitan governance
3. Regulation of paratransit governance

The first level of urban statecraft in transport governance is the **sectoral agency** which is a part of the governmental arrangements that has specialised and focussed agencies which are involved with building and maintenance of the road networks. The typical approach regarding road investments of the agencies is aimed at boosting GDP growth which relates to the ideologies of 'civilisation' and' modernity' (Cirolia and Harber, 2021; Khalili, 2017). Cirolia and Harber (2021) critics that national road investments are often executed without considering local conditions and ambitions. Such criticism can be contextualised to Nairobi's sectoral agency with most focus being on expanding road networks and developing new infrastructure to increase capacity.

In Nairobi, the following institutions are involved regarding the road networks (Ministry of Roads and Transport, 2023) -

- Kenya Roads Board, (Kenya Roads Board Act, 1999 & 2007)
- Kenya National Highways Authority (Kenya Roads Act, 2007)
- Kenya Urban Roads Authority, (Kenya Roads Act, 2007)
- Kenya Rural Roads Authority
- Kenya Institute of Highways and Building Technology
- Engineers Registration Board of Kenya

The multiple institutions at times have overlapping jurisdictions and therefore end up competing for resources such as funding from international donors, multilateral lenders and the national road maintenance levy or existing networks (Cirolia and Harber, 2021). This competition for financial resources can easily overtake county government ambitions and lead to unequal resource allocation. Therefore, this leads to sectoral splitting as institutions are in competition rather than in collaboration and therefore fragmentation in planning.

The second level is a **metropolitan authority** that is focussed on city wide programmes. The idea is the metropolitan authorities are better able to respond to overall goals of mobility and operate in a manner that can find synergies and lessen fragmentation by having a metropolitan area-based approach rather than a sectoral approach (Arroyo-Arroyo et al., 2024). A current trend of the metropolitan authorities is to carry out BRT projects as a mobility solution (Klopp et al., 2019; Cirolia and Harber, 2021). The case is similar regarding Nairobi with the formulation of NaMATA (Nairobi Metropolitan Transport Authority) which has aims in improving the public transport system through implementing

a Mass Rapid Transit System (MRTS) which includes a BRT system project, Commuter Rail System and Non-Motorized Transport System (NaMATA, 2022a). It has mobility as a goal but in terms of the activities of the metropolitan authority, it is centred towards producing infrastructure and has limited information on how the proposed infrastructure will be governed. Cirolia and Harber (2021) and Klopp et al. (2019) critically view these new institutions as agencies used to carry out BRT. However, with mobility as a goal, this requires a governance approach as metropolitan agencies span over different jurisdictions; For example, NaMATA needs to develop mobility strategies that overlap 5 different counties as well as overarching goals of road agencies which often overlap. A critique is that while the development of the agencies is better able to have an overview of goals, it can also lead to control away from local governance structures (Cirolia and Harber, 2021). This can lead to enhancing top-down governance which at the current state has limited influence on the existing public transport.

However, the scope of metropolitan agencies needs to include not just organising formal public transport but also informal transport in terms of mobility. NaMATA takes responsibility for increasing mobility in the Nairobi Metropolitan area but does not include informal transport despite its current role in providing transport (Arroyo-Arroyo et al., 2024). Informal transport will continue to provide transport as the network will cover most of the area. The dominance of the informal network shows a clear need for informal transport inclusion when discussing the role of sectoral agencies. However, there is a limitation in theory on how including informal transport can and should be in the roles of sectoral agencies. Therefore, this study takes a particular approach in analysing how the sectoral agency NaMATA is including informal transport in their BRT project plans.

The third level involves the regulation of **paratransit governance** which has an ad-hoc approach towards the arrangements which are steered by city officials (Cirolia and Harber, 2021). The network is a complex system with active reproduction (Cirolia and Harber, 2021). In the basic structure of African city paratransit networks involve associations, fleet-owners, drivers and conductors (Agbiboa, 2020). There is a specific target price needed to be paid to the fleet-owner which in turn affects the salary of the driver and conductor for the day. Responsibilities and overhead costs are placed on the drivers which include fines from station managers and from the police (Agbiboa, 2020). This leaves a vulnerable position for the drivers. As a manner to arrange the system, this led to adding institutional arrangements to organise individual paratransit vehicles to associations. In Kenya these are SACCOs (Savings and Credit Cooperative Organization). However, this still leaves the driver in the same vulnerability as the responsibility of the vehicle still remains with the driver. One noted vulnerability is that often drivers are faced with issues of having to bribe police officials (Agbiboa, 2020; Klopp et. al, 2019). This has led to an increase of the revenue extracted from the industry which is done also formally through licensing (Cirolia and Harber, 2021). However, popular transport remains framed as being unregulated despite regulations existing and outdated yet playing an active financial role with the higher institutional levels such as state and governmental agencies (Cirolia and Harber, 2021). From this framing, the general strategy is towards phasing out popular transport. Due to financial constraints and institutional capacities this requires a gradual process as popular transport develops in areas without existing formal public transport.

Other methods embarked are then increasing regulations on for example banning on certain routes, requiring drivers to belong to associations to safety rules such as speed monitors (Cirolia and Harber, 2021). In Kenya, the Michuki rules are the regulations that increased safety of popular transport which were introduced in 2004.

The growing strategy of regulation of popular transport is to replace it with BRT projects. Authorities often look at the South African model as a frontrunner in how to implement BRT successfully. During the initial introduction of the new BRT, it was met with unrest from existing informal transport. Therefore, contracts were introduced to existing popular transport operators to promise jobs in the new system and utilise the local knowledge from existing transport (Gauthier and Weinstock, 2010). Social unrest is not uncommon in relation to announcement of BRT projects with existing popular transport which stems partly from framing of informal transport being unregulated and outdated and a safety concern. This makes it important to include popular transport in the planning stages of formalising formal transport.

Overall, the relationship between paratransit networks and the state is highly complex and needs further analysis (Cirolia and Harber, 2021). There are a range of different actors with conflicting and sometimes competitive roles that differ in interest (Cirolia and Harber, 2021). This study aims to develop a better overview of the position and relationship of the paratransit transport system in Nairobi as an example of an overview of a relationship.

2.3 Public transport as a CPR

Public transport is perceived as a service provided through state institutions as transport acts as a collective good. Transport can fall victim to market failure and potential negatives arising from market power (Glover, 2011; Kerzhner, 2022). For example, negatives that can emerge are the lack of price standardisation, insufficient routes and the governing of safety standards. Such downfalls have resulted in states taking over the organisation of modern transportation systems which has been the case since the 19th century (Glover, 2011). This is a similar approach to what is mentioned by scholars about how the “tragedy of the commons” recommends that “the state” control natural resources to protect them from destruction and the use of privatisation to prevent the tragedy of the commons (Ostrom, 2015).

State institutions aim to harness collective benefits and eradicate free rider problems. A free rider problem is when one actor benefits from the joint effort of others involved without adding any of their efforts (Ostrom, 2015). Free rider problems can result in a reduction of the collective benefits (Ostrom, 2015). Regarding transport, passengers not paying for tickets is an example of a free rider problem. In informal transportation, another example can be traffic police taking bribes from drivers to overlook traffic violations. Arguably, from a policy analytical perspective, it shows the need for attention to acknowledging the complexities of institutional arrangements which occur (Ostrom, 2015).

States are not rational actors because governing actors still have free-riding tendencies. While central regulation is needed to curb the free-rider problems and safeguard against market failures, it still leaves uncertainty on user rights and dealing with conflicts. User rights and conflict resolution are barriers to formalising transport in contexts with established informal transport networks (Ostrom, 2015). This calls for reflection on how public transport is organised.

Public transport can be viewed as a resource that is a common pool resource (CPR). CPR is defined by Glover (2011) as goods or services that have common use and are shared. They have two characteristics: they have a limitation on use which affects the level of service and that it is hard to dictate additional users of the service (Glover, 2011). In terms of public transport, this can be seen in the manner to which there are set capacities in terms of the limitations on how many passengers can alight public transport vehicles which can cause crowding and competition (Glover, 2011). Through this competition in informal transport, this can lead to increased fares during rush hours and overcrowding at stations. Public transport also meets the second criterion as a CPR as they provide open access. Fares can be seen as having a limit on who can access but on the other hand if fare is met anyone has access to the resource. Therefore, monitoring users of public transport at best can be estimated but conceptually seen as a universal service as if it is in place, it is open to all (Glover, 2011). Following the definition of Polski and Ostrom (2017), CPR has a low excludability meaning it is difficult to limit access to the good and high subtractability which means that the number of users dictates the amount of supply. This is true of public transport as there is limited access based on vehicle capacity and the only limit to access is the fare. Critically, informal transport does not follow the classification of public transport as a CPR as it is privately owned. Therefore, it responds to market demand rather than a set of rules of operation.

However, aims of how public transport should operate can be theorised as a CPR that calls for efficiency, limited social and environmental costs that enhance the benefits that are inclusive to spiritual, aesthetic and cultural elements of the service (Glover, 2011). State ownership is seen as a method to enhance these services to meet public transport ideals which has been met with success in several developing countries. However, it has been met with failures in offering adequate services due to rising costs in transportation and environmental concerns prompting a new approach to public transport governance. It goes hand in hand with the view that state or market can be rational in enabling long-term, productive resource systems free of free-riders and therefore there is a reliance on institutions that govern resources instead (Ostrom, 2015).

This has led to a mix of public institutions and private service providers which relates to Ostrom's three CPR management solutions- private property, governments and community ownership (Glover, 2011; Ostrom, 2015). Interestingly, especially while discussing community ownership, these are common characteristics of informal transport. This leaves the questions of whether emulating formal public transport systems may be outdated as they are exploring tendencies already occurring in informal public transport. This suggests that the focus should shift towards integrated public transport systems.

2.4 IAD framework

To help understand how to foster the existing collective effort of informal transport, the Institutional Analysis and Development (IAD) framework can be utilised (shown in Figure 1). The IAD framework is intended to organise capabilities, existing knowledge from studies and in assessing past governance reforms (Ostrom, 2011). Based on existing literature and guides on the framework, it can easily be utilised in contextualising case studies. The framework can be used in the context of understanding the informal transport arena through the first step in policy analysis. What is clear from existing literature on informal transport is a push for an integrated transport system as replacing informal transport has been met with limited success by authorities (Cirolia and Harber, 2021). Therefore, a new perspective on the transport arena is needed which the framework can offer.

Critically, the framework requires more nuance regarding the context to include more cultural elements to explain the limited success of replacing the informal transport that takes place. Over time there has been a development of urban culture associated with informal transport that should be considered whilst assessing the transport planning arena. Through adapting the framework to the context, this has theoretical relevance in improving the framework to understand non-traditional institutions such as informal transport. Through its application, it can enable the framework to be more versatile and applicable to more institutional contexts that are inclusive of informal arrangements. For example, understanding the institutional arrangements requires broadening to not only formal institutions but also in understanding the structure of how informal transport is arranged. Therefore, it adds a new perspective in broadening institutional arrangements to actors and organisations that have no current role in decision-making but are key towards achieving outcomes.

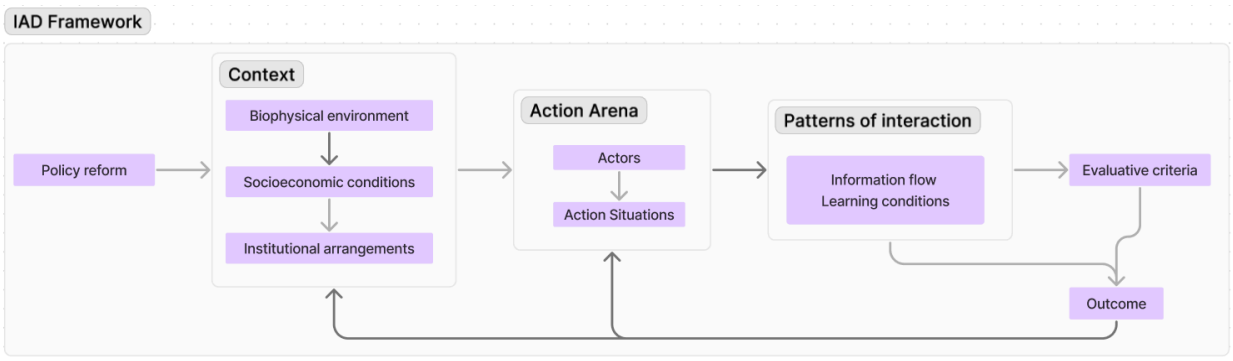

Figure 1 IAD framework (Adapted from Ostrom (2005)

To operationalise the IAD framework, the **action arena** first needs to be identified. The **action situation** used in this study is integrating informal transport and formal transport. The formalisation of public transport in Nairobi is done through the BRT project by NaMATA. The broader mobility plan includes non-motorised transport and commuter rail.

However, as this is still in the planning and design stage, the research focuses on the BRT project as this is the first priority in the mobility plan. It is at the stage where the pilot project is close to implementation. The action situation at this stage can then be defined as the *integration of BRT and informal transport*. This is a common trend within African transport. The adapted framework can be applied to cities with informal transport aiming towards formalising transport. It takes the theoretical framing of public transport as a CPR to capture the nuances of a market competition to better reflect the ad hoc development of public transport associated with informal transport. This links to viewing the action situation cluster as a CPR which includes Appropriation, Investment and Maintenance, Monitoring, Sanctioning, Evaluation and Claim-Making, Rule-Making (McGinnis, 2011). Another typical cluster is the context of Policy Instruments (or Policy Tools) which looks at institutional configurations with activities of Lobbying, Proscribing (law-making or regulation), Implementation, Monitoring, Enforcing, Coalition-Building and Maintenance (McGinnis, 2011). As much as the study is looking at policy documents related to BRT plans in contexts with existing informal transport, the critique is that the policy documents and the agencies involved take on an infrastructure delivery approach as discussed in previous sections. The **actors** are *government agencies, informal transport operators, financing organisations, BRT operators and commuters*. There is multi-stakeholder complexity, therefore a stakeholder quadrant will also be used to represent the relationships between the actors as they have differing power stands and interest levels.

