2024

INFORMAL TRANSPORT

Master Thesis at Utrecht University

A Review of Paratransit across Sub Saharan Africa

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Introduction

At the core of society lies movement: The movement of people, goods, information, and ideas. Transport is the key to enabling movement from one place to another (Abler et al., 1972; Hoyle & Knowles, 2001; Ogonda, 1986; Urry, 2007). Transport facilitates economic and social development, whether it is by commuting to work, accessing services, or social activities (Nwaedozie et al., 2023; UN-Habitat, 2011). Transport is such a crucial aspect of urban living that humans are inclined to develop it whether or not they receive formal assistance from the government (DigitalMatatus, 2014).

In post-independence years, many newly formed states across Sub-Saharan Africa (SSA) nationalised transport companies (Ehebrecht et al., 2018). During the economic crisis of the 1980s and 1990s, numerous countries underwent structural adjustment policies influenced by the World Bank, promoting austerity, deregulation, and privatisation (Abraham et al., 2021; Behrens et al., 2017; Cervero & Golub, 2007). In countries like Nigeria or Tanzania, the policy changes provoked the dismantlement of state-funded transport companies. In the absence of formal transport or in response to low-quality services, ground-level informal response emerged to meet the demand (Roychowdhury & Chandola, 2022; Woolf & Joubert, 2013).

Informal transport, also known as paratransit, is a spatiotemporally flexible transport mode (Neumann et al., 2015). Hence, either the routes (space), schedule (time), or both are flexible. It is a user-demand-oriented form of transport mostly found in urban spaces in the developing world. The term 'informal' concerns services for which no or weak formal regulatory framework exists or where national regulations are not (entirely) enforced (Sunio et al., 2021). Paratransit can take the form of commercial minibuses, motorcycles, shared taxis, and tricycles, among others (Goodfellow, 2016; Nwaedozie et al., 2023). They are known to adapt to constantly changing external conditions and user's needs (Kerzhner, 2022). As Agbiboa (2019) illustrated from a shared-taxi slogan in Cape Town: "This Is a Taxi! It Can Stop Anywhere, Anytime, Anyplace" (p. 175). Informal transport systems are unique in themselves, moving beyond the rigidity of conventional transport and fulfilling local needs.

Informal transport is the backbone of SSA societies. The Sub-Saharan Africa Transport Policy Program estimated that informal transport services account for 80% of Africa's motorised trips (Agbiboa, 2019). Paratransit plays a crucial role in urban mobility by offering cost-effective and easily accessible options for many city dwellers (Evans et al., 2018)

Nwaedozie, et. al., 2023). They use physical spaces beyond the reach of formal transport systems, adapting to local landscapes and city configurations (Evans et al., 2018). Paratransit is deeply embedded within the everyday reality of millions of city dwellers, being an enabler of socio-economic activity and the source of "news, gossip, rumours, and urban myths" (Agbiboa, 2019, p. 175). At the same time, in an exponentially growing urban Africa, paratransit has a crucial role in today's and the continent's future development.

Paratransit has gained momentum among academics in the past 15 years (Martin et al., 2023). Research on informal transport across SSA has been studied from numerous disciplines, including engineering, sociology, economics, anthropology, masculine studies, geography, medicine and environmental sciences (Kamuhanda & Schmidt, 2009; Venter, 2013; Williams et al., 2015). However, the body of knowledge produced is very segmented and does not give a comprehensive view of the informal transport phenomenon. Ehebrecht and colleagues (2018) attempted to provide a multifaceted view by conducting a literature review on motorcycle taxis in SSA. Nonetheless, focusing only on motorcycle taxis excluded other modes of transport essential to understanding paratransit. A comprehensive systematic literature review on informal transport services in SSA needs to be conducted. Thus, this research seeks to fill the gap by providing an overview of the up-to-date information on informal transport services.

The current systematic literature review seeks to answer two research questions: How have informal transports across urban Sub-Saharan Africa been researched in academic articles? And how are informal transport systems researched differently across Sub-Saharan Africa? This article comprehensively summarises informal transport across SSA and its regional differences. It is based on 70 identified academic articles concerning paratransit in SSA.

This author has been trained in postmodernist epistemology and critical theories. Thus, this epistemology shapes how the article is conceived and the lens of analysis. The terms 'informal transport' and 'paratransit' will be used interchangeably throughout the document. At the same time, even though I refer to concepts like 'Africa' or the 'West', I am aware that these entities are nothing but homogenous. There are enclaves of 'non-West' within the 'West', and the space named 'Africa' by imperialists is extremely rich in diversity. As Mira Mookerjee (2024) wrote, "The only common denominator that unifies it [the concept of Africa] is the logic behind the Big Lie that stereotypes the continent as incorrigibly primitive, underdeveloped and inflicted with conflicts and gloom". In this research, the terms 'Africa' or 'SSA' are used as an

umbrella term where numerous realities coexist. This research brings forward a regional perspective to analyse regional peculiarities on the topic. However, spatial research gaps and knowledge clusters will affect the accurate portrayal of geographical realities. This research seeks to synthesise context-specific realities, knowledge not generalisable to a "single African reality".

The present systematic literature review starts by providing an overview of the methodological process and considerations around it. Then, entering the results and discussion section, it starts reviewing general trends in the field, spatial distributions and patterns of knowledge, and the spatial focus used in research. Afterwards, it delves into conceptual and theoretical discussion on paratransit, starting with the concept of informality, the dichotomy between formal and informal transport, and the underlying discourses on paratransit. Later, methodological approaches to articles are analysed, both describing the main methods and data collection trends, and discussing methodologies used in sub-topics. Next, it summarises the knowledge within key themes in literature: operation characteristics, safety and violence, and electrification. Then, the thesis provides the current knowledge on paratransit and its implications. Lastly, it presents considerations for future research.

Methodology

The present study employs a systematic literature review (SLR). SLR is a research method used to identify and synthesise all relevant research evidence regarding a given topic and find patterns in research (Boaz & Sidford, 2006; Victor, 2008). It is "a systematic, explicit and reproducible method for identifying, evaluating and interpreting the existing body of recorded work produced by researchers, scholars and practitioners (Fink, 1998, p. 3). This method will help gather scattered knowledge on paratransit, assess the current knowledge within a field, and evaluate the consistency among findings (Buldeo Rai & Dablanc, 2023; Petticrew, 2001; Seuring & Gold, 2012). At the same time, it will provide a rigorous and transparent process minimising selection bias (Petticrew & Roberts, 2008). It will also reveal gaps in the existing literature and highlight areas where further research is needed.

A systematic literature review will benefit the visibility and comprehension of the knowledge gathered on African informal transportation systems. Informal transport services are studied fragmentedly, and few studies take a holistic approach (Goodfellow, 2016). There is little clear understanding of the overall dynamics tied to these forms of transportation. Thus,

conducting a SLT will enable uniting fragmented views and providing a more multifaceted understanding of informal transport. Moreover, it will help advance ahead of the present need for more coherent knowledge.

Search Strategy

Three academic search engines are used to guarantee a comprehensive and representative literature sample. The researcher chose a sizeable worldwide database (Web of Science) and two regional ones (SciELO and AfricaBib). Web of Science is a world-leading citation database widely used for meta-analysis (Zhu & Liu, 2020). It contains over a billion cited references across disciplines. SciELO is an open-access regional database focused on Latin America and Africa research. AfricaBib is a social science database specialising in African research. AfricaBib was used as a complementary search engine with a looser search sequence. Combining the three databases forms a significant and specific body of academic literature relevant to the current research.

The keywords and terms used in the search sequences contained each aspect of the current research: informality, transport, and Africa. Informal transports go with different names across African cities (Agbiboa, 2019). Thus, general terms like 'informal transport' or 'paratransit' and local names are used. The keywords for the general search were informal transport, paratransit, motorcycle taxis, minibus taxis, and Africa. Informal transport and paratransit were used as synonyms. The researcher sought to gather papers on any paratransit type; thus, it included both motorcycles and minibuses. The search sequence was as follows: ((((ALL=(informal transport)) OR ALL=(paratransit)) AND ALL=(Motorcycle Taxis)) OR ALL=(Minibus Taxi)) AND ALL=(Africa).