The **context** includes the biophysical environment, socio-economic conditions and institutional arrangements. The **institutional arrangements** can be organised using the concept of urban statecraft through *road agencies, metropolitan authorities and informal transport*. The **biophysical environment** can be translated as the material conditions needed which in this case would be the physical infrastructure. This includes *paratransit vehicles, BRT buses, bus stops, BRT routes and informal routes*. The **socio-economic conditions** in the framework will be translated instead to *perceptions of public transport*. As the framework is being applied to Nairobi's BRT, which is still in a planning phase, it is hard to determine which socio-economic conditions are met. However, what can be analysed are the desired conditions expressed in planning documents. Comparing informal transport and BRT can be done based on experiences and opinions which are driving the choices made in designing and planning public transport. The key elements to the perceptions on informal transport and BRT are *safety, accessibility, affordability* and *reliability* as these are the main attributes of informal transport that are referred to in literature as needing to be solved. These will be translated to codes shown in the conceptual model (Figure 2).

Patterns of interaction in the framework looks at behaviour and interactions between the actors in the action situation. There will be competition between informal transport and

the BRT network which can lead to conflict. Therefore, it requires coordination between the informal transport and BRT network in developing routes. The patterns of interaction can be represented by looking at *coordination meetings, mobility behaviour* and *operational conflicts*.

The **evaluative criteria** of the framework will be investigated by analysing the lessons learned from the comparative cases studies of the DART, Lagos BRT and the Rea Vaya case studies. Additionally, the interviews will also indicate conditions to ease implementation and improve public transport.

The **outcome** is a *hybrid public transport system*.

2.5 Conceptual model

The conceptual model of the study is based on the IAD framework.

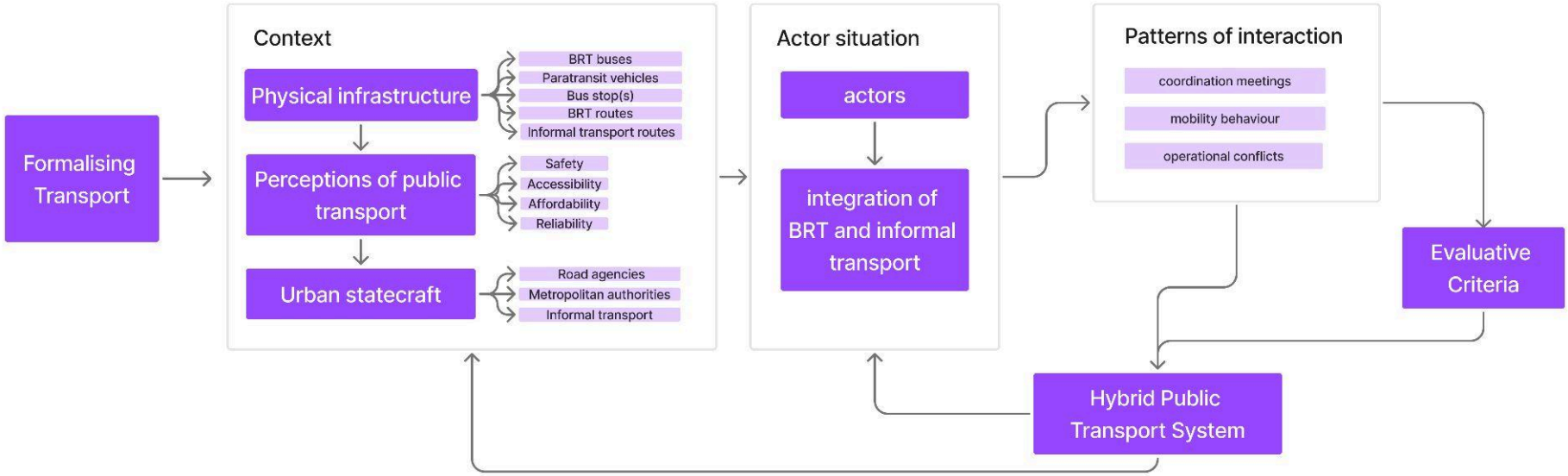

Figure 2 Conceptual Model

3. Background

The size of the Nairobi metropolitan area is projected to grow to 13 million with 5.21 million living in Nairobi city by 2030 (Korea Eximbank, 2017). This has led to Nairobi being a strong transport hub in Kenya as it hosts 67% of Kenya's motor vehicles. 70% of this motorised transport is supplied by public transport (matatus and buses) with approximately 4 million passengers a day. However, the current network faces issues of inefficiency and safety requiring restructuring and upgrading (Korea Eximbank, 2017). This need has prompted developing a mass rapid transit plan with BRT being first for implementation. As current public transport plays a key role, there is a need for an integrated transport planning approach that includes matatus and buses to the new mass rapid transit plan.

3.1 The context of Matatus: Nairobi's informal transport and subculture

Matatus operated as early as the 1960s, after Kenya's colonial period to transport people in newly desegregated Nairobi and legalised in 1973 with the absence of restrictions. This led to a boom in the amount of matatus providing services as well as an increase in safety risks due to the lack of governance which prompted regulation on inspection and licensing in 1984. By the late 1990s, this transformed the matatu industry into a fleet of colourful exteriors, interiors decked with sound systems, and even televisions as a marketing strategy. Often links to pop culture and even political statements adorned exteriors of matatus with each having a unique design (Mutongi, 2017). This has expanded the industry to provide a series of jobs such as drivers and conductors but also mechanics, artists, painters, sound technicians, and SACCO organisers to name a few (Spooner and Manga, 2019). With a stronghold in the market, previous attempts by Nairobi City Council to have their own publicly owned mass transit transport have failed with commuters opting to use matatus instead (Klopp et. al, 2019; Mutongi, 2017).

The success of matatus however, comes at a cost. They are estimated to be related to 95 percent of car-related fatalities (Agbiboa, 2020). As a consequence of ineffective traffic control, approximately 58 million Kenyan shillings are lost daily (Agbiboa, 2020). This pushes for the agenda to develop new mobility systems that are safer and more reliable hence the push away from policy makers from the informal sector.

However, the government does profit from the matatu sector as it provides revenue through licensing and the bribes extracted from traffic police (Klopp et. al, 2019). Additionally, some government officials and traffic police are also owners of matatus which causes a conflict of interest in governance and benefit from free-riding and using the industry as an unethical source of income through bribery and corruption. This shows the complex position matatus have in Nairobi's transport domain and explains the lack of inclusion in planning.

3.2 Nairobi's BRT project

Nairobi's BRT project which consists of 5 BRT corridors is planned under the Mass Rapid Transit System which also encompasses 4 commuter rail routes to develop a mass transit system (NaMATA, 2022; Klopp et. al, 2019). NaMATA (Nairobi Metropolitan Area Transport Authority) is a new governance structure responsible for project management and stakeholder engagement.

The authority comprises government actors and foreign consultants. It aligns several county functions under a council and management boards which are mainly national government representatives (Cirolia and Harber, 2021). The foreign consultants provide technical knowledge and financing however, it remains unclear how the financing will be organised and is divided between the different planned corridors. The project had a pressing need for institutional design to make the responsibilities known of each of the actors and collaborate with the matatu network. Even with the success of implementing the 5 corridors, most of the transport demand will still be met by matatus. A strong factor affecting the project is the distrust between the matatu sector and government officials which had led to planning being infrastructure focused (Albrechts, 2003; NaMATA, 2022; Klopp et. al, 2019; Falchetta, Noussan and Hammad, 2021).

4. Methodology

4.1 Case study design

The thesis will use case studies to develop an understanding on the phenomenon of paratransit networks and current roles in planning. Using a case study approach offers the advantage of being able to use mixed methods to describe a phenomenon in detail based on the real-life context (Priya, 2021). The primary case study is the Nairobi BRT which will be investigated through a theoretical literature review, semi-structured interviews and document analyses. Secondary case studies will be used to derive lessons to be applied to the primary case study. Regarding the conceptual framework, the secondary case studies will also serve as input for the evaluative criteria. As the Nairobi BRT project is not operational at the time of the research, having insight on already implemented BRT projects and comparing how the cases have carried out implementation can assess Nairobi's plans on their approach. This is highly relevant as secondary case studies are referenced in Nairobi's BRT planning documents as aspirational goals.

The cases are selected based on the criteria that:

- the context includes informal transport
- they are in sub-Saharan Africa
- the BRT is in operation
- there is adequate documentation available through project plans, policy documents and journal articles.

The cases selected are Rea Vaya in South Africa, Lagos BRT and Dar Es Salaam Rapid Transit (DART).

4.2 Units of analysis

The spatial boundary of the case study analysis is the matatu network and the BRT project in the Nairobi Metropolitan Region. The chosen scope of the Nairobi Metropolitan Region is related to the scope of the planned BRT project. The theoretical scope is based on the theoretical literature review regarding the concepts of paratransit networks/informal transport, inclusivity and institutionalism. The timeframe of the research is from November 2023 until August 2024 with data collection occurring from April 2024 until August 2024.

4.3 Data collection

Theoretical literature review

The thesis will start with a theoretical literature review on informal transport to gain an understanding of how informal transport operates, the advantages, disadvantages and insight on the ongoing transitions in informal transport. The institutional aspect of informal transport will be discussed to aid in understanding the public transport arena of Nairobi and the case studies discussed in later chapters. Furthermore, the perception of public transport as a common pool resource is discussed and further framed by the IAD Framework. This will be utilised to operationalise Nairobi's matatus as the primary case. From the theoretical literature, the background on the development of matatus and the role it plays for Nairobi's transport demands and urban culture will be focussed on. Information on the BRT project will also be collected.

Semi-structured Interviews

With the identified stakeholders listed below, key players in Nairobi's transport planning will be interviewed using a semi-structured interview to answer the RQ *What roles do matatus play in Nairobi's transport system and urban culture?* Semi-structured interviews were chosen as opinions are better expressed in openly designed format rather than an structured interview style or in questionnaires for example, but through the guide can be used to structure the results back to the framework (Ruslin et al., 2022; Neumann and Hunger, 2019). Due to the BRT not being implemented yet, the project can only be assessed based on opinion on the feasibility. Opinions give an indicator on what measures the planning officials are supportive of and gives insight to relationships with identified actors.

The interview participants of this research are -

- NaMATA (Nairobi Metropolitan Transport Authority)
- KeNHA (Kenya Highway Authority)
- NTSA (National Transport Safety Authority)
- Nairobi City County

The interviews followed a guide which is included in the appendix 11.1. The interviews lasted from 40 minutes to an hour and 10 minutes. Based on preference of the interviewees, the NTSA interview was done online whilst the rest took place in person. However, the interview with NaMATA took place with a focus group. Based on the information of the interview guide, a presentation was given by the focus group with a follow up question session based on the guide. The presentation slides and notes were made to deduce results and used as the transcript. The interview transcripts were coded using Atlas.ti. The code groups are based on the conceptual framework based on the IAD framework. The code groups are shown in the table below.

Table 1 Code groups

Code groups	Codes
Actors	- commuters - financing organisations - government agencies - informal transport operators - BRT operators
Material conditions	- BRT buses - BRT routes - bus stops - informal routes - paratransit vehicles
Patterns of interactions	- coordination meetings - operational conflicts - mobility behaviour
Perceptions of public transport (BRT) (Matatus)	- safety - accessibility - affordability - reliability
Urban statecraft	- informal transport - metropolitan authorities - road agencies

Document analysis

Using qualitative case studies of Nairobi BRT projects and comparative BRT projects (Rea Vaya, Lagos BRT, Dar Es Salaam Rapid Transit (DART)) will be analysed through coding. Starting with Nairobi, coding and analysis of current transport visions and plans will be analysed to see how matatus are included as well as in the BRT plans and route maps available. The coding groups used are in Table 1 above. Inductive codes will also be added

based on the coding group to account for any trends that may have not been identified theoretically. Additionally, using input of the policy documents the stakeholders will be mapped as well to give an overview on the actors involved and their roles.