For the local names search, a list of 37 terms that refer to some form of informal transportation is created (see Appendix 1). This list was created based on an initial search to determine the local names of informal transport modes. Informal transport modes go by different names across the continent; minibus taxis are called danfos in Lagos, trotros in Kenya, Accra and Ghana, kombis in Zimbabwe, and motorcycles are called okadas in Nigeria, boda boda in Kenya, among others (Agbiboa, 2017; Alimo et al., 2022; Arosanyin, 2010; Doherty, 2022; Dube, 2018; Dumedah & Eshun, 2020; Dzisi et al., 2021). Each term was searched from the list independently, and eight terms had relevant literature (those marked in orange in the appendix). Some keywords led to no results; some terms had multiple meanings but no research

on the meaning referring to a form of transportation. Keywords of local terms for transportation were discarded if 1) they had multiple meanings and there was research only on the non-relevant meanings, 2) the term was only the surnames of a scholar, and 3) the informal transport terms were used only outside Africa. When the key term had multiple meanings, I added keywords such as 'minibus' or the country's name to narrow the search. In some cases, the strategy worked. The final search sequences with relevant results were the following: ALL=(Matatu), ALL=(boda-boda), ALL=(Danfo), (ALL=(Keke)) AND ALL=(Nigeria), ALL=(Trotro), (ALL=(okada)) AND ALL=(motorcycle), ALL=(Daladala), ALL=(kombi).

All the enquiries have a time frame limitation from 2000 until now. This way, the present research would provide an up-to-date discussion on the topic. All the searches were conducted on March 18, 2024. Three hundred twenty-three papers were identified through Web of Science, one through SciELO, and two through AfricanBib. Thus, a total of 326 papers were gathered in the search. Fifteen papers were removed because they were duplicated. Consequently, the study had an initial sample of 311 articles.

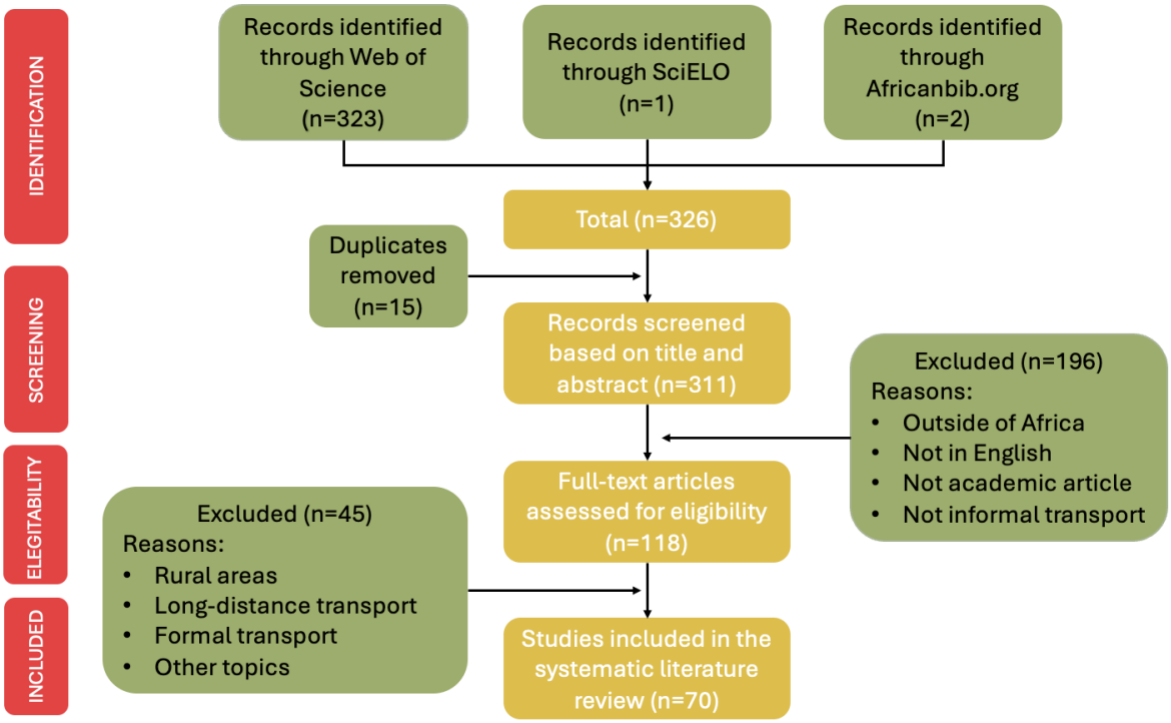
Exclusion and Inclusion Criteria

The articles were screened for eligibility using predefined inclusion and exclusion criteria. Firstly, there was a screening round of the title and abstract of the articles based on the inclusion criteria. One hundred ninety-six records were excluded based on the following inclusion criteria: 1) research conducted in Africa, 2) research written in English, 3) research in the form of an academic article in a peer-reviewed journal, and 4) research on other topics. Only those articles that explicitly contained the words 'paratransit' and 'informal transport' or mentioned a form of informal transport passed the fourth inclusion criteria. Nineteen articles were excluded for being conducted outside of Africa, one for not being written in English, ten were not academic articles, and one hundred sixty-six were not related to informal transport. Secondly, there was a round of eligibility based on the exclusion criteria. One hundred twenty-one studies were assessed for eligibility by reading their inclusion and conclusion. When those two parts were inconclusive, the entire article was read. The pre-defined exclusion criteria were 1) research conducted in rural areas, 2) research on long-distance informal transport, 3) research focused on formal transport systems, and 4) informal transport is not the central topic of study. Forty-five articles were excluded as they did not pass the exclusion criteria: eight focused on rural areas, four on long-distance transport, five on formal transport, and twenty-eight did not

have paratransit at the centre of the research. Seventy articles are part of the sample included in the current systematic literature review.

Figure 1

Systematic Literature Review - Sample Selection Process.



Methodological Considerations

Given the rigid search sequences used for Web of Science and SciELO, there is a chance that relevant articles were not included (Jurgilevich et al., 2017). Additionally, this study was delimited to peer-reviewed academic articles, excluding any grey literature and its potentially relevant thematic material. The emphasis on peer-reviewed articles aimed to ensure the quality and reliability of the literature sample (Berrang-Ford et al., 2015) while limiting the sample size (Karjalainen & Juhola, 2021).

Results & Discussion

Informal transportation systems in urban Sub-Saharan Africa have been the subject of extensive research in academic literature, reflecting their critical role in shaping the mobility, economy, and social dynamics of the continent's rapidly urbanising regions. Scholars have

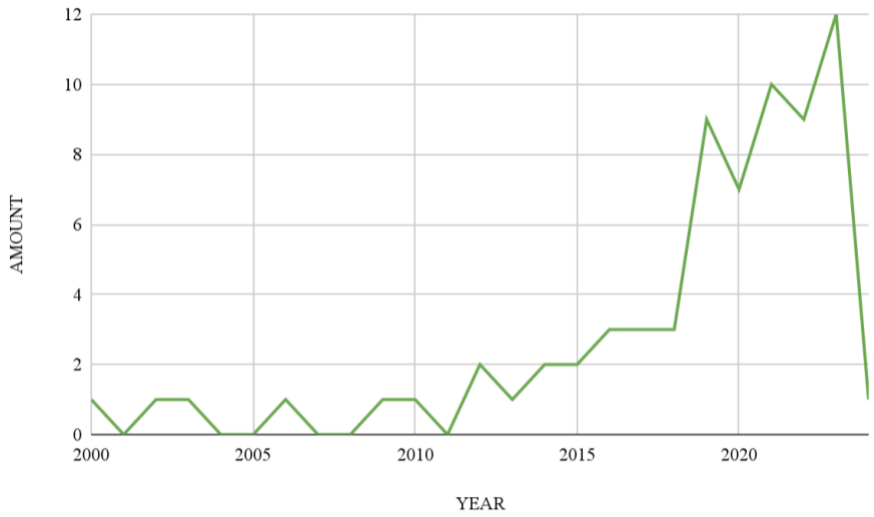
approached the study of informal transport from multiple disciplinary perspectives and employed a variety of methodological approaches to capture the complexities and nuances of these systems. This section will delve into aspects, issues, and debates shaping the study of paratransit in SSA.

Trends in Literature

There is a growing academic interest in the informal transport sector in Sub-Saharan Africa. Figure 2 shows that there has been a steady increase in the number of articles published on the topic of paratransit in SSA. Research rose to a high point in 2019 and peaked in 2023, with 12 papers published that year. The largest body of research, 66 per cent, was published between 2019 and 2023. Up until March of 2024, one article was published. Only 6 academic articles were published during the first 11 years of the 21st century. Multiple researchers have observed an exponential increase in studies on paratransit in the past 15 years (Ehebrecht et al., 2018; Martin et al., 2023; Olvera et al., 2020). Ehebrecht and colleagues (2018) explain that the rise of academic interest is concerning the growing importance of paratransit. The increase in the number of informally provided services has come hand in hand with negative externalities, mainly road safety issues. This has fostered public and academic discussion on delving into aspects of it and regulating the sector. This indicates that the academic interest in paratransit in SSA is a relatively recent phenomenon linked with its growing importance in the continent.

Figure 2

Number of Publications by Year (by March 2024)



There has also been a noticeable shift in the topics of interest for researchers over time. The articles at the beginning of the century focused on grasping a general understanding of the paratransit sector. They were primarily interested in explaining the general phenomenon, livelihood determinants, and business strategies. Authors researched the nature of motorcycle taxi sector (Howe, 2003), costs of daily operations (Fasakin, 2002), income opportunities (Kamuhanda & Schmidt, 2009), earning determinants (Arosanyin, 2010), history overview of changing perception towards minibus taxi operators (Mutongi, 2006), and business strategies (McCormick et al., 2013). Thus, the initial studies were primarily conducted within the discipline of economics. Over the years, paratransit has been studied from a wider variety of disciplines, ranging from engineering (Booysen, Abraham, Rix, & Giliomee, 2022; Booysen, Abraham, Rix, & Ndibatya, 2022; De Beer & Venter, 2021; du Preez & Venter, 2022; Giliomee et al., 2023), masculinity studies (Gibbs, 2014), psychology (Eagle & Kwele, 2021), anthropology (Doherty, 2022; Ference, 2019; John Wakota, 2021), politics (Möller & Doevenspeck, 2023), medicine (McHunu et al., 2012; McHunu et al., 2020) among others. Research has become more specialised, delving deeper into a broader set of aspects of the informal transport sector in SSA.

Spatial Distribution & Patterns

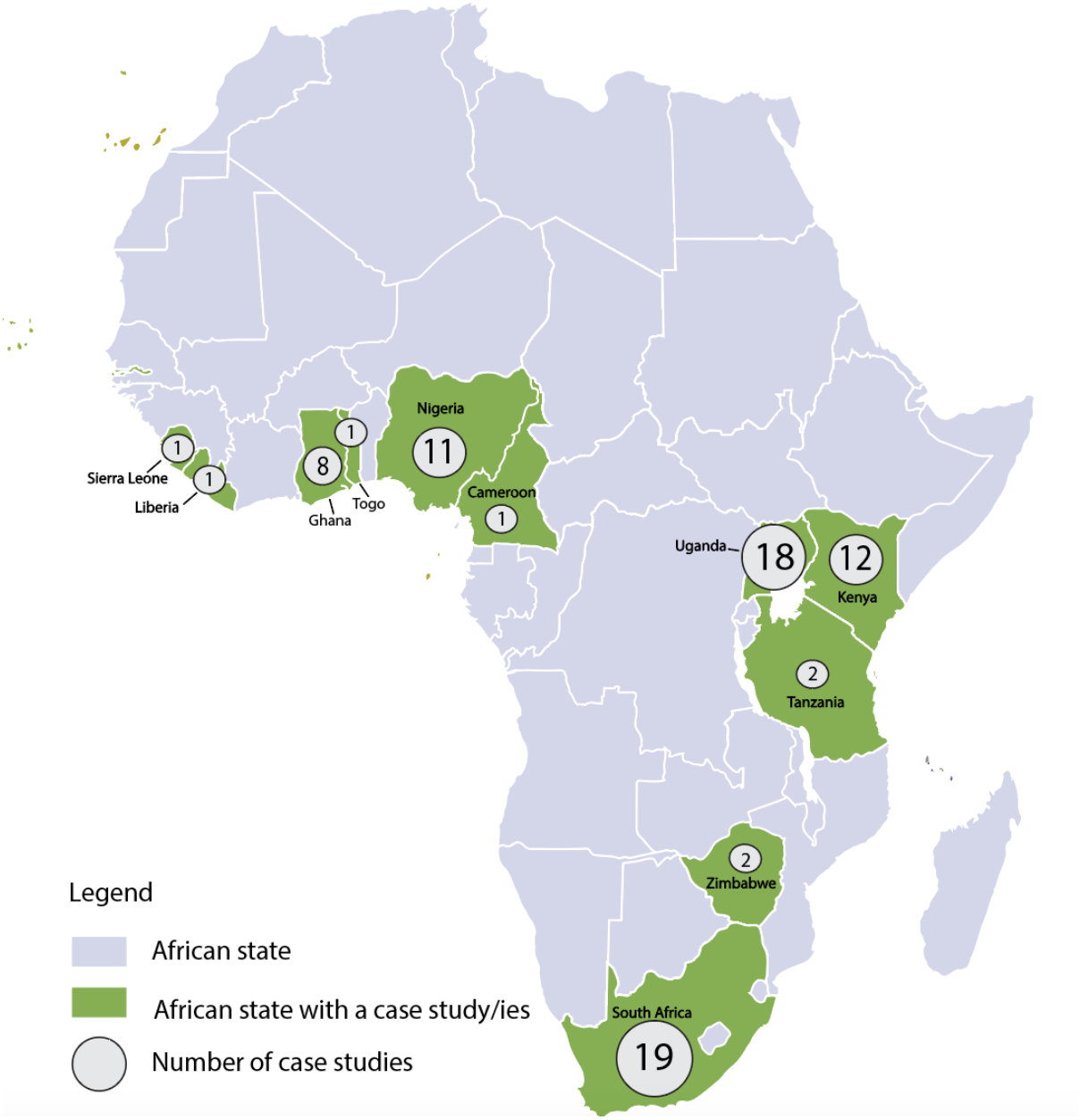
This research identifies several key regional hubs for informal transport growth, such as Nigeria and Ghana in West Africa, Kenya and Uganda in East Africa, and South Africa in Southern

Africa. Originally a regional phenomenon, informal transport services have now proliferated across the continent, appearing in numerous locations due to various factors that will be discussed in the following sections (Ehebrecht et al., 2018). However, current research on informal transport has primarily concentrated on a few countries. Most studies do not explicitly analyse the spatial distribution of services or justify the choice of specific case study locations. Despite these limitations and the potential misalignment of literature-based insights with the actual distribution and regional significance of motorcycle services in Sub-Saharan Africa, we can still identify some regional trends and connect them to the findings.

Knowledge of paratransit has been highly concentrated in a small number of countries. A total of 11 Sub-Saharan African states have case study/studies. Figure 3 shows the geographical distribution of publications per country. Research is mainly concentrated in West, East, and South African clusters. There is no research yet in Central Africa. Thus, there is an uneven distribution of research among the regions. The most researched country is South Africa, which appears in 19 case studies, followed by Uganda with 18 case studies. Kenya is prevalent in 12 case studies, Nigeria appears in 11 case studies, and Ghana in 8 papers. Then, less significantly, Zimbabwe and Tanzania are researched in two papers. Finally, Liberia, Togo, Sierra Leone, and Cameroon are researched once. South Africa, Uganda, Nigeria and Kenya disproportionately get much academic attention, while vast extensions of the continent still need to be researched. The uneven spatial distribution of research does not necessarily represent the presence of paratransit in each locality.

Figure 3.

Geographic Distribution of Publications



Regarding the mode of transport, apparent spatial differences are noticed. In South Africa, minibus taxis research predominates over other modes. Not surprisingly, minibus taxis are the primary form of paratransit in South Africa (Woolf & Joubert, 2013). It is estimated to encompass 70% of public transport trips and dominate 90% of the taxi market in South Africa (Ndebele, 2011). In the case of Kenya, over 81% of the research focused on minibus taxis, the remaining on motorcycle taxis, and all data was gathered in Nairobi. Minibus taxis, locally known as *matatus*, are a highly used form of public transport in urban Kenya (Phoebe, 2017).

In Nairobi, *matatus* provide transport to over 60 % of the inhabitants, being an essential part of the city's mobility and economy (Mutongi, 2017). Therefore, the importance of minibus taxis in urban Kenya is well-represented in academic literature. Modes of informal transport are studied in line with national usage.

Additionally, it is possible to identify specific regional characteristics of informal transportation services in each country. National and local governments have adopted various approaches to managing paratransit, balancing the negative externalities against the benefits (Ehebrecht et al., 2018). Consequently, many governments have recognised and regulated the services, while others have banned them outright (Fobosi, 2019). In some cases, such as Nigeria, there is a mix of regulatory approaches within the same country (Ackrill et al., 2023). Even in places where moto-taxis are banned, like Ghana, the services have established themselves de facto (Alimo et al., 2022). Despite a general increase in demand for paratransit, variations exist from one location to another. In some regions, moto-taxis are the primary mode of public transport, as seen in Lomé and certain Nigerian cities, while in others, they serve as complementary services (Ehebrecht et al., 2018). The extent to which they compete with other transport modes remains unclear from existing studies. Moreover, the presence of tricycles as a form of moto-taxi service varies regionally; they are popular in some Nigerian and Tanzanian areas but are not yet common in countries like Ghana and Togo.