Policy documents regarding the secondary case studies will also be analysed through coding with the same codes shown in Table 1. In-vivo coding will also be used to develop an evaluative criteria in the conceptual model. Lessons from the secondary case studies will be drawn due to similarities in the need for affordable and reliable transport and hurdles faced in implementation such as protesting from informal transport operators. The results will be summarised in a table showing how informal transport networks are included, the institutional design, weaknesses and successes. The results from the table will then inform a list of lessons, potential policy recommendations and institutional design recommendations. The documents analysed are outlined in table 2 below:

Table 2 Document analysis

Project	Policy Documents	Author
Nairobi BRT	BRT Design Framework (2018)	NaMATA
	KENYA BRT Final Report Part 1 (Chapters 1 - 4)	Korea Eximbank
	KENYA BRT Final Report Part 2 (Chapter 5)	Korea Eximbank
	UPDATED INTEGRATED NATIONAL TRANSPORT POLICY (2024)	Ministry of Roads and Transport
DART	Dar es Salaam Urban Transport Master Plan (2018)	JICA
Rea Vaya	Strategic Integrated Transport Plan Framework for the City of JoBurg (2013)	City of Johannesburg
Lagos BRT	ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF)	
	Lagos Bus Rapid Transit Africa's first BRT scheme	Dayo Mobereola (Former LAMATA Managing Director)

4.5 Data collection framework

Table 3 Data collection framework

Research Questions	**RQ1** What stakeholders are present, what influence do they have on Nairobi's public transport arena and what relationship do they have with each other?	**RQ2** What role do matatus play in Nairobi's transport arena and urban culture?	**RQ3** What lessons can be learned from the implementation of BRT projects in other cities with established informal transport?	**RQ4** Which policy recommendations and conditions of institutional design can be used to implement Nairobi's BRT project to the existing matatu network?	**MRQ** How to develop an integrative and inclusive public transport design and policies for Nairobi that includes Nairobi's BRT project and informal transport network?
Which information	Key actors and stakeholders, their power and interests	Information from interviewees from key stakeholders in Nairobi's transport planning	Information from project plans and policy documents for Rea Vaya, Lagos BRT and DART		All the above
Retrieval moment	March 2024	July/August 2024	April- August 2024		February- August 2024
Source of information	Project documents, policy documents, journal articles	Semi-structured interviews	Project documents, policy documents, journal articles		All the above
Research Method	Document analysis Stakeholder mapping	Semi-structured Interviews	Literature Review Case study comparison		Content analysis, summary notes
Documentation method	Stakeholder map, analysis text in findings	Transcripts	Summary table and analysis in findings section	Summary text and bullet point list	Findings, Discussion and Conclusion text
Method of analysis	Stakeholder map that identifies relevant stakeholders and relationship. Atlas.to coding of documents	Atlas.ti coding of interviews	qualitative content analysis - summary of BRT projects with how informal transport was included, project duration, institutional design, weakness and successes of the projects.	Lesson drawing based on summary	Qualitative content analysis based on results of previeus sections

4.6 Ethics

Before the interviews, an information sheet that briefly describes the research aim and purpose as well as the interview guide and letter of consent had been provided to the respondents to ensure informed consent is given (the guide and letter of consent can be found in appendix 11.1 and 11.2 respectively). The personal details are anonymised with respondents referred as per their organisation in the results. A recording was made of the interview for transcription apart from the NaMATA presentation which was documented through notes. The recorded respondents were informed in the letter of consent and verbally at the beginning of the interview on being recorded. After the research, the transcription will be stored as a password protected encrypted file on a password protected computer for up to 2 years and then will be deleted which is outlined in the data management plan (see appendix 11.3). The recording once the transcription is finalised will be deleted after the research has been submitted. The option to withdraw from the study before and during the interviews was expressed to the interviewees both verbally at the beginning of the interview and in the information sheet. The final report will be shared with the respondents as requested.

5. Nairobi's Public Transport Arena

This chapter will look at the primary case study of Nairobi's BRT project. The actors will be identified and analysed in terms of their role and relationships with each other. This will outline and make clear who is involved in the public transport arena which is unique to Nairobi. Once the actors are identified and their relationships, the context of Nairobi's public transport arena will be explained. Firstly, the physical infrastructure associated with BRT and matatus will be discussed. Through understanding the required infrastructure and existing infrastructure, it lays the foundation to compare the two systems and identify how the systems will interact with each other after the implementation of the BRT. When having a basis on how the physical infrastructure will be, it can be matched with perceptions of the respective systems. As the BRT is in the planning stage, it will be evaluated on whether the suggestions are feasible and address all the needs from the commuters. This will give insight by evaluating how the patterns of interactions are suitable for developing integration within public transport. Lastly, conclusions will be drawn about the potential for integration of BRT and matatus.

5.1 Actors in Nairobi's public transport arena

Firstly, this section will look at the actors present in the public transport sector. Each actor will be outlined, and their roles will be explained. The actors are grouped based on the code groups identified. Next, the stakeholders identified will be mapped out based on the relationship they have with each other based on the hierarchy using the concept of urban statecraft. This will be used to answer ***RQ1*** *What stakeholders are present, what influence do they have on Nairobi's public transport arena and what relationship do they have with each other?*

The actors involved in Nairobi's public transport are part of a complex actor arena with various stakeholders ranging from local to national to international. In the Updated Integrated National Transport Policy (INTP), key stakeholders in Kenya's transport arena are presented in figure 3 below (Republic of Kenya Ministry of Roads and Transport, 2024). Using input from the policy documents and figure 3 below a specific diagram related to the actors in the public transport arena can be developed. In the updated integrated national transport policy, the desire to have specific guidelines based on the four types of transport present in Kenya (pipeline, road, air and maritime) was highlighted (Republic of Kenya Ministry of Roads and Transport, 2024). Therefore, using the integrated national transport policy and BRT plans, the following sections will look at actors in public transport.

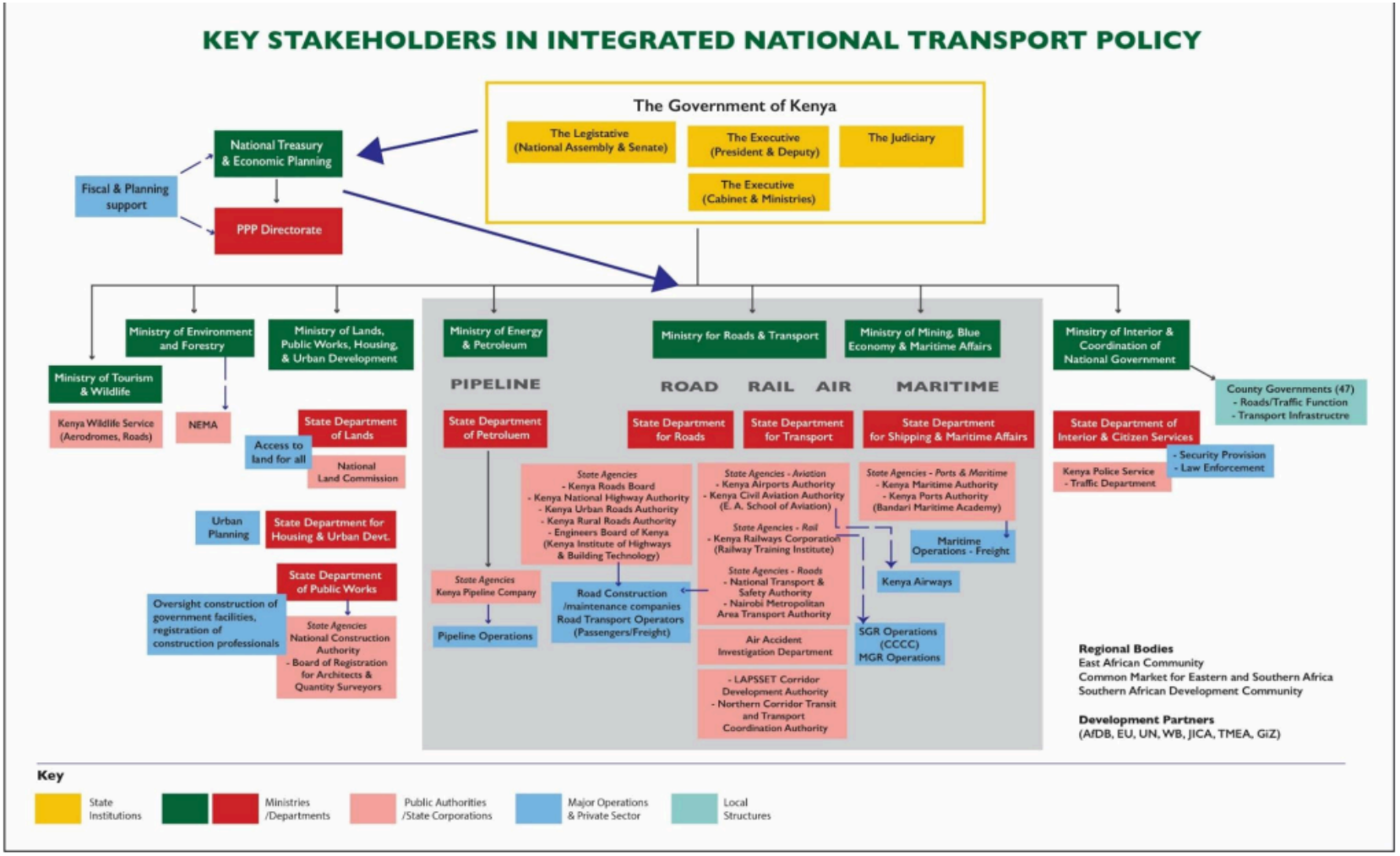

Figure 3 Key Stakeholders in Nairobi's Transport planning (Republic of Kenya Ministry of Roads and Transport, 2024, pg 19)

Regarding the actors in transport planning, some actors remain mainly dedicated to the BRT project and others are specific to the current public transport system. From coding the BRT documents and the national transportation policy the actors referenced are displayed in table 4 below with their roles.

Table 4 Actors in Nairobi's Transport Planning

Actors	Roles
(Public transport) Commuters	
Referenced as Local Residents, Passengers, User(s), Customers and Low-income urban workers	Users of public transport.
Financers	
AfDB (African Development Bank)	Funded Gauff consultants to create "the BRT Feasibility Study and Business Plan Preparation BRT Line 4 East" (NaMATA, 2022b)
EDCF (Economic Development Cooperation Fund Korea Eximbank)	Funding BRT Line 5 Nyati
World Bank	Funding BRT line 1 Ndovu (NaMATA, 2022b)
EU	Funding BRT line 3 Chui and line 4 West (NaMATA, 2022b)
UN-Habitat	Funded ITDP to develop service plan studies for Line 1 and Line 2
Government agencies	
Ministry of Roads and Transport	The overseeing branch of government that manages the state agencies in transport planning.
Government of Kenya	Partly financing the BRT
Government of the Republic of Korea	Partly financing the BRT
Road Agencies	
KeNHA- Kenya Highways Authority	In charge of developing, rehabilitating, managing and maintaining the National Trunk

	Roads (Kenya National Highways Authority, 2019). This refers to major highways.
KURA- Kenya Urban Roads Authority	In charge of developing, rehabilitating, managing and maintaining roads in urban areas (Kenya Urban Roads Authority, 2024).
KeRRA - Kenya Rural Roads Authority	In charge of developing, rehabilitating, managing and maintaining rural roads (Kenya Rural Roads Authority, 2017).
NTSA- National Transport and Safety Authority	Provide regulations that need to be followed by users of the road which SACCOs fall under. The licensing of public transport vehicles as well falls under NTSA's jurisdiction meaning they have a direct relationship with the informal transport network (National Transport and Safety Authority , 2023).
Metropolitan Authority	
NaMATA - Nairobi Metropolitan Area Transport Authority	Comprises both government actors and foreign consultants who are tasked with the designing and management of 5 BRT corridors and 4 commuter rail routes to develop a mass transit system. NaMATA includes representatives of the counties present in the metropolitan area (NaMATA, 2024b). - Nairobi City County - Kiambu County - Machakos County - Kajiado County - Murang'a County
Informal transport operators	
These are organised into SACCOS (Savings and Credit Cooperative). The SACCOs referenced in the documents are: - Kenya Bus Service Management Ltd - City Hoppa Ltd - Express Connections - Outridge	Currently providing public transport in Kenya through fleets of buses and 14 passenger mini-vans.

- Star Bus - City Shuttle - City Fairy - Paradiso	
BRT operators	
Unnamed BRT operator/ Bus operating company	Will manage the BRT fleet and staff the stations.

From the stakeholder identification, there are multiple agencies involved on different levels with overlapping tasks and responsibilities which JICA notes is a reason for the hindrance in managing the current public transport (Japan International Cooperation Agency, n.d.). For example, the role of KURA and KeNHA have identical responsibilities in having authority over the roads with KURA being restricted in urban areas. Regarding identifying stakeholders in relation to BRT, the plans are further fragmented in the 5 corridor lines with each undergoing different studies financed by different stakeholders (NaMATA, 2022b).

Additional actors were also identified which are not covered in the initial code groups and were developed in-vivo. The additional actors are identified as Consultants and Foreign Agencies shown in table 5 below.

Table 5 Additional Actors

Actors	Roles
Consultants	
Gauff Consultants	Producing studies for BRT Line 4 (east) (Korea Eximbank, 2017)
Ingerop / Lux consultants	Funded by the EU, Ingerop / Lux consultants prepared feasibility studies and business plans for BRT Line 3 and Line 4 (west) (Korea Eximbank, 2017; NaMATA, 2022b).
Digital Matatus	Has a project dedicated to collecting matatu transit data which has been developed into route maps and mobile routing applications (Ma3route, Flashcast sonar, digitalmatatu, matatumap) (Ahn,2015).

Foreign Agencies	
Japanese International Cooperation Agency (JICA)	Ongoing project with NaMATA to aid in improving the administrative capacity of running a public transport service in the Nairobi Metropolitan Area; (Japan International Cooperation Agency, n.d.).
Integrated Transport Planning Ltd (ITP)	Appointed by the World Bank to design a Feasibility Study and Business Implementation Plan for the Line 1 of the Nairobi Bus Rapid Transit (BRT). This was conducted based on international and World Bank standards (Korea Eximbank, 2017).
Institute for Transport and Development Policy (ITDP)	Hired by the KenHA, ITDP was tasked with creating a preliminary BRT service plan for Line 1 Ndovu (ITDP, 2015).

5.2 Aspects of Urban Statecraft

There lacks documentation of the overall current institutional structure on how public transport is organised or in determining future institutional structure. This can lead to miscommunication on understanding the roles of the actors or what their relationship will be. For example, understanding where the SACCOs fit into the institutional structure would provide clarity for what they are responsible for and set regulations. As a stepping stone in providing insight in the institutional arrangements, the stakeholders can be mapped. The governmental actors can be arranged based on the urban statecraft to understand the hierarchy present in the planning arena shown in Figure 4.

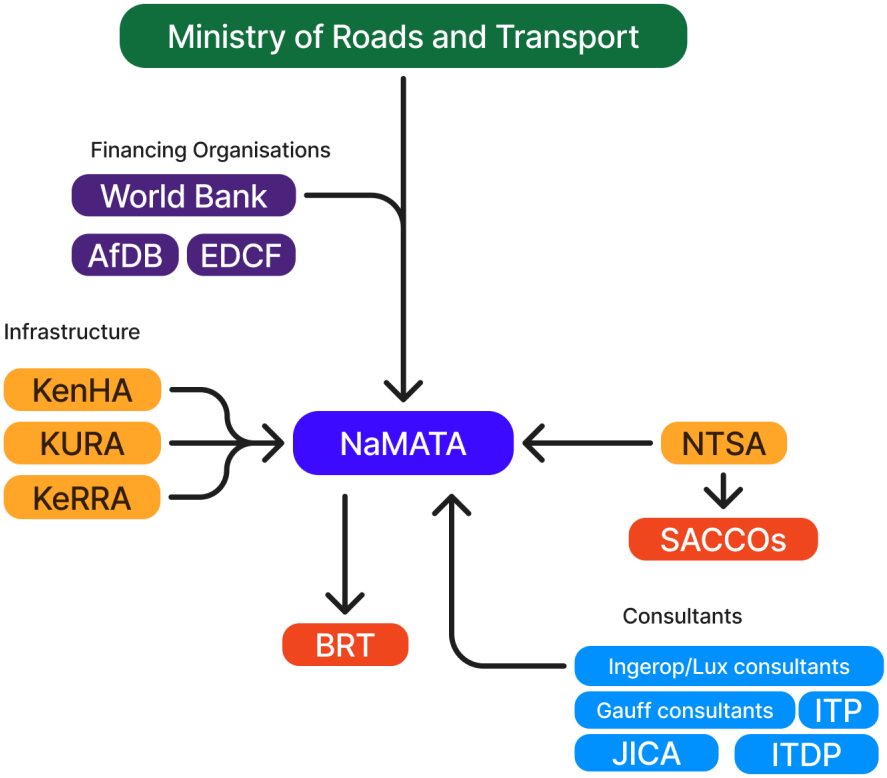

Figure 4 Actors in Nairobi's Public Transport

The Ministry of Roads and Transport is the **governing agency** of transport and oversees initiatives of the road agencies. There is a split between state agencies for roads and state agencies for transport. For the study, they are summarised as **road agencies** as both road agencies and agencies of transport are involved in public transport. NaMATA as the **metropolitan authority** is the authority in charge of the design and eventual operation of the Nairobi BRT. However, in the NaMATA BRT design framework, there is reference of having a BRT operator or a bus operating company (NaMATA, 2018). Therefore, it is not entirely clear if NaMATA will end up managing the BRT or hire another company. KeNHA, KURA and KeRRA are not directly linked to public transport but play key roles in providing the infrastructure required to run public transport and build the BRT infrastructure required. KeNHA has an ongoing project developing expressways which is collaborative with NaMATA as on the expressways to expand the roads to include BRT only lanes. KURA also has the same role as KeNHA but is limited in urban areas (Kenya Urban Roads Authority, 2024). Therefore, coordination with these two road agencies is needed in developing the stations and additional infrastructure which can be found in the material conditions section. It is hard to determine with the similar roles who has a higher power over each other and there may be conflicting roles. Based on the role descriptions of the respective authorities in Table 4, KenHA, KURA, KeRRA, NTSA and NaMATA are presented on the same institutional level which facilitates collaboration between the agencies.

In the diagram presented in the INTP (Figure 3), the positioning of where **informal transport** takes place is not included. This supports that current transport planning limits the role of the informal transport sector. Looking at the role of NTSA, apart from overseeing road safety, NTSA also oversees public service vehicles (PSV) registration. Through the NTSA's website is the online portal for PSV companies and SACCOs to carry out the necessary paperwork to operate. For example, vehicle registration as each PSVs must be registered under a SACCO (National Transport and Safety Authority, 2023).

The BRT system in Nairobi was developed through several parallel studies conducted by several **consultants** and their development partners which are **foreign agencies**. Therefore, they fall under the metropolitan authority as they provide studies such as service plans to advise the metropolitan authority to make decisions. This differs per line and is financed through the financing organisations of the particular line.

The institutional arrangements as described in this section shows how complicated the different levels of governance are involved, and the number of actors involved add to the complexity. Understanding the differences between the road agencies based on the descriptions requires more clarity. Therefore, it supports the need towards restructuring the agencies involved into sectoral agencies apart from just transport and road agencies. For example, NTSA has a role as more of a regulatory body through its mandate of licensing and therefore is involved in both transport and road. Lastly, the inclusion of foreign agencies and consultants play integral roles in transport planning and therefore should be included as additional levels of urban statecraft.

5.3 Context of Nairobi's public transport arena

From understanding the actors involved, the next step is understanding the context of the arena. This will make it clear what the deliverables are needed on the system which is addressed in section 5.3.1 Physical infrastructure. Through this, it will provide understanding on how the overall public transport network will work and look like. From understanding the required and current infrastructure the associated perceptions will be discussed. From reviewing the perceptions associated with matatus, the required changes in the systems are identified. As the BRT is to be future implemented it should work towards improving the transport system which can be evaluated against current perceptions. The perceptions of the BRT can be further analysed in whether the system will be able to deliver on the measures and infrastructure planned and whether the current institutional design is able to facilitate the implementation of the plan. Looking at the patterns of interaction in Nairobi's BRT will describe how the integration will take place. This adds to the feasibility of the system and utilises the information the power structures in place with the actors in the system. Lastly, the findings will be discussed in 5.5 Integration of BRT and matatus

5.3.1 Physical Infrastructure

This section discusses the physical infrastructure that is present with matatus and the planned infrastructure for the BRT as it is still in its planning phase. The characteristics are summarised in table 6 below using the coding associated with physical infrastructure (routes, vehicles and bus stops). An additional column discusses how the overall integrated public transport system will be. From there, the feasibility, successes and weaknesses will be discussed with references to the actors involved. This gives an overview of the future public transport network which will have both BRT and matatus and what needs to be addressed for better coordination of the two transport networks.

Table 6 Physical infrastructure of Matatus and BRT

Physical Infrastructure	Matatus (current)	BRT (planned)	Future Integrated Public Transport
Routes	Ad-hoc route developed by passenger demand. Route map through Digital Matatu using mobile mapping (Digital Matatus, 2014).	5 BRT only corridors (trunk routes). Based on a study of Digital Matatus routes which selected the busiest routes to be the 5 corridors . Will include feeder routes with feeder buses.	New BRT lanes which exclude matatus. The matatu routes will still carry a majority of the travel demand so Potentially matatus will also be feeders.
Vehicles	Matatus and buses Low capacity Graffiti decorated exteriors Outdated interiors	Electric Trunk buses and feeder buses. Higher capacity Adequate for wheelchair users (NaMATA, 2018). Interiors are fitted with visual and audio announcements. Map network displayed.	Both paratransit vehicles and BRT vehicles
Bus Stops	More than 24 terminals and has approximately 2,481 stops. However, matatus also stop in undesignated stops.	Unknown amount of stops and terminals. All stations fitted with turnstile gates, shelters with route information both visual and auditory.	Potential transfer stations between the two systems. Physical separation of BRT stops and Matatu stops.

Informal Routes

The Matatu routes were used as a basis for the BRT routes which suggests the informal route is accurate in responding to passenger demand. There is limited knowledge on the route network with the only network map being developed by Digital Matatus which has been recognized as a planning tool for the City of Nairobi. Using the data from Digital Matatus, this was included in the MRTS to determine routes for the BRT project. The data was collected using a study group from the University of Nairobi through collecting field data with mobile devices using mapping applications (Digital Matatus, 2014). This was then developed to a map with routes and stops shown in Figure 5 below.

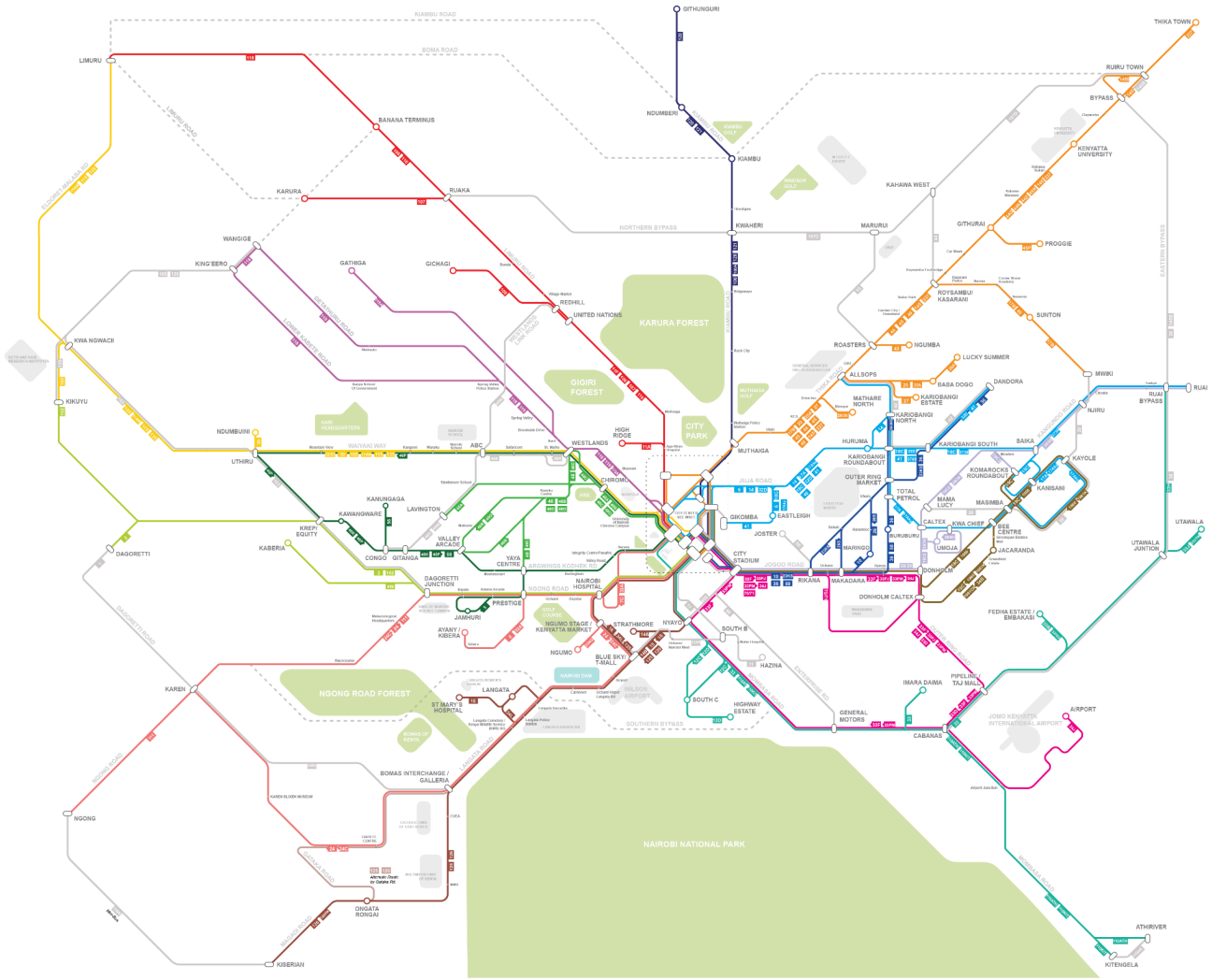

Figure 5 Map of Nairobi's matatus. Source: Digital Matatus (2014)

Paratransit vehicles

Within the policy documents, the paratransit vehicles are referred to as matatus or as PSVs. There is limited discussion on the characteristics of these vehicles with them only being referenced as having low capacities and having outdated interiors. There is no reference to the decorated exteriors nor the retro-fitted interiors of some matatus who have loudspeakers and televisions. In general, the discussion of paratransit vehicles is focused on its disadvantages such as lack of reliability, inaccessibility to vulnerable populations, unsafe driving and fluctuating fares (Republic of Kenya Ministry of Roads and Transport, 2024; Korea Eximbank, 2017).

Bus stops

Matatus has more than 24 terminals and has approximately 2,481 stops. The location of the terminals was also determined by passenger demand but are limitedly documented. The stops can be seen in the Digital Matatus map of the matatu network (Figure 6). Some terminals have adequate space dedicated whereas others are in sub-optimal locations. As the terminals are developed based on demand this has led to a concentration of matatu and bus terminals around the CBD which can be seen in figure 6.

BRT routes

As the BRT has not been implemented the discussion is based on plans of the BRT. It aims to be "more than the physical infrastructure of bus lanes and stations—reliable service and customer friendly operations are also essential to the success of the system." (NaMATA, 2018, p.37). The BRT will consist of 5 corridors shown in the map below (Figure 6). The corridors are named after the Big Five found in Nairobi National Park to appeal to future users.