Spatial Focus

The spatial focus on researching informal transport across SSA varies greatly. Martin and colleagues (2023) found that studies tend to be developed around three spatial focuses: Sub-Saharan Africa, sub-regional level, or city level. Studies with SSA or Africa as their focused entity are concerned with explaining a broad transnational phenomenon. For instance, Diaz Olivera and colleagues (2020) researched the lasting development of motorcycle taxi models in SSA cities, while Ehebrecht and others (2018) looked into the role of moto-taxi services in providing public mobility options in SSA. Those studies are wide in scope, mostly not accommodating regional differences and providing a generic understanding of trends. In contrast, studies with a sub-regional or national spatial focus delve deeper into the specific context of the topic studied. Numerous studies use this spatial focus (Aggrey et al., 2023; De Beer & Venter, 2021; Dzisi et al., 2023; Martin, 2022; Mutongi, 2006; Mwebesa et al., 2021; Möller & Doevenspeck, 2023; Neumann et al., 2015; Raynor & Mirzoev, 2014; Salon &

Gulyani, 2019). These studies provide clear accounts of national trends and most often extrapolate the results to a broader context.

Lastly, some studies use the city as their spatial focus (Doherty, 2022; Ference, 2019, 2021; McCormick et al., 2013; Ndibatya & Booysen, 2020; Plano & Behrens, 2022; Tetteh et al., 2017; John Wakota, 2021; Xiao, 2019, 2022). The knowledge those authors seek is very specialised and closely embedded within the local complex dynamics of space. They are mainly composed of rich, detailed, and nuanced understanding of the lived experiences of people associated with informal transport. The topics vary, from personhood formation (Doherty, 2022) to joyriding experiences (Ference, 2021), urban lived images of inscriptions (J. Wakota, 2021), and analysis of urban rhythms (Xiao, 2019). The knowledge produced is often limited to the locality in which it is produced. Thus, it cannot be extrapolated to other spaces or contexts. As Plano and Behrens (2022) wrote about their findings, "These interventions are assessed in Cape Town and are not intended to be generalisable to other locales" (p. 9). Unsurprisingly, a strong correlation exists between using a local spatial focus and the methodology. All papers with a local spatial focus are qualitative, and many conducted ethnographic work research. The chosen spatial focus often reflects how the research is conceptualised.

Conceptual & Theoretical Frameworks

Dichotomy between Formal-Informal

The provision and regulation of transport services in urban SAA have been mainly conceptualised through the lenses of informality. Ehebrecht and colleagues (2018) described the concept of 'informality' in the context of transport as "services for which no, or only a weak, formal regulatory framework exists and/or where existing state regulations are not (fully) enforced" (p. 243). Thus, the government is not directly involved in these services' operation practices or organisations (Heinrichs et al., 2018). This takes the form of weak governmental control, lack of service standards, uncertified operators, non-adherence to traffic regulations, road safety concerns, and other external factors. The idea of 'informal' is constructed in opposition to the 'formal' (Ehebrecht et al., 2018). This dichotomy is often embedded in larger underlying discourses of (Western) Modernity and (under)development. Informality embodies marginality, reinforces a constant dis-attention to specific realities and enables 'dangerous' thoughts to become productive in inhospitable contexts (Simon, 2019). Informality is

connotative to insufficiency, depravity, improperness and restricted in its functionality. The (in)formal lenses are reductionist and reinforce a Eurocentric view.

Some authors have recently criticised the 'formal' and 'informal' divide, pushing for a more differentiated perspective. AbdouMaliq Simone (2019) suggests using the concept 'popular' as the word "embodies the various efforts undertaken by those with no, partial or unsustainable access to wage labour not only to generate a viable livelihood but to anchor such livelihood in forms of accumulation that enable them to participate in larger circuits of sociality and to elaborate the semblance a public infrastructure" (p. 618). That is to say, 'popular' reflects human efforts to engage in empowering activities to emulate public systems infrastructure (Xiao, 2019). From Simone's point of view, it is more revealing to study the varying degrees of 'popular' effort that direct collective attention and labour into shared amenities and infrastructures. This elucidates what freedoms people have to construct and contribute to that which sustains the community yet falls outside their work. Heinrichs and colleagues (2018), in an attempt to overcome the formal-informal dichotomy, proposed the concept of 'institutional or urban bricolages'. The notion of bricolage challenges the perception of actors as mere victims of institutional change, emphasising their agency and capacity for strategic improvisation and adaptation (Gebara, 2019). Bricolage implies individuals connecting structure and agency through their actions, offering a valuable framework for empirical research. Thus, urban bricolages are spaces created with interwoven formal regulations and traditional social relations arrangements. This concept appropriately conceptualises current practices in the SSA urban transport systems. Although some scholars provide new frameworks beyond the formal-informal dichotomy, the existing body of literature is still largely shaped by the discursive use of ‘informality’ (Xiao, 2019).

Discourses on Paratransit

“How you see the world is largely a function of where you view it from [...]; what you look at; what lens you use to help you see; what tools you use to clarify your image; what you reflect on; and how you report your world to others”
- van Eck, Wassermann, & van der Merwe, 2023, p. 2.

There are three main discursive trends around the paratransit sector. Abraham and others (2021) identified three main narratives towards informal transport: public transport failure, a hybrid future, and a complex adaptive system. The most extensive discourse around paratransit views

it as an example of public transport failure in the developing world. Informal transport is analysed through the standards imposed by transport systems in the developed world (Aggrey et al., 2023). Thus, paratransit is always framed as needing to catch up to the 'functioning' transport of the developed countries. For instance, Booysen and others (2022) wrote, "Paratransit in Africa's developing countries differs substantially from that in the developed countries [...]; they are notorious for poor safety and inefficiency" (p. 4). Thus, this view does not describe paratransit as a phenomenon in itself, but it exists in opposition to formal transport in Western countries. Paratransit is defined in terms of what they are not and their differences from formal transport. For example, Aggrey and others (2023) described paratransit as "have little or no control by an overall regulatory authority [...] it is unplanned, [...] with no published or fixed fare and usually takes unapproved routes" (p. 354). This description does not explain what paratransit is but rather what is not. To support this stance, terms like 'chaotic', 'unsustainable', 'unsafe', and 'lacking' are used to refer to paratransit (Abraham et al., 2023). This use of language is seen in McCormick and others' (2013) description of Nairobi's paratransit: "It is almost a total lack of adherence to traffic rules, prescribed routes, and regulatory requirements. The resulting chaotic behaviour has long been referred to as '*matatu* madness'" (p. 136). The phenomenon of paratransit is described in negative terms in the form of deficit. This view broadly diagnoses 'informality' as a core problem that needs to be tackled (Doherty, 2022).

Consequently, they advocate for overtaking the informal transport industry and formalising it by replacing it with "the Western idea of orderly transport: the bus rapid transit (BRT) system" (Abraham et al., 2021, p. 119). Neumann and colleagues (2015), fully adhering to this view, stated that paratransit "are a necessary nuisance that should be formalised". The ultimate goal of researchers from this perspective is to facilitate the formalisation process through their studies. Agbiboa (2016) describes this discourse as an "effort to impose order and predictability on day-to-day lives" (p. 1). This discourse has been reinforced and reproduced both by African and Western scholars. Non-governmental organisations are also involved in the endurance of this view. The World Bank and other development agencies promote the formalisation of paratransit across SSA via mapping programs, consultation processes, digitalisation, business promotion, re-training projects, and automobile buy-blocks (Doherty, 2022). This discourse has been criticised by Mbembé and Nuttall for reading African cities by the meta-narrative of urbanisation, modernisation, and crisis (Agbiboa, 2016). All in all, a predominant discourse on paratransit frames it as a degraded version of (Western) formal transport.

The second view supports a hybrid reality where informal transport is complementary to formal means of transport (Abraham et al., 2021). Mwebesa and colleagues (2021), advocates of this view, stated, "In order to ensure the sustainability of many African cities, an integration of public transport (buses and rail) and other forms of transport (cycling, walking, and motorcycle taxi) is inevitable" (p. 2). This discourse adheres to the current state of infrastructure and spatial configuration, where many urban areas are inaccessible with formal public transport (Agheyisi, 2021; Booysen, Abraham, Rix, & Giliomee, 2022). Therefore, informal transport is currently filling the public transport vacuum. In many African cities, governments have tried to implement formal transportation modes like Bus Rapid Transit (BRT) with little success (du Preez & Venter, 2022). This is the case in South Africa, where five cities have implemented BRT systems, spending almost one billion dollars. However, those systems have resulted financially unsustainable and not very popular. Given the circumstances, some researchers try to find a way to combine formal and informal transport. Plano and Behrens (2022) explain that Cape Town is revising its approach to public transport to include both existing paratransit and new, scheduled services, mainly in a "feeder-trunk service relationship" (p. 1). Advocates of this view recognise the importance of paratransit in a hybrid public transport system (De Beer & Venter, 2021). There is growing scholarly attention on how formal and informal services can effectively co-exist and how policy can best improve the collective public transport system (du Preez & Venter, 2022). However, this view faces much resistance from paratransit operators (Abraham et al., 2021). Informal transport workers and operators fear losing autonomy and self-organisation, elements at the centre of African paratransit. Although with some resistance, growing attention is given to the view of public transportation as a hybrid system co-existing with informal and formal transport.