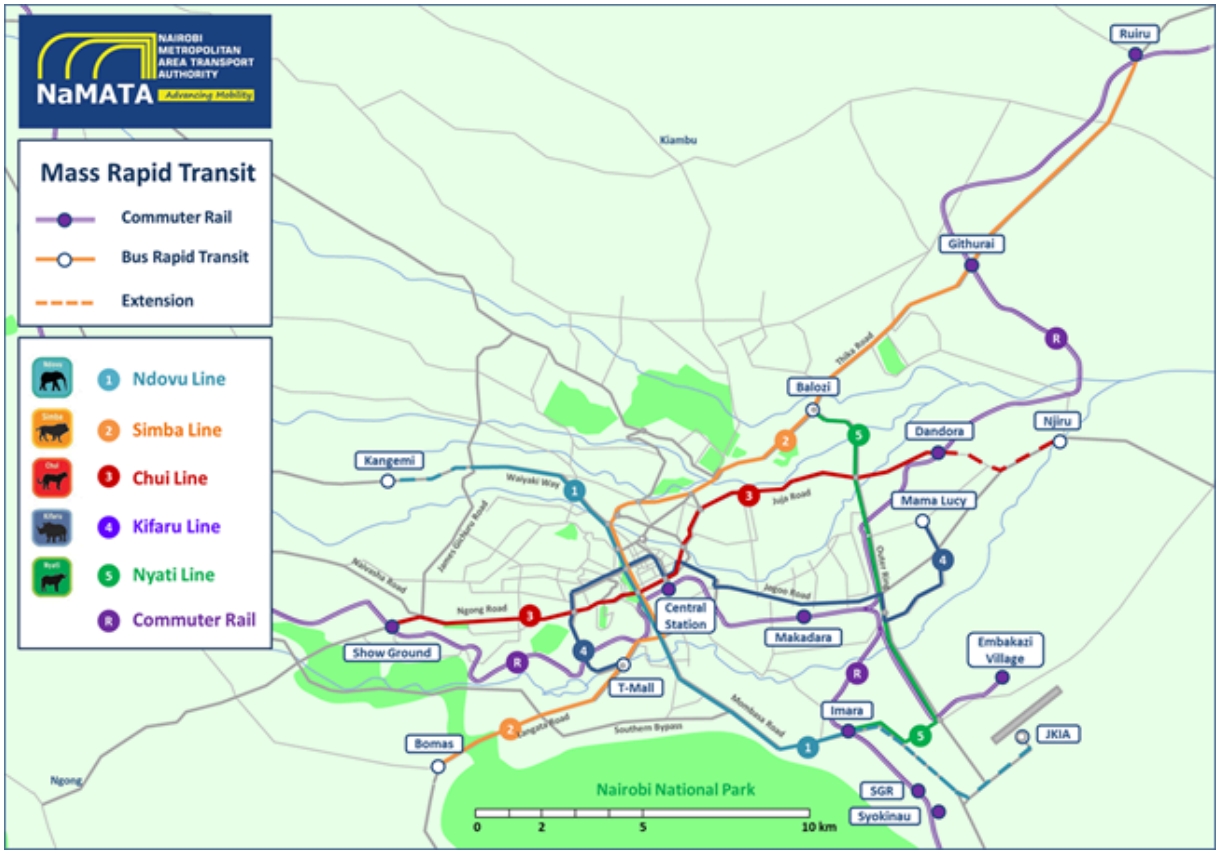

Figure 6 Map of Nairobi's Mass Rapid Transit route (NaMATA, 2022).

The corridors will follow dedicated closed BRT only lanes which are referred to as trunk lanes/services shown as the different lines in figure 7 (NaMATA, 2018; NaMATA, 2022). The lanes are located in new roads developed in the metropolitan areas such as the expressways (Korea Eximbank, 2017). Based on the infrastructure needs this requires donors to fund the infrastructure required which increases the actor complexity. These bus lanes are aimed to be introduced gradually as demand increases with Line 2 Simba being the pilot corridor (Republic of Kenya Ministry of Roads and Transport, 2024). The network will also expand to feeder services/lanes. The feeder services are mainly referenced as being provided for by the BRT operator to ensure seamless transfers occurring in transfer stations and having a single fare to reduce expensive transfer costs (NaMATA, 2018). In the BRT final report, there is suggestion that the feeder route will be catered through the matatus which was suggested in the MRTS (Korea Eximbank, 2017). This leaves ambiguity of whether this is still the aim as it is not further discussed in documentation other than in designing terminals. However, this clarity is crucial in determining the success of the system which will need the current network to carry the transport demand.

The stations and terminals will also be equipped with maps showcasing the BRT routes with station locations and the fare charts (NaMATA, 2018). However, to ensure better transitions to the system a suggestion would also be the development of feeder routes maps as most likely the stations are not the end destination of the passengers. The potential

transfers are considered when the BRT corridors pass near commuter rail stations, matatu terminals or intercity bus terminals (NaMATA, 2018).

BRT buses

The BRT buses are modelled after examples such as the DART. There is a distinction between having BRT trunk buses operating on the corridors and feeder buses. However, what makes the buses distinct is unknown. The BRT buses are electric to lower emissions. The buses are also fitted with doors on both sides to ease boarding and increase efficiency which are adequate for wheelchair users (NaMATA, 2018).

In terms of the aesthetics of the BRT fleet, the buses are suggested to "project a smart image for the system" (NaMATA, 2018, p. 39). The designs are to provide an attractive exterior and interiors for the system. The interiors are fitted with visual and audio announcements. Maps of the network will also be present in the interiors to show route stops (NaMATA, 2018).

The number of buses to be used in the BRT fleet has not been decided with the ITDP suggesting 385 buses whereas the ITP should be calculated after selecting a vehicle type. There is no suggestion on what method will be used. Especially since each line is being carried out by different actors, it may differ based on the line (Korea Eximbank, 2017).

Bus stops

The BRT aims to have stations that can hold the capacity of the users which are safe and comfortable (NaMATA, 2018). The efficiency of the system is considered with having stopping bays that allow multiple buses to stop and depart independently from each other in both directions of travel. The design of the station also pays close attention to being accessible to vulnerable passengers and via other modes (see section Perceptions of BRT; Accessibility) For night travel, the stations are equipped with lighting.

The stations also serve a function in "defining the image of a BRT system." There was a suggestion in the design framework to invite participants or host a design competition to have designs that are reflective of local culture (NaMATA, 2018). However, these designs may be restricted to also fall in line with the desired "smart" image which the matatus colourful exteriors is most likely to be more expressive of local culture.

In regards to the **physical infrastructure**, the biggest hurdle is the feasibility of achieving the investments in the BRT. It requires high cooperation from the actors involved in delivering and funding the infrastructure. More importantly, integration of the current paratransit is also crucial in order to attract users to the BRT and encourage spillover effects to the current network. For example having designated route stops with schedules. As paratransit is self-regulated, it also means that it has the capacity to implement change from the bottom-up which could be encouraged institutionally.

5.3.2 Perceptions of Public Transport

Perceptions of the BRT

Accessibility

The BRT documents consider BRT as providing "improved accessibility" and "convenient access for all users" (NaMATA, 2018, p.5). In the design framework, accessibility requirements have been highlighted with attention to different target groups such as "persons with disabilities and special needs." (NaMATA, 2018, p.35). At the current state, the existing road infrastructure is limited in providing infrastructure that is universally accessible. There is dedication in having the stations using ramps in its design specifications to allow for access for the disabled. The visually impaired are also considered through providing railing on the ramps and installing tactile paver blockers. Seating will be introduced for waiting in the stations with space provided for wheelchair users (NaMATA, 2018). Furthermore, zebra crossings, median refuge islands, tactile paving, pedestrian signals, and bus stops that match the height of pedestrian pathways are all examples of the emphasis placed on pedestrian infrastructure which currently needs improvement (NaMATA, 2018). Through this the BRT is planning to be more inclusive to vulnerable populations. However, the investment of incorporating these changes is high, meaning that NaMATA must make these standards non-negotiable for implementation to occur. As NaMATA's role is not in building infrastructure, carrying out the infrastructure required falls under the road agencies which may hinder the application of some of the highlighted measures.

Affordability

The BRT takes on a market-based approach when discussing the affordability of the BRT. It mainly reflects on the cost of executing the project and the maintenance of the facilities from an operating point of view. For example, the operating costs are planned to be recovered through the fare paid by passengers to attract private investment (NaMATA, 2018). The stations are suggested to use materials that minimise maintenance costs (NaMATA, 2018).

There are limited suggestions on how the BRT can be made affordable. There is no explicit information that informal transport remains expensive for the low-income population. Instead, there is a statement that the project should:

"Build an economically feasible BRT system that is appropriate to Kenya's' economic status and citizen's income level"- (Korea Eximbank, 2017, p. 2)

Therefore, it aims towards countering the negative attributes of the informal transport such as mitigating transfer fees across BRT routes and stabilising route fees. The final BRT report makes note of the current fees paid in matatus using the City Hoppa as an example but makes no suggestions on what the base fee will be (Korea Eximbank, 2017). Keeping in mind that the fare is to cover the operation costs with the additional infrastructure that is

not present in current public transport, it is likely to be higher than the base fee of informal transport. Furthermore, patterns of on peak and off peak travel times will most likely occur which may lead to overcrowding during peak times and lack of customers during the off peak times. This may lead to higher operating costs which in turn will increase the affordability of the BRT which has been seen in the South Africa case study.

Reliability

As matatus were developed ad-hoc based on passenger demand, BRT services will be determined through doing demand studies on the current public transport network in place (NaMATA, 2018). The capacity of informal transport has been noted in the INTP as low and as a response the BRT aims to have each sub-stop cater for around 50-60 buses per hour (NaMATA, 2018). However, this will be dependent on how much investment is gained to be able to meet the capacity. Critically, the transport demand calculated will most likely be distributed between different modes of transport such as paratransit and not just BRT. Therefore the reliability discussed can also be viewed as a selling point in competing with the current network which needs to be assessed after implementation as funding is the main hindrance of the implementation.

The reliability is also increased in the BRT network through real time passenger information, displays of bus routes and schedules and maps of the stations. Destinations and arrivals of buses will be notified both through visually displays and auditory announcements at both the platforms and onboard the buses. The stations will also be where the fare will be collected to ease efficiency with the fare remaining static regardless of peak hours (NaMATA, 2018). This differs how informal transport operates however as the feeder routes are most likely how people access the BRT the overall reliability of the public transport still needs to be improved. Therefore, there should be planning as well to develop scheduling for the informal transport. The feasibility of such an intervention is low due to the lack of planning capacity as informal transport is self-regulated. However, since the system will operate with both feeder and trunk routes, reliability will have to be addressed for both trunk and feeder routes to solve the current issues faced.

Safety

Safety of the passengers is addressed in several ways in the BRT project. Firstly, through using the closed system of BRT, there are less conflict points while driving, lowering the risks of traffic accidents. Next, pedestrian access is highly discussed with infrastructure supporting safe crossing such as traffic lights and increased lighting that also considers the vulnerable population. If the suggestions are executed, this will increase safety on the nearby area of the BRT stations as well as the stations itself. However, it calls for collaboration with the agencies in charge of developing infrastructure and the safety authority (NaMATA, 2018). Special driving training will take place for the drivers in the BRT system. As an increased safety feature to other vehicle operators as well, there will be traffic wardens deployed at major intersections and zebra crossings. This will ensure that the vehicles are signalled to not enter the BRT corridors and that priority is given to the BRT vehicles at intersections (NaMATA, 2018). These safety aspects extend to the trunk

routes therefore a point of improvement would be to address the feeder lines safety aspect. In general, from having a BRT only corridor, the lack of traffic conflicts does increase the safety aspect of the BRT.

Perceptions of Matatus

Accessibility

At the current state, matatus and buses have restricted accessibility to people with disabilities (PWDs), elderly and the poor (Republic of Kenya Ministry of Roads and Transport, 2024). This is also experienced in the urban transport infrastructure in general as there is a lack of facilities and infrastructure to aid vulnerable populations such as the PWDs, the visually impaired and hearing impaired. Under the INTP, the need to do so is highlighted but limited in detail (Republic of Kenya Ministry of Roads and Transport, 2024).

Affordability

The fare on matatus is dependent on several factors such as peak hours. During a study on current PSVs, the lowest base fare recorded was 30 Kenyan Shillings which is around 0.21 Euros (Central Bank of Kenya, 2024) from the SACCO Citi Hoppa during non-peak hours. In the study, it was estimated that most passengers paid 50~70 Kenyan shillings (40.6%) with 8.7% of them paying a fare of 20~50 Kenyan shillings. However, often the fares can vary as it is hard to regulate the individual buses. For example, extra charges can incur due to rain of 2 to 3 times the normal fare due to increased traffic (Korea Eximbank, 2017). This decreases the affordability which is already too expensive for most of the low-income users such those living in informal settlements. Most of the travel demand is still met through walking and cycling (Republic of Kenya Ministry of Roads and Transport, 2024)

Reliability

Matatus are documented in the BRT report as “mostly cramped, uncomfortable, old-dated, and poorly managed” of which the BRT design tries to counter (Korea Eximbank, 2017, pg. 79). In the INTP, the public transport holds a similar view of public transport being unreliable and having a limited capacity and supports the development of a new public transport system (Republic of Kenya Ministry of Roads and Transport, 2024). Matatus have unknown stop times and have flexible stops with some designated bus stops according to NaMATA (2018). At these stops, it is common practice that the waiting times are dependent on how long until the seats are filled as it is viewed as being more economical. This typically occurs at the end points of the matatus routes (Korea Eximbank, 2017). There is also limited availability of information on public transport routes, schedules, stops and the fare (Republic of Kenya Ministry of Roads and Transport, 2024). Regarding fare this can vary as discussed in the Affordability section. With the transport routes, there is growing documentation that can be found at Digital Matatus and the various applications developed showcasing route data.

Safety

Matatus are associated with unsafe driving practices (Republic of Kenya Ministry of Roads and Transport, 2024). In the BRT final report, the driving practices are referenced as "illegal and abusive driving" to meet the daily lease fee from the SACCO, which puts passengers at risk (Korea Eximbank, 2017). Examples of the driving practices include illegal overtaking during traffic. In the policy documents there is no reference on what measures can be taken to increase safety and instead highlights the issue further encouraging replacing matatus.

The **overall perceptions** on the BRT are seen as positive whereas the matatu is seen as a problem to be solved yet crucial to delivering the transport demand due to their well established network.

5.4 Patterns of interaction in Nairobi's public transport planning

Coordination meetings

There is a strong desire to increase the amount of coordination meetings between the different planning agencies and the informal network, but these are discussed as an aspiration rather than being practised due to current institutional arrangements and legal frameworks. Moreover, the different modes of transport are not coordinated hence the development of NaMATA. However, much of the focus seems to be on the BRT.

The INTP stresses that current infrastructure and institutional arrangements fail to integrate the multiple modes of transport which has led to an "an imbalanced, costly and environmentally unsustainable urban transport system" (Republic of Kenya Ministry of Roads and Transport, 2024, pg. 35). The policy suggests coordination of activities and responsibilities of the actors across different institutions. It firstly calls for a revision in the legal framework to enable increased participation in developing and managing transport. In the BRT project, there is discussion on including a design competition with the local residents and engaging other potential stakeholders, but it is not specified how this will be carried out (NaMATA, 2018). This also explains why there is limitation in the current BRT plan in harnessing opportunities in participation. There is a goal set by the INTP to "Promote free, prior and informed consent (FPIC), participation and protection of vulnerable groups and indigenous people." Again, critically this is stated as an aspiration, with no clear intervention in place to ensure this. Rather it supports the notion that participation is highly limited.

There is also a push towards having coordination in urban transport and having its own dedicated policy and to create a national institution dedicated towards urban transport policy (Republic of Kenya Ministry of Roads and Transport, 2024). Looking at NaMATA, the responsibilities of focusing on urban transport which is a stepping stone towards developing a national urban transport institution. NaMATA aims to coordinate the various activities and plans with mobility in mind. Road transport planning has been criticised for being fragmented across the county governments and road agencies. Within the structure of NaMATA, it coordinates by having the county governors in its council and works together

to steer the agencies to achieve its mobility goals. The coordination meetings that take place are through having a board of representatives.

The importance of having coordination meetings with the different planning agencies and the development of policies is made clear but the presence of this coordination is highly limited.

Operational conflicts

Regarding operational conflicts, the current matatu sector has conflicts between operators regarding routes and through driving with mixed traffic (Korea Eximbank, 2017). Therefore, the introduction of the BRT can be viewed as being one more competitor for the matatus and will replace the busiest routes. It does provide an opportunity to streamline the various operators into one company, but this requires strong negotiation due to the distrust of planning officials. Institutionally, there is also no institutional coordination framework with the national and the county governments for the management of the transport sector (Korea Eximbank, 2017). This leads to disjointed efforts that differ from different counties which leads to issues as the BRT network covers 5 different counties.

Overall, the discussion of operational conflicts was limited in the documents with little reference to potential conflict from the current network operators and discussion on how to integrate between institutions is referenced as an issue with limited actions on how to improve.

Mobility behaviours

Mobility behaviour for the commuters will be from paratransit, walking and cycling to the BRT network. As the BRT will take over the 5 busiest routes, it would be feasible in projecting that some of the transport demand will shift over to the BRT because of route replacement. In order to understand transport behaviour, transfer surveys were done to aid in modelling passenger transfers. The aim of the BRT is to "increase the overall passenger carrying capacity of a corridor by encouraging commuters to switch from other modes" (NaMATA, 2018, pg.4). Therefore, it aims to attract both current public transport users and private vehicle users. However, this will require a shift in behaviour as private vehicles are the preferred mode of transport. In order to achieve modal shift, there has to be public information shared on the BRT to attract users which is limited as the BRT is still in its planning phase. There should be plans made on how to engage the passengers.

Overall, the **patterns of interaction** have made clear there needs to be more communication institutionally between the agencies as well as an increase in participation for the current public transport. Having NaMATA's role in facilitating coordination between the agencies with a focus on mobility offers a platform to facilitate better coordination. Through the interviews, better insight on the relationships between the agencies and their perception on paratransit can further discuss how the actors interact.

5.5 Integration of BRT and Matatus

There is a clear need to coordinate with the KeNHA and KURA with NaMATA to make the required infrastructure to be met. Not only to implement the BRT but also to meet the BRT goals in being accessible to all which is currently lacking. The BRT documentation makes clear rebuttals to the disadvantages the current public transport faces but there is little acknowledgement of the successes of matatus and buses which is made clear from the institutional desire to replace matatus. However, the reality remains of the coexistence of the future formal BRT and the current informal matatus which is supported through the designing of terminals for passenger transfer between BRT and paratransit networks. Aside from addressing this piece of infrastructure, what can be assumed is that institutionally BRT and matatus will remain segregated. However, there are patterns of interaction that point towards coordination but are still limited. To better understand the role and future role of matatus, interviews from planning officials in Nairobi's public transport will be looked at in the next section.

6. Interview results

This section discusses the role of matatus in the current and future public transport through interviews with planning officials. It also discusses the current organisation of the institutions and their relationship with matatus, their view on what hurdles and early-wins have so far taken place. The results are organised based on the themes of the document analysis (actors, aspects of urban statecraft, context-perceptions of public transport and patterns of interaction). The organisations interviewed were KeNHA, NTSA, Nairobi City County and NaMATA.

6.1 Actors

Through the interviews, there were additional actors identified. From NaMATA (2024a), there is a dependence on donors to provide electric buses for the corridors. For example, MCC (Millennium Challenge Corporation) is offering blended financing for 200 buses. In order to aid NaMATA, the AfD (French Development Agency) as well is consulting on increasing the institutional capacity and GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) is developing standards of e-mobility (NaMATA, 2024a).

There is potential to offer employment opportunities. For example, The World Bank is aiding in technical training for data analysis for operation and JICA is conducting a study on how to formalise existing paratransit which shows promise in capturing the market (NaMATA, 2024a). However, it is unlikely to capture the current paratransit workers as most have a low education background. According to a labour assessment done on the matatu industry, 59.5% percent of the respondents reached secondary education level and only 8.7% had additional training in IT (Spooner and Manga, 2019).

The role of the counties was seen as more crucial in the development of the BRT. In addition to the respective governors of the county being in NaMATA's council, there were also the directors of transport of each county involved (NaMATA, 2024a).The county is in charge of licensing the routes of the current paratransit network (KeNHA, 2024). However, during the interview with NTSA (2024) the route service licence was stated to be under NTSA. Overall, the roles and responsibilities of the officials need to be streamlined as the institutional arrangement is highly complex.

The paratransit has been closely linked to the planning process of NaMATA with discussions occurring for 5 years (NaMATA, 2024a). The focus has been on aiding in the transition to BRT with the hope the BOC (bus operating company) formed will be managed by current operators. The approach was on education on the need to also improve the capacity of current operators (NaMATA, 2024a). This has led to several developments spearheaded by the operators such as the presence of electric buses already being operated by SACCOs and the start of off-fare collection systems using mobile paying services. Formally, these SACCOs being consulted by NaMATA have been organised to form the FPTS (Federation of Public Transport Sector) which involves 20 representatives. They have provided valuable first-hand knowledge on the operation of the paratransit industry

such as route consultation. Additionally, JICA formed a steering committee to further aid in the process. However, the concern is as much as there is engaging of the paratransit, it is done at the level of the SACCOs and not the other dependents in the industry (NaMATA, 2024a). While the drivers are taken into consideration, it can be assumed that the artisans, mechanics and engineers will not be transferred into the system as it will be based on capacity training from the various donors. In the labour impact assessment, it was calculated that the implementation of the BRT will amount to approximately 30,000 job losses (Spooner and Manga, 2019). Additionally, as the drivers will have to take in additional training to the BRT, it is unknown if that cost will fall to the driver or the BOC. Given the vulnerability already faced by matatu drivers, this should be made clear.

6.2 Aspects of Urban Statecraft

NaMATA as the metropolitan agency has representation of all the road agencies within their boards to increase coordination. This is also further aided through a steering committee by JICA. The role and influence of consultancy firms are influential to the governance structure and should be included in the theory. The aim of NaMATA is in coordination of public transport to then "ensure compliance" and "regulatory monitoring" (NaMATA, 2024a) . Therefore, the aim for long term planning is the various agencies first consult NaMATA's plans to then take into account the various projects undertaken by the respective agencies and county governments. For example, through documenting plans for a route, this can be taken into account in developing land use policies to increase the efficiency of implementation (NaMATA, 2024a). Having this coordination in governance would improve the current institutional fragmentation discussed that is occurring in transport planning currently.

In regards to the popular transport, the buying from SACCOs would be organised by the FPTS and form a BOC under NaMATA (Nairobi City County, 2024; KenHA, 2024; NaMATA; 2024). However, the feeder routes will be managed by the SACCOS unable to buy in which will be licensed under NaMATA/ Nairobi City County (NTSA, 2024; Nairobi City County, 2024). When asked on whether there will be feeder regulation, there was mention of JICA being tasked with creating an integrated network plan. However, as of now NTSA will be in charge of feeder regulation and NaMATA will be in charge of BRT regulation (KeNHA,2024).

The current network is semi-structured so to speak with operations having designated routes and organised into SACCOs. The paratransit workers are under "SACCOs of certain principles and the regulations which are approved by NTSA and they are supposed to follow" (KeNHA, 2024). When interviewing Nairobi County, there is already a bus network plan being developed by the county which shows how this process is already ongoing in the division on public transport. The concern is that there tends to be a lack of data sharing happening between the different agencies leading to replications of studies being performed rather than coordination. This is caused further by the overlapping tasks in management of public transport in the different agencies, for example creating a route network.

6.3 Context - Perceptions of public transport

The ongoing perception of public transport that was mainly highlighted was the **inefficiency** of the current network (NTSA, 2024; County of Nairobi, 2024; NaMATA, 2024a). There is competition between the SACCOs for busy routes which has led to clustering (NTSA, 2024; Nairobi City County, 2024; NaMATA, 2024a). The County often settles the disputes on an almost daily basis. Regarding pricing, the BRT will not be able to be as **affordable** as the current network. The BRT was quoted as it "cannot compete with matatus" (Nairobi City County, 2024). Furthermore, in terms of **accessibility**, it is noted to be highly accessible through its extensive route which the BRT will not be able to provide (Nairobi City County, 2024; NTSA, 2024).

The traffic police oversee enforcing the **safety** regulations the NTSA has mandated. However, it has been highlighted that this has been compromised due to corruption. It is known that the traffic police take bribes along routes (NTSA, 2024, Nairobi City County, 2024). The corruption in the public transport industry is credited to be the cause of unsafe driving practices to meet daily targets from the vehicle owners which has led to increased competition (Nairobi City County, 2024).

Through the BRT, it is felt that through NaMATA, it can dictate regulations to be followed to increase the **safety** and **reliability** of public transport. This will bleed into the matatu industry as it will fall under regulation. It was made clear that the SACCOs will be given priority in operating the BRT either through a parent company and the SACCOs are able to buy shares (KeNHA, 2024). Those that are unable to buy shares will "fortify the smaller services" through feeder routes (KeNHA, 2024). The involvement is being facilitated by NaMATA which is organised through the FPTS which consists of the SACCOs buying into the BRT. However, the feeder routes will be coordinated under the county through SACCOs and regulated by NTSA. Already, it was highlighted that there is no limited entry to running a SACCO therefore, it poses the risk of increased fragmentation of the industry as less powerful SACCOs are vulnerable to eventually being bought out.

6.4 Patterns of interaction

There is a clear hierarchy present within the road agencies which are separated into different mandates. It was felt that this worked well, with the representative of KenHA stating "We work through the ministry to coordinate. They coordinate all the authorities. So the current status is very good" (KeNHA, 2024). However, this conflicted with the opinion of the representative from NTSA who felt that instead problems tend to lead to a "blame game" between the agencies. It was credited that there lacks knowledge on the role of NTSA and it is often blamed for traffic accidents despite it being a shared responsibility between NTSA, the drivers, and the state of the road which is under KURA, KeNHA or KeRRA depending on the road. From the description of the mandate of the NTSA, it is involved in assessing traffic accidents, it often is blamed for the accident (NTSA, 2024). As highlighted

by NTSA (2024), when it comes to the current public transport in the event of an accident, who is at fault is hard to determine. For example, if the driver is at fault, then it leads to the SACCO being suspended for a duration of time. It was criticised as; "just a way of punishment. But to me, from where I see it, it is not the best we can do it. But now why are we doing it? Because it is the only way we must induce some discipline." (NTSA, 2024). The lack of being able to discipline the current sector was also felt by the County but credits the lack of influence as planning departments focused investments on car infrastructure and increasing road capacity where interventions could have taken place to dedicate public transport lanes (Nairobi City County, 2024).

Overall, the patterns of interaction have improved through the development of the BRT project, but there tends to be focus on how to discipline the paratransit network as a means to improve the current network and there is still distrust between the different agencies as well.

6.5 Integration of BRT and Matatus

The formation of NaMATA can be seen as the starting integration on transport planning and facilitating engagement with operators and agencies. As the transport planning sector has been seen as fragmented. It was credited to be because transport is 'split in different modes' (KeNHA, 2024). There are high hopes that the project, which is credited if implemented as planned, can transform Nairobi's transport. The plans are faced with high optimism by planning officials in increasing the efficiency of the system. There was a limitation from the respondents on the early wins as the project has not been implemented yet.

There is optimism in the BRT being able to solve the issues present in public transport, but big hurdles have been highlighted. The involvement of the current public transportation is the most crucial intervention. Already each of the sectors have direct relationships with the SACCOs in terms of licensing by the NTSA and having quarterly meetings and direct contact with the county government through a WhatsApp group (NTSA, 2024, Nairobi City County, 2024). The biggest concern is in the matatu network viewing the BRT as competition which is not the intended case.

"One of the challenges we'll face is resistance from the matatu owners, because we'll be placing them out of business so in terms of to encounter that challenge is to include the matatus to the governance" (KeNHA, 2024).

It was felt there will be little resistance due to the ongoing engagement by NaMATA and the BOC being governed by current SACCOs (Nairobi City County, 2024). On how to include the feeder routes, what was suggested for example was to 'package benefits for operators' NaMATA, 2024a). What can be foreseen though, is that as much as the matatus will be included in BRT governance, it will still be those SACCOs who can afford to buy in whereas the feeder matatus are still left with the same issues. Therefore, a strategy is also needed for the paratransit network.