A third critical discourse is gaining momentum, which frames paratransit in SSA as a complex adaptive system. They view the paratransit system as composed of multiple independent non-linear components working semi-orderly from a local logic (Abraham et al., 2021). This discourse emerges as a counter-reaction to hegemonic discourses framing paratransit as the culmination of public transport failure. Aggrey and colleagues (2023) ironically wonder that when informality is described as swamps of backwardness, the question that should follow is to whom? They re-state the essential role of paratransit in alleviating unemployment for low-income urban dwellers and their sources of livelihood. Evans and colleagues (2018) make the criticism clear by writing, "Rather than approaching *bodas* [motorcycle taxis in East Africa] as degraded variants of Western mobility or a transitional

stage towards it, this paper approaches *bodas* on their own terms as part of an alternative sustainable urban future" (p. 2). This illustrates a scholarly effort to reframe paratransit as a distinctive transport system that should be understood within its regional context (Agheyisi, 2021). Paratransit is then seen as a multi-layered phenomenon and a microcosm of city life. It contains "dynamic spaces of mutual exchange, interaction, production, consumption, and forms of everyday conversation" (Agbiboa, 2017, p. 372) It is contained within popular imagination and lived realities. This perspective recognises the coping strategies and innovative forms of self-organisation embedded in paratransit (Abraham et al., 2021). It highlights how the system adapts to meet the mobility needs of the population with minimal or no centralised oversight. In fact, the apparent 'chaos' of paratransit reveals an underlying order hidden from the orientalist gaze. There is an informal logic operating, as Ehebrecht and colleagues (2018) pointed out, "far from these services being unorganised or unregulated, various forms of self-regulation take the place of formal state control or complement it" (p. 243). The term 'aesthetic of chaos' emerged to celebrate the coping mechanisms and forms of self-organisation of poor urban dwellers whose exceptional capability to exist is read as challenging conventional logic and limiting Western ideas of order (Agbiboa, 2016). These discourses do not necessarily assume paratransit to be either unproblematic or necessarily 'the answer' to urban transport challenges; instead, it is seen as a transport system essential to everyday survival for city dwellers (Evans et al., 2018). This is clearly illustrated by Doherty (2022) when he writes, "*Boda boda* occupy a complex position in the city's moral landscape, providing a virtual means of mobility, but also widely pathologised as unsafe, criminal, and guilty of causing congestion" (p. 242). Paratransit is framed as complex, morally contradicting systems fulfilling urgent mobility needs but inflicted in derogatory social narratives due to hegemonic reasoning.

Olvera and colleagues (2020) identified two contrasting views in academic debates regarding the rise of paratransit regarding global structures. The first view frames the popularity of informal transport as a sign of bottom-up resistance against neoliberal structures in Africa. It frames paratransit as a form of local knowledge and initiatives and a counter-model for BRT projects and foreign investment. Multiple scholars have claimed motor taxis to be an example of creativity in the face of colonial oppression (Ference, 2021; Nyairo, 2023). This view contains a critique of persistent unequal power systems in modern Africa. As Ference (2019) wrote, "*Matatus* [minibus taxis in Kenya] are extremely ambivalent in Kenyan society. *Matatus* are perceived as risky, dangerous death traps as well as symbols of the nation, and simultaneously an example of indigenous ingenuity in the face of an oppressive colonial system

and the persistent legacies of uneven development in the postcolonial context" (p. 190). This quote illustrates the multi-layered symbolism of paratransit and their role for city dwellers to regain (momentaneous) agency in an oppressive society. The second view perceives the development of paratransit in SSA as a form of engagement in general movements towards neoliberal globalisation (Olvera et al., 2020). The motorcycle taxi increase highlights a facet of contemporary capitalism: the informatisation of the production of goods and services in the Global South. It claims that informalisation and globalisation are interwoven processes emerging from global capitalism. The two views attached opposite meanings to the rise of informal transportation concerning global forces.

Methodological Approaches

Main Methods and Data Collection Methods

The sample of articles has a diverse set of research methods. Half of the articles are of a qualitative nature. The data collection methods varied from model simulations, surveys, cross-sectional studies, GPS data, and GIS. Surveys and simulations are the most frequently applied data collection methods. The first is used in 15 articles, while the second one is in 10 articles. 25 articles are conducted qualitatively, using interviews, fieldwork, participant observations, focus groups, ethnographic research, open-ended questionnaires, informal conversation, and photo analysis. Of these methods, the most frequent are interviews, used 14 times, and ethnographic research, 7 times. 7 studies use a mixed-method approach involving qualitative and quantitative data collection. Surveys and interviews are commonly combined for mixed-method articles (Dube, 2018; Howe, 2003; Plano & Behrens, 2022). I also encountered articles combining GPS forms of data gathering and fieldwork with participant observation and informal interviews (Kemajou et al., 2019; Mutongi, 2006). Lastly, there are two literature reviews (Ehebrecht et al., 2018; Mutongi, 2006) and one systematic literature review (Martin et al., 2023). Based on these numbers, it can be concluded that informal transportation in Sub-Sharian Africa is mostly studied quantitatively. At the same time, qualitative research is still very prevalent and uses a broader range of data collection methods.

Methods in Relation to Topics

Surveys. A large number of studies use surveys to investigate operation characteristics of paratransit. For instance, researching its costs (Fasakin, 2002), earning determinants

(Arosanyin, 2010), willingness to pay (Fasakin, 2000), commuting patterns (Salon & Gulyani, 2019), quality of service (Dzisi et al., 2021), stakeholders profiles (Kamuhanda & Schmidt, 2009), drivers working behaviour (Schlüter et al., 2020). Another main topic researched through surveys is safety on the road. Articles have looked into road safety solutions (Mwebesa et al., 2021), the effectiveness of safety programmes in altering drivers' behaviour (Muni et al., 2019, 2020), examining safety information needs (Nwagwu & Olatunji, 2012), and factors associated with injuries of motorcycle taxi riders (Tumwesigye et al., 2016). This method is also used to assess the effect of the pandemic on public transportation (Sogbe, 2021), create policy creation for motorcycle taxi regulation in Ghana (Alimo et al., 2022), and investigate commuters' cognitive responses to minibus taxi advertising (Jacobs et al., 2020).

Interviews. Over half of qualitative research uses interviews as their primary method. Interviews are used to understand various topics and frequently are intended to build knowledge for policy recommendations. Interviews are used in business studies to identify organisational and administrative structures of tricycles in Benin (Agheyisi, 2021), of minibuses in Kenya (Behrens et al., 2017), and business strategies in Nairobi (McCormick et al., 2013). It is also used for topics on gender violence experienced by women commuting in minibus taxis (Eagle & Kwele, 2021; Martin, 2022) and grasping modes of masculinities (Gibbs, 2014). This method also investigates matters of health (McHunu et al., 2012) and road safety (Raynor & Mirzoev, 2014). Two studies use it to assess enforcement measures against motorcycle taxis in Lagos (Ackrill et al., 2023) and to reduce COVID-19 spread (Peters et al., 2023). It is also used for topics like assessing the incorporation of mobility-as-a-service platforms (Dzisi et al., 2023), providing a detailed account of informal workers (Aggrey et al., 2023), analysing precarious working conditions (Fobosi, 2019), and examining inscriptions as metaphors of the city (Wakota, 2021). A wide range of topics and disciplines make use of interviews as a method to investigate unknown knowledge of the paratransit industry.

Simulations and modelling. Simulations and models account for almost one-third of the quantitative research. Many of these studies use simulations to discuss the electrification of informal transportation on the continent. Multiple studies have researched the potential electrical energy demand and have developed simulation environments to analyse the grid impact and charging opportunities of electrifying paratransit (Abraham et al., 2021; Booysen, Abraham, Rix, & Ndibatya, 2022; Giliomee & Booysen, 2023; Giliomee et al., 2024). Other scholars have improved existing simulation models of energy usage and demand (Abraham et

al., 2023; Giliomee et al., 2023). Modelling has been used for topics around built infrastructure, mobility prediction, and technical profiles. Researchers have quantified the economic impacts of introducing priority infrastructure (De Beer & Venter, 2021); examined the implications of mixing informal and formal operations in shared public transport lanes (du Preez & Venter, 2022); modelled minibus taxis supply and demand in South Africa (Neumann et al., 2015); and developed quantitative ventilation profiles (Matose et al., 2019).

Ethnography. Ethnographic research sheds light on the everyday life dynamics of city dwellers using informal transportation. The articles using it unpack unconventional subjectivities of lived experiences. For instance, Xiao and Adebayo (2019) researched the subjectivities of passengers navigating the rhythms of urban mobilities. Similarly, Doherty (2022) researched spatial situations of urban mobilities through the lenses of personhood. Agbiboa (2016) opted to take informal transport workers as the unit of analysis to investigate social imagination and everyday experiences. Building on a layer of imagination, Agbiboa (2016) researched minibus taxi workers' reality through the slogans in the vehicles. Ference (2019) first researched joyriding practices as a form of urban placemaking and later (2021) unpacked negotiations in the hustle economy. Correspondingly, Xiao (2022) delved into performed situational inequality. All these studies have in common the analysis of socially constructed layers of meaning built into everyday realities.

GPS. This form of data collection is prevalent in research around mapping movement patterns. It has been used to map movement characteristics (Ndibatya & Booysen, 2020), patterns of accessibility (Nelson, 2023), and road network coverage (Dumedah & Eshun, 2020). It has also been employed to assess paratransit energy requirements (Booysen, Abraham, Rix, & Giliomee, 2022) and test its efficiency as a data collection method (Williams et al., 2015). These assessments focus on accessibility, connectivity, liveability, and spatial distribution between transportation modes.

Fieldwork. Fieldwork is used to comprehend abstract parts of paratransit, such as moments of delight (Nyairo, 2023) or the rationale for its existence (Tichagwa, 2016). It is also used to examine unique mobility patterns (Möller & Doevenspeck, 2023) and the potential role of minibus taxis in supporting education (van Eck et al., 2023).

Combined methods. Used for a variety of research inquiries regarding paratransit operation characteristics (Kemajou et al., 2019; Ndibatya & Booysen, 2020; Plano & Behrens, 2022), its impact on urban dwellers (Evans et al., 2018; Howe, 2003), and tax effectiveness (Dube, 2018).

Literature Reviews. These papers aim to present comprehensive summaries of the role played by moto-taxi services in providing public transportation options in SSA (Ehebrecht et al., 2018), the perception of the overall population towards minibus drivers over time (Mutongi, 2006), and the impact of digitalisation and electrification to paratransit (Martin et al., 2023).

Cross-sectional studies. This primary method is applied mainly when identifying causal factors regarding road traffic accidents (Kitara & Ikoona, 2022; Kitara & Karlsson, 2020; Siya et al., 2019).

Key Themes in Literature

Academic literature on informal transport in Sub-Saharan Africa has three main themes. These themes relate to issues around operation characteristics, safety and violence, and electrification of the sector.

Operation Characteristics

A total of 22 studies researched some aspects of paratransit operation characteristics across diverse contexts and transportation modes. These articles are divided into sections that investigate usage patterns, employment practices, and economic costs. This section provides an overview of the current knowledge on this research theme.

Usage Patterns

The multiple modes of informal transportation are used in different ways. Howe (2003) found that motorcycle taxis in Uganda are mainly used for three forms of short-distance service: 1) within the central urban regions, where they compete with traditional shared taxis; 2) as supplementary transport on routes leading to urban areas that are less appealing to taxis due to low demand density or challenging road conditions; and 3) as connectors to main roads, thereby complementing taxi services and high-capacity bus systems. Updating Howe's findings, Evans and colleagues (2018) specifically looked into motorcycle taxis in Kampala - Uganda's capital city. They found that the journeys mostly happen between Central Kampala - economically

vibrant spaces with jobs and public institutions- and residential areas on the city's outskirts. 64% of the surveyed claimed that their main journey with a motorcycle taxi was to go to or from the city centre. In Yaoundé, Cameroon, motorcycle taxi transport usage varies slightly. The focus in Yaoundé is to use motorcycle taxis as a connector between modes of transport (Kemajou et al., 2019). It responds to the specific demand for short trips in the periphery to transport clients to the main roads. Commuters will take minibus taxis to get closer to the city centre. To effectively compete with other informal transport modes, motorcycle taxis have strategically positioned themselves to align with demand.

The choice of transport mode is affected by several reasons. Interviewees indicated a preference for motorcycle taxis in case of shorter trips while choosing cheap minibus taxis for longer distances (Evans et al., 2018). Motorcycles are faster than minibuses; the latter gets stuck in traffic, takes longer routes, and has more stops. Moreover, motorcycle taxis' popularity emerges from their ability to meet demands other transport modes cannot (Howe, 2003). Motorcycles in Uganda operate where conventional public transport is uneconomic or physically impossible to access. According to data, 18% of motorcycle taxi journeys access spaces impenetrable to four-wheeled transport, and 14% imply accessing informal settlements (Evans et al., 2018).

Some researchers have identified usage patterns in paratransit. Regarding usage patterns, Evans and colleagues' (2018) survey reveals an average of 23 passengers per motorcycle taxi daily, with approximately half of the passengers relying on the same motorcycle daily. This high frequency of regular riders highlights a significant level of social integration between users and providers, as passengers tend to trust specific drivers they consider safer. They typically contact their preferred motor taxi rider via text or phone call. Based on a household survey, the mean trip length of motorcycle taxis in Uganda ranged from 1.3 to 5.4 km in urban Uganda (Howe, 2003). Evans and colleagues (2018) had similar results in Kampala, with the trip average being 3.04 km, barely varying throughout the day. From their data, the average motorcycle taxi journey takes 18 minutes. Those findings align with Kenya, where, according to Salon and Gulyani's (2019) research, commuting time is short: in small cities, the average commute time is around 20 minutes. While in Nairobi, the average commute is 30 mins. Only 5% of the surveyed population report commuting over an hour daily.

Business Model & Employment Practices

Informal transport sector businesses are risky with the potential of success but rather precarious. Ndibatya and Booysen (2020) found that Kampala's paratransit system operates under a high-risk yet typically profitable model for taxi owners. This system is marked by limited access to capital, the absence of government subsidies, and the exploitation of drivers, particularly those who do not own the taxis they drive. Initial capital for individual drivers and owners usually comes from personal savings and informal loans from friends and family. Drivers rely on passenger fares to cover all operational expenses. Most drivers lease their vehicles from owners responsible for repairs, with rental fees varying based on the vehicle's condition.

The informal transport sector is often portrayed as precarious. Fobosi (2019) used precariousness as a lens to describe employment practices in the South African minibus taxi industry. He pointed out the lack of work security regarding poor working conditions, health effects, and safety concerns. Workers are constantly exposed to insecure working relations. Agbiboa (2016) takes up a similar task by illuminating the uncertain conditions of informal transport workers in Lagos. The aggressive behaviour of many informal transport workers in Lagos can be partly attributed to the daily rental agreements between drivers and owners. These agreements require drivers to pay a fixed amount to the owners at the start of each day, which is non-negotiable despite the numerous bribes paid to local enforcers and traffic officers. Consequently, minibus drivers can only meet their daily income targets by either increasing the number of trips or maximising the number of passengers per trip, leading to overloaded vehicles and high-speed driving. Most minibus owners interviewed consider the minibus taxi business as a primary survival strategy. Schlüter and others (2020) found that minibus taxi drivers in South Africa aim to work 10 to 12 hours per day in an attempt to fulfil their minimum expenses.

Livelihoods

Motorcycle taxis serve as a socio-political stabiliser by providing employment for a significant number of unemployed youth (Kemajou et al., 2019). Howe (2003) found that motorcycle taxis in Uganda mainly impact the urban poor through the employment provided. Riders and operators are from the least educated classes, each supporting five dependents. About 1.7 million people in Uganda, or 7% of the citizens, receive part of their livelihood from the informal transport sector. The paratransit sector also has an indirect positive effect on its users.

60% of male and 38% of female commuters report that the use of commercial motorcycles results in increased income. Mostly, the benefactors are traders in animals, bricks, food, and local alcoholic spirits, which are in high demand in urban areas. This is also the case in Kampala, where the informal public transport sector impacts the livelihood of millions of impoverished urban dwellers daily (Ndibatya & Booysen, 2020).