Another hurdle is funding which can be credited to causing delays in the system causing differing accounts on the current status of the BRT from planning officials. Lastly, a key challenge was on public perception on change which is reflective of the distrust of government interventions. This is due to the ongoing corruption which was discussed as present in the current industry. Also, there is a lack of understanding of what the roles are of the different agencies which needs to be made more transparent. For example, the understanding of NaMATA as a policy agency is misunderstood and is compared to other road agencies who produce infrastructure (NaMATA, 2024a). The role transparency of the institutions will be needed as well to encourage the desired modal shift to BRT for car users.

6.6 Future of Nairobi's public transport

Overall, the role of matatus has not only been as providers in transport but also as key stakeholders in developing governance for the BRT project. Stakeholder engagement will be key in the integration of the BRT as the paratransit operators are being depended on to buy into the BOC for the BRT and provide the feeder routes. The eventual desire of the BRT is gradual outphasing of the matatu industry through recapturing them in the extension of the BRT. The biggest hurdle identified is in the funding with expectation that there will be little resistance from matatus as they are in the governance structure. However, the engagement with the current industry is with mainly SACCO owners and leaves out other actors in the current industry such as the artisans, the mechanics and so on. Therefore, implementation is still expected to cause unemployment. By looking at other case studies discussed in the next chapter, will aid in forming advice for the implementation of the BRT where there is existing informal transport.

7. Case Studies

This chapter looks at the BRT case studies selected in sub-Saharan Africa that have been implemented and in locations where informal transport is present. The selected case studies are Rea Vaya in Johannesburg, DART in Dar Es Salaam and Lagos BRT. The data used will be from the document analysis. In the introduction of the case studies, each section will include how the BRT was planned and how informal transport was addressed in planning. This will then be summarised in table 7 outlining the institutional design, how informal transport was included with all the secondary case studies and the primary case study of Nairobi. This will aid in making comparisons between the case studies to draw lessons from their implementation which will be used to create an evaluative criteria. The evaluative criteria can then be included in the conceptual framework.

*This chapter therefore answer both **RQ3** and **RQ4:***

- *What lessons can be learned from the implementation of BRT projects in other cities with established informal transport networks?*
- *Which policy recommendations and conditions of institutional design can be used to implement Nairobi's BRT project to the existing public transport arena?*

7.1 Rea Vaya

Johannesburg's formal public transport consists of a municipal bus called Metrobus and the Rea Vaya BRT system. The BRT was introduced due to the increase of funding due to the 2010 FIFA Soccer World Cup and the increased advocacy by international NGOs. This was also supported nationally by the Department of Transport in their Public Transport Strategy and Action Plan (City of Johannesburg, 2013). The BRT corridors were introduced gradually, and it is currently moving on to phase 1C (Rea Vaya, 2023). During Phase 1A, Piotrans (Pty) Ltd was formed which is owned 100% by 313 stakeholders who were operators in Johannesburg's taxi industry and all BRT drivers are former taxi drivers. This is how informal transport was considered during the implementation of the BRT.

The City of Johannesburg oversees both Rea Vaya and Metrobus services as well as building and maintaining roads and public transport infrastructure (City of Johannesburg, 2013). This means that there is less institutional fragmentation compared to Nairobi's public transport institutional arrangements. The City of Johannesburg has a department dedicated to transport which oversees the transport planning for the city. It is similar to the role of NaMATA in overseeing transport but in the Nairobi case study it shares responsibilities with other national road and transport agencies. In Johannesburg's public transport like in Nairobi, there are still paratransit services present through other buses and minibus-taxis. According to the Strategic Integrated Transport Plan Framework, the city licensed 4,935 buses and minibuses for public transport, with 32 taxi associations controlling at least 1,013 different routes (City of Johannesburg, 2013). This supports the notion that implementation of BRT systems still requires support from paratransit networks. Therefore, within the City of Johannesburg's transport framework, there is not only a public transport strategy but a specific minibus-taxi strategy. This includes reorganising minibus-taxis by contracting them and scheduling routes or recapitalising them and scrapping the vehicles (City of Johannesburg, 2013). In Kenya, the paratransit network is already organised into SACCOs, have specific route operation but have limited capacity to be organised to schedules. At most the plan for matatus is as feeder routes to BRT terminals.

7.2 Lagos BRT

The Lagos BRT was the first BRT program implemented in Africa by LAMATA (Lagos Metropolitan Area Transport Authority). LAMATA is a semi-autonomous corporate body established in 2002 to address transport needs of the Lagos metropolitan area. LAMATA is responsible for formulating, coordinating, and implementing urban transport policies and programs in the area. This has led to the development of a mass rapid transit plan as well that includes commuter rail and BRT similar to NAMATA's mass rapid plan. LAMATA plays a lead role in transport policy formulation and coordination of major operational and investment decisions (Lagos State, 2015; Integrated Transport Planning and IBIS Transport Consultants, 2009). This is the same outlined responsibilities that NaMATA carries out in the Nairobi context. LAMATA has several powers, including the power to levy and collect user charges and other tariffs, fees, and road taxes as authorised by the Governor (Lagos State, 2015). In Kenya, the Kenya Revenue Authority oversees collecting all government

revenue including the revenue and taxes associated with the BRT (Kenya Revenue Authority, 2024). Therefore, in terms of power, NaMATA is more limited towards designing frameworks and policies.

The Lagos Urban Transport Project (LUTP) was the predecessor of the LAMATA established in 2000, receiving a grant from the Japanese Development Agency for studies on LUTP Phase One (Lagos State, 2015). It is now the Japanese International Development Agency (JICA) which is also present in the planning of Nairobi BRT through providing studies as well. The current state of the Lagos BRT is phase 2 which is the expansion of the BRT (LAMATA, 2024). The BRT-Lite system is 65% physically separated from other traffic, 20% on bus lanes marked with paint and 15% mixed with traffic (Integrated Transport Planning and IBIS Transport Consultants, 2009). After implementation, it is credited with reducing travel time, reduced interchanges, cheaper and safer compared to the paratransit network (Integrated Transport Planning and IBIS Transport Consultants, 2009). However, the capacity of the BRT is low and has led to overloading calling for an expansion of the current network (Integrated Transport Planning and IBIS Transport Consultants, 2009).

The paratransit network present in Lagos consists of approximately 75,000 minibuses (danfos) along with a smaller fleet of midi-buses (molue) (Otunola, Kriticos and Harman, 2019; Integrated Transport Planning and IBIS Transport Consultants, 2009) The Lagos BRT adopted a BRT-Lite system in coordination with the informal transport sector through the National Union of Road Transport Workers (NURTW) which purchased 100 BRT buses for the implementation and Lagbus bought 25 (Klopp et al., 2019; Integrated Transport Planning and IBIS Transport Consultants, 2009). However, it has been noted that more buses are required as the current capacity is low and leads to overcrowding which led to the procurement of 125 buses by Lagbus (Integrated Transport Planning and IBIS Transport Consultants, 2009). This shows how successful coordination with the existing systems is in place and can be utilised to meet demand and for successful implementation of BRT.

7.3 DART

To create and run a Bus Rapid Transit (BRT) system in Dar es Salaam, the Prime Minister's Office Regional Administration and Local Government established the Dar Rapid Transit (DART) Agency in 2007. The attraction was in increasing traffic efficiency by utilising large capacity buses and new fare collection technology. To carry out the implementation of Public-Private Partnership (PPP) is used. The Dar es Salaam City Council came up with the idea for the BRT initiative in 2003. It is suggested that the Dar Urban Transport Authority (DUTA) create a unified Strategic Urban Transport Policy and coordinate urban transport planning and policy based on the 2003 National Transport Policy, the Dar es Salaam Transport Policy, and the Systems Development Master Plan . DUTA is an autonomous body that has legal authority under its own unique legislation (JICA, 2018). Its Board of Management engages relevant stakeholders to facilitate coordination and cooperation.

The present informal transport in Dar Es Salaam is categorised as micro (less than 15 passenger capacity), mini (16-25) and medium (26-45). In preparation of the

implementation of BRT, micro Daladala were banned from operating downtown to solve traffic jams and increase capacity of the paratransit. This was communicated by SUMATRA via the media, at meetings and workshops (JICA, 2018). The current operation of the BRT is growing in the amount of users due the fare affordability. For example, there are discount fares of up to 50 percent for children and students (JICA, 2018). However, this has led to overcrowding. Road congestion during peak hours is the most urgent issue. The system is slow as the feeder routes still operate on normal routes (JICA, 2018). Both rail and BRT have been implemented which is similar to the end plan for Nairobi in the MRTS. During implementation and ownership of executing the plans by DUTA were credited to 'lack of clarification, demarcation and harmonised function among the multi-level stakeholders (JICA, 2018). Therefore as part of the process a board was to be implemented to ensure coordination and harmonisation (JICA, 2018). This is supportive of the city's vision in focusing on transit oriented development in which the BRT corridors are highlighted as potential areas (JICA, 2018).

The results of analysis of the policy documents of the case studies are summarised in the table below. It includes the institutional design, how informal transport networks are included, weaknesses and successes. Using the summarised data comparisons and similarities can be outlined across the case studies.

Table 7 Summary of BRT case studies (Adapted from Klopp et al., 2019; Arroyo-Arroyo et al., 2024)

City	Lagos	Joburg	Dar es Salaam	Nairobi
Start Date of BRT	2008	2009	2017	-
Current BRT phase	BRT lite 2nd phase	Full BRT (ITDP silver ranking) 2nd Phase (1C)	BRT 1st phase	Planned
Institutional Design				
Governance institutions	LAMATA	City of Joburg responsible No single metropolitan transport authority	DART (Dar Rapid Transit)	NaMATA
Scope of Responsibilities	Authority on urban PT (BRT, bus, urban rail, ferries, collaborates with paratransit)	Runs Metrobus (municipal bus service) and the Rea Vaya Bus Rapid Transit (BRT) system, builds and maintains the city-owned roads including public transport infrastructure Responsible for all transport planning in the city (City of Johannesburg, 2013) .	BRT only	Implementing Mass Rapid Transit System (BRT, commuter rail and non-motorised

Relationship to government	Reports to Lagos State government ; coordinates with local governments		Reports to Department of Regional and Local Government in President's Office	Council with minister of transport and finance ministers and 5 county governors
Organisation Sponsor	Governor of Lagos	Concerted advocacy by international NGOs National Department of Transport	President's office	Joint initiative with counties led by national government
Policy/plan that emergence stemmed from	1992 Lagos Mass Transit Study	2010 FIFA Soccer World Cup Public Transport Strategy and Action Plan	Masterplan by JICA	Integrated National Transport Plan Nairobi 2030 Vision document
How informal transport was included				
Informal transport present	Minibuses (danfos) and a smaller number of midi-buses (molue) (Otunola, Kriticos and Harman, 2019)	Minibus taxis Buses	Daladala	Matatus and buses
Relationship to government	Under regulation of LAMATA	Licensed under the City of Johannesburg.	Under regulation by SUMATRA (Surface and Marine Transport Regulatory Authority)	Organised under SACCOs registered under NTSA.

Relationship to BRT		During Phase 1A, Piotrans (Pty) Ltd was formed which is owned 100% by 313 stakeholders who were operators in Johannesburg's taxi industry and all BRT drivers are former taxi drivers (City of Johannesburg, 2013).		Will cater to transport demand on routes outside the 5 corridors planned
Role in Future network		Aim to be outphased gradually	BRT on primary and secondary routes with tertiary routes being operated by paratransit.	Aim to be outphased gradually
Weaknesses of the BRT				
	Limited capacity leading to overcrowding	Taxis are the preferred method of Travel	Limited capacity	Will compete with Matatus well developed network
Successes of the BRT				
	Higher comfort Increased reliability	Regarded has high quality compared to taxis and Metrobus	High amount of users Increase in quality of public transport	Will have route distributed more than Matatus CBD centric network

7.4 Lessons from Rea Vaya, Lagos BRT and DART

Firstly, the main concern is to avoid competition with current informal transport to avoid conflict. In Rea Vaya, this was tried by hiring former taxi drivers to drive BRT (City of Johannesburg, 2013). In Lagos, this was done by having Lagbus and NURTW purchase buses (Integrated Transport Planning and IBIS Transport Consultants, 2009). Therefore, the priority would be to have the BOC consist of current paratransit operators and use the paratransit drivers. To facilitate this there needs to be **clear institutional arrangements** with the role of paratransit made clear and the responsibilities of each of the transport planning agencies. In Lagos, the presence of LAMATA has led to better transport planning coordination (Integrated Transport Planning and IBIS Transport Consultants, 2009).

Additionally, there needs to be **active stakeholder engagement with the paratransit operators**. For example, in Lagos, this was achieved through community engagement programmes to invite the public to understand the benefits of implementing BRT and create community ownership (Integrated Transport Planning and IBIS Transport Consultants, 2009). In Rea Vaya, the benefits were listed as regular and increased drivers' salaries (City of Johannesburg, 2013). This promotes public support to encourage ridership. However, it is noted that there is still a limitation in attracting car users to the systems which means there should be the development of targeted engagement expressing benefits for car users for the system (City of Johannesburg, 2013). For example, traffic congestion can be mitigated through a modal shift to public transport. This can generate more revenue for the system and additional public support (JICA, 2018).

Feeder route planning is crucial for spillover effects on the paratransit network. This is because implementing the BRT does not lead to solving current issues in the network as a whole. For example, in Dar, the capacity of the BRT is still noted as low leading to an expansion of the network which will take time. Therefore as an additional measure to increase capacity, 14 passenger vehicles in the paratransit network are being out-phased. (JICA, 2018). In Rea Vaya, specific strategies were outlined in informal transport to improve the system. Feeder route planning can also increase transparency of the role of the actors involved in the transport arena.