Commercial motorcycle and tricycle drivers do not earn a fixed salary; instead, their income depends on the daily revenue generated (Ehebrecht et al., 2018). Data from Kampala suggest that vehicle owners earn approximately $56 per week, nearly twice the amount that hirers make, which is around $30 per week (Howe, 2003). However, owners face additional expenses related to vehicle depreciation and significant repairs. In peri-urban areas, owners' earnings drop significantly to $30 per week, while hirers' earnings unexpectedly increase to $33 per week. Arosanyin (2010) found that riders who rent motorcycles earn more than riders-owners. The author attributes it to a higher incentive from rented motorcycle drivers to earn more to pay daily expenses such as vehicle rent, fuel costs, and income. Fasakin (2002) researched the factors contributing to the daily operation costs of commercial motorcycles in Akure, a middle-sized city in Nigeria. The results show that the most important determinants of daily operational costs are garaging costs, ownership level of operations, the cordiality of the relationship between the hired rider and business owner, the repair skills of the rider, and daily encounters with law enforcement agents.

The costs of using informal transport are subject to daily change. The cost of operating motorcycles per kilometre ranges from US$0.07 to US$0.12, with lower rates applying to longer trips of up to 16 kilometres (Howe, 2003). Interurban bus fares per passenger are approximately US$0.02 on paved routes and US$0.04 on unpaved routes. Consequently, motorcycle taxis are two to six times more expensive than bus fares. Nevertheless, they are more affordable than sole-hire taxi services, which are their primary competitors in urban areas. Fasakin (2000) examined factors affecting the willingness to pay for motorcycle taxis in Nigeria. He found that factors impacting the journey fare and users' willingness to pay were incidents of robbery by operators, the education level of the population, and the methods determining a trip fare. A common strategy in minibus taxis to make trips more profitable is to start trips without passengers, cautious observation, and random back-off (Ndibatya & Booysen, 2020).

Safety and Violence

A large number of studies have looked at the negative externalities of informal transport in SSA, including safety issues, traffic accidents, and gendered violence. This section indicates some basic insights.

Road Safety

Regarding road safety, many road accidents involving paratransit are observed. Tumwesigye and colleagues (2016), citing official UN data, show that Africa has the highest road traffic fatality rate in the world, being 24.1 per 100,000 population. Especially in Nigeria, the individual country with the highest road traffic death rates, rising to 52.4 per 100,000 population (Venkatraman et al., 2019). In 2011, a research team reported that over 12,000 people die in Nigeria yearly due to motorcycle-related accidents; 30,000 are severely injured, and 70,000 families are indirectly affected by those accidents. In Uganda, around ten people die daily due to road traffic accidents involving informal transport (Toroyan et al., 2013). According to Uganda's Police Force, in 2020, 33% of annual fatalities were from accidents involving motorcycle taxis and their customers (Mwebesa et al., 2021). The percentage of accidents attributable to motorcycle taxis has risen annually, a significant cause of road traffic injuries (Kigera et al., 2010). These injuries are a profound economic burden for the individuals, with an estimated cost ranging from 300-369 USD in treatment, costing about 1.2 billion USD annually, equivalent to 5% of Uganda's GDP (Toroyan et al., 2013; Tumwesigye et al., 2016).

Multiple factors are associated with paratransit's likelihood of having an accident. Kitara and Karlsson (2020), and Kitara and Ikea (2022) research on motorcycle taxis in Gulu Municipality, Uganda, found that economic stressors are the main factor associated with road traffic accidents. They report drivers with sufficient knowledge of road safety measures, having taken extensive training, and with an adequate attitude on road use. However, the economic stress of poor daily income altered driving behaviour, leading to more accidents. Raynor and Mirzoev (2014) corroborate these findings in the Kenyan context, showing that the minibus taxi industry fosters financial pressures on drivers while promoting excessive competition, leading to dangerous driving behaviour. Their research also found that traffic police corruption is a significant obstacle to improving road safety due to weak legislation enforcement and bribery being the cultural norm. Tumwesigye and others (2016) found complementary factors

independently associated with injuries among motorcyclists in Uganda: being under the influence of alcohol, lower engine capacity of motorcycles, having less than three years of riding experience, long daily riding time, and sharing a motorcycle. According to Uganda's riders, the perceived factors associated with motorcycle taxi accidents are slightly different; the main factors are competition for passengers, non-adherence to road safety rules and inadequate helmet usage (Siya et al., 2019).

Various actions have been taken to reduce road traffic accidents associated with paratransit. Mwebesa and colleagues (2021) found that motorcycle taxi riders in Uganda perceive education and training programs to have the highest positive effect in changing driving behaviour to adapt to new city regulations. In Nigeria, riders have a high perception towards helmets used for accident protection (Nwagwu & Olatunji, 2012). A different approach is stricter policy regulations around road traffic. Lagos State in Nigeria implemented harsher laws in 2012 to regulate paratransit (Venkatraman et al., 2019). The new laws implemented new traffic offences and penalties, prohibited specific routes for motorcycles and tricycles, and added vehicle inspection offences and penalties. Venkatraman and others (2019) found a significant decrease in motorcycle deaths following the enforcement of this law. Additionally, private companies are emerging to formalise the motorcycle sector and address the accident issues. Muni and colleagues (2019; 2020) have investigated the road safety-conscious private company SafeBoda, providing training and equipment to their riders. They found that the SafeBoda programme is correlated with a gain in safe riding behaviour among motorcycle taxi drivers in Kampala. Their drivers, compared with normal ones, were more likely to use helmets, have a valid driving licence, and are less willing to drive towards oncoming traffic.

Gendered Violence

A couple of studies have researched the gendered violence targeted towards women in minibus taxis in South Africa. Eagle and Kwele (2021) claim that a misogynistic culture and a high risk of exposure to violence define the industry. They found that young women are exposed to multiple levels of violence in minibus taxis, like accident risk, threatening driving, gender abuse and aggression by drivers, street crime, sexual harassment and rape. This resulted in anxiety, fear, signs of 'thoughts blocking', resignation, and perpetuating traumatic stress. Women used various forms of coping mechanisms like praying, behaviour alteration or detachment. Similarly, Martin (2022) considered (black) women's specialised experience of sexual violence threat when using minibus taxis. He introduced "how minibus taxis are

themselves gendered and gendering mobilites" (p. 311). South African black women's commute is shaped by a genuine and anticipated fear of unsafety, being the rule, not the exception. Therefore, he shows that the space of minibus taxis is closely linked with experiences of violence.

Electrification

There has been a rapidly exponential increase in academic interest in informal transport electrification in the past five years. A total of 8 studies delved into the study of a potential electric tension of paratransit. This sudden interest is framed around a world effort to combat climate change in line with the Sustainable Development Goals. As Giliomee (2023) puts it, "In the view of the size and significance of paratransit in SSA, and its consequential emissions, the electrification of this sector rates among the most important transitions in modern SSA in the fight against climate change" (p. 2). Another often-used justification for electrification is its potential benefits for human health and increased living standards (Giliomee et al., 2024). The prospected reduction in greenhouse gases and combustion engines will improve urban air pollution.

Most studies in electrifying paratransit focus on evaluating the potential electrical energy demand and delivering a simulation to examine the gripping impact and charging opportunities. Abraham and colleagues (2021) found that the mean energy demand of commercial minibuses is 213kWh/d with an average efficiency of 0.93kWh/km. The charging opportunities come from the taxis stopping time ranging from 7.7 h/d to 10.6 h/ d. They conclude that installing photovoltaics (PV) of 320 m 2 could satisfy the energy requirements of the average taxi 50% of the time. Booysen and others (2022) results collected in Kampala showed moderately different outcomes. The median energy demand of the fleet of minibuses was 220 kWh⁄d, with a median stationary time of 8 h⁄d to 12 h⁄d. The median potential for charging from solar PV ranged from 0.24 kWh⁄m 2 to 0.52 kWh⁄m 2 per day. The authors concluded that sufficient investment in renewable energy generation would be needed to transition to a sustainable transport future. However, the energy requirements of an electric minibus taxi "will have a knock-on effect on the region's already fragile electrical grid" (p. 1). Booysen and others (2022) claimed that the electrification of minibuses would result in a 10% increase in the grid demand. They suggest using second-life vehicle batteries in renewable-powered charging stations or a battery swapping scheme to reduce stopping times. Giliomee and Booysen (2023) are more transparent with the infeasibility of such change. They said, "The

findings of this study clearly indicate that the nationwide [South Africa] electrification of the minibus taxi industry is currently unfeasible given the existing electricity supply conditions, assuming no changes in operations" (p. 12). The additional energy requirements would substantially strain the nations' power resources, where each gigawatt of electricity impacts public access to power. From their data, they concluded that implementing an electric minibus taxi sector would imply an additional 4 to 5 hours of daily power cuts. In a later publication, Giliomee and colleagues (2024) suggested a solution to soften the grid blow in the form of stationary external batteries at minibus taxi terminals. Martin et al. (2023) note that potential challenges may arise over time, including reliance on a limited number of swapping providers or, conversely, a highly fragmented industry landscape, interoperability issues, and infrastructure redundancy. Additionally, the scope of impact assessments should be broadened beyond the conventional focus on environmental, health, and economic factors and also consider spatial dimensions and life-cycle aspects, such as the management of assets at the end of their life cycle.