While discussing the affordability of the public system, it is important to factor it into an integrated mode. Most likely the last mile demand will be catered for either through paratransit services and therefore pushes for **an integrated fare system**. The integrated approach to assessing public transport is done in Dar Es Salaam with consideration of fares and travel time. That and fare subsidisation, this has led to fare systems that provide student discounts (JICA, 2018).

The integration of informal transport to BRT projects aids in successful implementation as support as feeder routes and in public acceptance and ridership as seen through the case studies. As an evaluative criteria, the BRT project should have clear institutional arrangements, active stakeholder engagement with paratransit operators, include feeder route planning and develop an integrated fare system.

8. Conditions for implementing BRT to formalise public transport

The **overall lessons** learned from the data is that there needs to be coordination between all stakeholders involved in public transport which is facilitated institutionally. This is an acknowledgement that is also felt by planning officials. It is clear integration is required and a hybrid system of both paratransit and BRT will be a result of BRT projects in contexts with informal transport. Therefore, the role of paratransit operators can be seen as central to BRT governance beyond just providing feeder routes as the common strategy is in using past operators to govern and work in the BRT. However, what is clear is that BRT does not solve the issues faced in current informal transport networks as the process of implementation is slow. BRT provides a key opportunity in providing the necessary restructuring in public transport to increase regulation to promote practices and educate current operators on how to improve the system. Institutionally as well, it can be key in developing coordination in transport planning. Therefore, the conditions for implementation are based on the developed evaluative criteria. there needs to be transparency on the roles and responsibilities of the actors involved, active stakeholder engagement and a clear paratransit network plan.

Nairobi's public transport sector is highly complex with the number of stakeholders being high. However, what is clear from the document analysis, interviews and the case studies is clear involvement of current public transport regulators. **Recommendations for policy** would be in creating clear policies regarding the involvement of public transport and to facilitate more public participation in the development of an integrated transport system.
Recommendations for the institutional design would be in formalising the informal transport through encouraging the industry to invest in developing tools such as scheduling and route maps. However, as this is difficult for the industry to produce it requires intervention from formal planning institutions to provide knowledge and find funding. As promising start, already interventions such as the use of electric vehicles. This shows the potential of the current industry in alleviating the negative attributes of the industry.

Regarding the **IAD framework** used in the study, it provided a structured approach to viewing the complex arena of informal transport. As each context is highly unique in terms of the arrangement, it is often hard to compare different transport systems. For example, Nairobi has existing structures through SACCOs and route licensing that is unique to the Kenyan context. Through the framework, it was able to conceptualise the case studies to aid in comparisons. The applicability of the study is high as the study can be replicated to assess and in depth analysis of similar case studies such as the primary case study in this research. As part of the research methodology, semi-structured interviews were conducted

In regards to **urban statecraft**, it was easy to identify the various levels of governance present. However, the role of consultants and financing agencies proved to also play a large role in transport planning. As a recommendation for future research, this can be further

explored as there was also a presence of the same agencies across the differing case studies such as the World Bank, JICA and AFDB.

Overall, the steps towards incorporating informal networks in formal transport plans are growing. There has been a **planning shift** on the perceptions of informal networks as crucial to supporting initiatives as the BRT. Whilst the literature on informal transport is still true on the negative attributes highlighted, what can be added is planning officials view informal networks as the key to successful integration.

9. Conclusion

By analysing Nairobi's Bus Rapid Transit project as the primary case study and analysing the secondary case studies, this thesis offers an insight on how to integrate informal transport to BRT projects. To develop an integrative and inclusive public transport design and policy, there needs to be clear and transparent institutional arrangements that facilitate active stakeholder engagement. This is particularly important given the complexity of the action arena. There is a pressing need for investment in the transport sector which in the context of sub-Saharan Africa has been left to self-regulate. This has led to developments in creating new institutional structures as well as the emergence of metropolitan authorities. Through the research, there is a clear dependency on formal planning on the informal network as they have expert knowledge on current public transport and can facilitate improvements in the network from the bottom-up and through governance roles. However, there is a limitation on the capabilities of the informal network to change as it is limited investment as it tends to cater to lower income populations and faces high inefficiency in its system.

The research process has shown that integration is a difficult task as it involves behavioural change both from paratransit operators and governance actors. A critical reflection on this research, as it is focused on the institutional design such as policy documents and perceptions from planning officials, it is lacking public perception on current public transport and the BRT project which is listed as key in successful modal shift. Therefore as a recommendation, the interview respondents should include representatives from current public transport operators and the commuters. This was not included in this research due to time constraints as the interview process was delayed due to difficulties in finding respondents earlier.

Suggestions for further research would be on studying the public perception of informal transport and BRT projects to assess what conditions should be included to facilitate use of public transport and improve informal transport.

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11. Appendix

11.1 Interview Guide

Introduction

Good morning/afternoon,

My name is Olivia Kindt, and I am currently writing my master thesis on Integrating Matatus in Nairobi's public transport future: a study investigating how to include matatus informal transport network in Nairobi's Bus Rapid Transit (BRT) Project **for** the Environmental and Infrastructure Planning Master course at the University of Groningen. The research focuses on Nairobi's public transport which consists of informal public transport (matatus) and a planned Bus Rapid Transit (BRT) project. The aim of the study is to investigate how to plan and design a public transport that blends existing informal transport to the planned bus project.

As part of the research project, I am conducting semi-structured interviews with people who are part of the planning in Kenya's transport sector. The aim of the interview is to gain understanding of the perceptions of matatus and the BRT project. This will give insight to better understand public transport in Nairobi in the study.

The interview will take approximately 40 minutes and will be recorded and transcribed. The transcript can be sent upon request. Before the interview, the letter of consent was signed but please note that you have the right to withdraw from the interview at any point.

Introductory questions

- Can you please introduce yourself and your role/position in (agency)?
- How long have you worked on this (project/agency)?
- Are there other agencies you regularly work with in regard to public transport planning?

Main questions

- Can you tell me more about the (BRT project)?
    - What is the current status of the project at the moment?
    - What has been done so far, what still needs to be done?
    - What will the final stage of the project entail?
- Who are the main stakeholders involved in Nairobi's public transport planning?
    - Is there a direct relationship with SACCOs/Matatus? If yes, what kind of relation?
- Currently, the public transport system in Nairobi comprises mainly matatus. Where do matatus fit in Nairobi's transport planning?
- What do you think about how matatus are operated?
    - How is it compared to the aspect of safety?
    - Do you think matatus are affordable?
    - Are matatus reliable?
    - Are matatus accessible?
- Do you work with matatus/SACCOs in your role in (agency)?
  If no
    - Are there any plans to work with matatus in future?

If yes
    - Could you describe what this relationship looks like?
    - What do you think are some of the advantages or drawbacks of this relationship?
- What are your thoughts on the current Bus Rapid Transit (BRT) project plans to create dedicated bus lanes for new buses in Nairobi?
    - Are there already early-wins in the project?
    - What are some of the hurdles faced in the project?
    - Do you think matatus should be included in the BRT plans?

Closing questions
- What improvements or changes would you like to see in Nairobi's public transportation in the future?
- Do you think that the implementation of the BRT is a step towards achieving these improvements or changes?

11.2 Letter of consent

university of groningen

Agreement to participate - Research Ethics Committee (REC)
in (doctoral) research project:
Title: Integrating Matatus in Nairobi's public transport future:
Subtitle: a study investigating how to include matatus informal transport network in Nairobi's Bus Rapid Transit (BRT) Project

The aim of the research is to investigate how to plan and design a public transport that blends existing informal transport to planned bus rapid transit projects. The aim of the interview is to gain understanding of the perceptions of Nairobi's informal transport. This will give insight to better understand informal public transport in Nairobi in the study.

- I have read and I understand the information sheet of this present research project.
- I have had the opportunity to discuss this study. I am satisfied with the answers I have been given.
- I understand that taking part in this study is voluntary and that I have the right to withdraw from the study until the moment that the study has been published, and to decline to answer any individual questions in the study.
- I understand that my participation in this study is confidential. Without my prior consent, no material, which could identify me will be used in any reports generated from this study.
- I understand that this data may also be used in articles, book chapters, published and unpublished work and presentations.
- I understand that all information I provide will be kept confidentially either in a locked facility or as a password protected encrypted file on a password protected computer.

Please circle YES or NO to each of the following:

I consent to my interview being audio-recorded
YES / NO
I wish to remain anonymous for this research
YES / NO

If YES
My first name can be used for this research
YES / NO
OR
A pseudonym of my own choosing can be used in this research
YES / NO

"I agree to participate in this individual interview and acknowledge receipt of a copy of this consent form and the research project information sheet."

Signature of participant:_____Date: _____

"I agree to abide by the conditions set out in the information sheet and I ensure no harm will be done to any participant during this research."

Signature of researcher: _____Date: _____

Please fill in the following information. It will only be used in case you want to be sent a copy of interview notes so that you have the opportunity to make corrections.

Address:
Email:

11.3 Data Management Plan

1. General	
1.1 Name	Olivia Wambui Els Kindt
Title of thesis	Integrating Matatus in Nairobi's public transport future: a study investigating how to include matatus informal transport network in Nairobi's Bus Rapid Transit (BRT) Project

2 Data collection – the creation of data	
2.1. Which data formats or which sources are used in the project? For example: - theoretical research, using literature and publicly available resources - Survey Data - Field Data - Interviews	Provide a short description of the sources/data that you are going to use. *Interviews* *Journal articles* *Policy documents*
2.2 Methods of data collection What method(s) do you use for the collection of data? (Tick all boxes that apply)	☐ Structured individual interviews ☑ Semi-structured individual interviews ☐ Structured group interviews ☐ Semi-structured group interviews ☐ Observations ☐ Survey(s) ☐ Experiment(s) in real life (interventions) ☐ Secondary analyses on existing data sets (if so: please also fill in 2.3) ☑ Public sources (e.g. University Library) ☐ Other (explain):
2.3. (If applicable): if you have selected 'Secondary analyses on existing datasets': who provides the data set?	☐ Data is supplied by the University of Groningen. ☐ Data have been supplied by an external party. (Please mention the party here).

3 Storage, Sharing and Archiving

3.1 Where will the (raw) data be stored *during* research? If you want to store research data, it is good practice to ask yourself some questions: ● How big is my dataset at the end of my research? ● Do I want to collaborate on the data? ● How confidential is my data? ● How do I make sure I do not lose my data? Need more information? Take a look at the site of the Digital Competence Centre (DCC)) Feel free to contact the DCC for questions: dcc@rug.nl	☐ X-drive of UG network ☐ Y-drive of UG network ☐ (Shared) UG Google Drive ☐ Unishare ☑ Personal laptop or computer ☐ External devices (USB, hard disk, NAS) ☐ Other (explain):
3.2 Where are you planning to store / archive the data after you have finished your research? Please explain where and for how long. Also explain who has access to these data NB do not use a personal UG network or google drive for archiving data!	☐ X-drive of UG network ☐ Y-drive of UG network ☐ (Shared) UG Google Drive ☐ Unishare ☐ In a repository (i.e. DataverseNL) ☑ Other (explain): On a password protected encrypted file on a password protected computer The retention period will be 2 years.
3.3 Sharing of data With whom will you be sharing data during your research?	☑ University of Groningen ☐ Universities or other parties in Europe ☐ Universities or other parties outside Europe ☐ I will not be sharing data

4. Personal data	
4.1 Collecting personal data Will you be collecting personal data? If you are conducting research with personal data, you have to comply with the General Data Privacy Regulation (GDPR). Please fill in the questions found in the appendix 3 on personal data.	Yes
If the answer to 4.1 is 'no', please skip the section below and proceed to section 5	

4.2 What kinds of categories of people are involved? Have you determined whether these people are vulnerable in any way (see FAQ)? If so, your supervisor will need to agree.	My research project involves: ☑ Adults (not vulnerable) ≥ 18 years ☐ Minors < 16 years ☐ Minors < 18 years ☐ Patients ☐ (other) vulnerable persons, namely (please provide an explanation what makes these persons vulnerable) (Please give a short description of the categories of research participants that you are going to involve in your research.) The research participants are representatives of planning actors involved in the Nairobi BRT project and involved informal transport. This is based on initial research on key stakeholders. The identified institutions are - NaMATA - KeNHA - NTSA - County government of Nairobi
4.3 Will participants be enlisted in the project without their knowledge and/or consent? (E.g., via covert observation of people in public places, or by using social media data.)	No
4.4 Categories of personal data that are processed. Mention all types of data that you systematically collect and store. If you use particular kinds of software, then check what the software is doing as well. Of course, always ask yourself if you need all categories of data for your project.	☐ Name and address details ☐ Telephone number ☑ Email address ☐ Nationality ☐ IP-addresses and/or device type ☑ Job information ☐ Location data ☐ Race or ethnicity ☑ Political opinions ☐ Physical or mental health ☐ Information about a person's sex life or sexual orientation ☐ Religious or philosophical beliefs ☐ Membership of a trade union ☐ Biometric information ☐ Genetic information ☐ Other (please explain below):
4.5 Technical/organisational measures	☐ Pseudonymisation

Select which of the following security measures are used to protect personal data.	☑ Anonymisation ☐ File encryption ☐ Encryption of storage ☐ Encryption of transport device ☐ Restricted access rights ☐ VPN ☐ Regularly scheduled backups ☐ Physical locks (rooms, drawers/file cabinets) ☐ None of the above ☐ Other (describe below):
4.6 Will any personal data be transferred to organisations within countries outside the European Economic Area (EU, Norway, Iceland and Liechtenstein)? If the research takes place in a country outside the EU/EEA, then please also indicate this.	No
5 – Final comments	
Do you have any other information about the research data that was not addressed in this template that you think is useful to mention?	No