Current Knowledge & Implications

Based on these findings, several conclusions can be drawn regarding the current state of knowledge about paratransit in Sub-Saharan Africa and their broader implications for the discourse on informal transport.

1. Research spans several disciplines, including economics, engineering, sociology, geography, anthropology, and public health. Initial research efforts were primarily concentrated on economic aspects such as operational costs, income opportunities, and business strategies. Over time, the scope has broadened to encompass engineering challenges, gender studies, psychological impacts, political dynamics, and public health concerns.

2. The geographical distribution of research has been concentrated in specific countries, notably South Africa, Uganda, Kenya, Nigeria, and Ghana. South Africa and Uganda are the most researched, while Central Africa remains under-researched. Each region exhibits unique characteristics in its informal transport systems, reflecting local socio-economic conditions and government policies.

3. There are identifiable commonalities in implementing informal transport services across different locations, but the local context significantly influences their configuration. The

concept of informality alone does not adequately account for the specific configurations observed in each location.

4. Public regulatory strategies to manage informal transport vary considerably between locations. While some regions adopt recognition and affirmative regulation, others enforce prohibition and repression. However, the proliferation of paratransit introduces additional challenges: it is often not perceived as a public commercial transport means, is overlooked in transport planning, and there is frequently a lack of experience in its effective regulatory control.

5. This raises the question of how and under what conditions informal transport services can be integrated into public transport systems. Integration depends not only on formal recognition through state regulation and the self-integration efforts of service operators but also on factors related to the rapid transformation of public transport systems. These factors include introducing bus rapid transit systems, developing mobility apps, increasing private car ownership, and evolving mobility needs of growing populations.

6. Regarding the theoretical level, there is still a considerable task to decolonise academic knowledge production on paratransit. The conceptualisation of paratransit mostly comes hand in hand with reproduction and reinforcement of over-simplistic dichotomies such as formal/informal and the framing of Africa in negative terms in contrast to the West. Underlying ideas of Modernity tied to the European project of colonialism and European hegemony are prevalent. There is no difference in the origin of the academics; both native African researchers and non-Africans reproduced a colonised mindset. Alternative discourses are starting to emerge, breaking some of the core assumptions of the Big Lie. However, this process is slow and remains at the periphery of mainstream academic research in paratransit. It still needs to be seen if these alternative conceptual approaches can better grasp the complex and permanently changing phenomenon of informal transport in Sub-Saharan Africa.

Issues for Future Research

From the insights gathered, we can pinpoint several knowledge gaps that need to be addressed in future research.

Firstly, it is urgent to bring at the centre of discussion a collective effort to decolonise the research on informal transport across SSA. Future research needs to re-think the theoretical approaches and discourses' underlying assumptions. As Evans and colleagues (2018) write, "More complete and compelling narratives are required that speak to a wider set of audiences" (p. 12). This task requires a paradigm shift and the creation of new vocabulary to address the issues at hand. Some authors like AbdouMaliq Simone, Dirk Heinrichs, or Allen Hai Xiao are taking up the task. However, this shift needs to become mainstream and engage a broader population segment to co-create a new reality of knowledge production. It is crucial to be critical of our role as academics in shaping the conception of 'Africa' and 'African' realities.

In order to decolonise research, a broader discussion on power dynamics in traditional methodologies is required. In traditional methodologies, the research team has (almost) absolute power over knowledge production. Especially in spaces where ancestral forms of local knowledge have systematically been suppressed and invalidated, the role of the researcher needs to evolve. Inhabitants of these spaces need the power to redefine what is considered knowledge and how it is produced. Thus, researchers should move beyond the function of 'knowledge authorities' and undergo a process of power redistribution. Arnstein (2019) claims that participation requires power distribution, which gives those involved real power to affect the outcome. She defines citizen participation as "the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberately included in the future" (Arnstein, 2019, p. 24). An example of this is participatory methodologies, which are gaining momentum across the globe. However, participatory methods have not yet been used in SSA paratransit. Therefore, methods containing redistribution of power need to be fostered to decolonise African knowledge production.

Moreover, infrastructure governance is a highly relevant and under-researched topic in paratransit. Ultimately, additional research is needed to explore how to enhance the involvement of associations representing motorcycle taxi operators in decision-making processes to contribute to more inclusive and effective regulation of the sector (Martin et al., 2023). Ehebrecht and colleagues (2018) call for future research on authorities' consideration of paratransit in public transport planning and policy creation in line with local contexts and stakeholders' needs. Alimo and others (2022) request further studies on "effective decentralised regulation under the condition of limited institutional capacities and the role of self-regulation in completing formal regulations" (p. 11). Moreover, in the emerging discussion of a hybrid

mobility future, researchers should study forms to plan paratransit operations within an integrated transport system (Doherty, 2022; Martin et al., 2023).

Some relevant socioeconomic impacts of paratransit still need to be researched. Firstly, research could assess the implications of paratransit in poverty alleviation (Ehebrecht et al., 2018). It has been broadly claimed that paratransit ensures livelihood for the urban poor, but this has not yet been researched. Secondly, academics commonly assume that paratransit enhances the urban poor's accessibility to spaces. However, no empirical research has tested the assumption. Thus, it would be recommended to study if informal transport positively correlates with accessibility, and if so, how. Thirdly, research found that road traffic accidents are mostly linked to economic stressors (Kitara & Ikoona, 2022; Kitara & Karlsson, 2020). Thus, it would be convenient to study forms to relieve drivers' economic stressors (Behrens et al., 2017). Lastly, it is important to examine the presence, role, and impacts of formal asset financing companies (Martin et al., 2023). These companies are becoming increasingly significant in facilitating vehicle ownership, yet they raise concerns about fair and financially sustainable access to financing.

The uneven spatial distribution of research across SSA should be tackled and is a potential theme for future research. An in-depth context-specific investigation of the reasons behind research unevenness across SSA should be done. At the same time, under-researched regions can undergo general studies to understand mobility patterns, socio-economic impacts, mobility demands, and operational characteristics. Lastly, additional in-depth and comparative case studies are essential to enhance and update the current understanding of specific local contexts in light of rapid changes within public transportation systems. It is particularly intriguing to investigate whether informal transport services will expand and solidify in particular localities or if they will eventually be supplanted by other transportation modes over the long term (Ehebrecht et al., 2018).

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Appendix

Table 4.

Names Used Locally to Refer to Modes of Informal Transport.

Name	Transport type	Location	Country
Matatu	Minibus	Nairobi	Kenia
Blue donkey	Minibus	Addis Ababa	Ethiopia
Kamuny	Minibus	Kampala	Uganda
Boda-boda	motorcycles	Kampala	Uganda
Danfos	Minibus	Lagos	Nigeria
Keke	Three wheeler	Abuja	Nigeria
Okada	motorcycles	Benin	Nigeria
Trotro	Minibus	Acra	Ghana
Daladala	Minibus	Dar es Salaam	Tanzania
Car rapide	Minibus	Dakar	Senegal
Gbaka	Minibus	Abidjan	Côte d'Ivoire
Esprit de mort	Minibus	Kinshasa	DRC
Candongueiro	Minibus	Launda	
Poda-poda	Minibus	Freetown	Sierra Leone
Sotrama	Minibus	Bomako	Mali
Songa kidogo	Minibus	Kigali	Rwanda
Kambi	Minibus	Cape Town	South Africa
Sotrama	minibus	Bamako	Mali
Ndiaga Ndiaye	minibus	Dakar	Senegal
Taxibé	minibus	Antanarivo	Madagascar
Hiace	minibus	Brazzaville	DRC
Molue	minibus	Lagos	Nigeria
Tuk tuk	Three wheeler		Madagascar & Kenya
Pousse Pousee	bicycle taxi		Madagascar
Dalla dalla	minibus		Tanzania
Taxis collectifs	minibus		Algeria
Toca toca	minibus	Bissau	Guinea-bissau

Magbana	minibus	Conakry	Guinea-bissau
Bush taxi	minibus		Benin & Togo & Burkina Faso
Taxi bus	minibus		Cameroon & Gabon
Foula foula	minibus		RC & DRC
Hafla	minibus		South Sudan
Combi	minibus		Namibia & Botswana
Kombi	minibus		Zimbabwe
Chapa	minibus		Mozambique
Twegerane	minibus		Rwanda
Iveco	minibus		Libya