



SUSTAINABLE URBAN MOBILITY SYSTEMS THAT BRIDGE CLIMATE CHANGE MITIGATION AND JUST TRANSITIONS: A CASE STUDY OF KAMPALA CITY

Calvin Rapa
2891967

A research report submitted to the Faculty of Engineering and the Built Environment,
University of the Witwatersrand, Johannesburg in partial fulfilment of the requirements for
the degree of Master of Urban Studies (Urban Management).

Johannesburg, 2025

Declaration

I, Calvin Rapa, hereby declare that this research report is my original unaided work. It is being submitted in partial fulfilment of the requirements for the award of Master of Urban Studies in Urban Management at the University of the Witwatersrand, Johannesburg. This work has not been submitted previously for any degree or examination at any other institution.



26th May 2025

Abstract

Limiting global warming to 1.5°C remains achievable, but it requires significant global efforts to reduce greenhouse gas (GHG) emissions. In the transportation sector, despite progress in carbon mitigation across the globe, the implementation of mitigation strategies often overlooks justice principles, particularly in the Global South. This study addresses this gap by proposing pathways for sustainable urban mobility transitions in Kampala city through the justice theory lens. Based on document reviews, semi-structured interviews, and field observations, findings highlight congestion due to poor infrastructure, rising private motorization driven by aspirations, and the reliance on paratransit for public transport as key mobility challenges in Kampala city. The study recommends transport policies tailored to the city's socio-economic and environmental realities, phased transition strategies with strong monitoring and evaluation, and regular policy revisions. This approach ensures equitable, sustainable, and socially just urban mobility solutions.

Key words: Sustainable Urban Mobility, Just transition, Just Transportation Transition, Climate Change Mitigation, Pathways

Dedications

I dedicate this work to the people of Kampala, Uganda, and to communities across cities in the Global South who inspire my vision for improved urban mobility. My aspiration is to contribute to solutions that empower residents to move from point A to point B with ease, in ways that are not only efficient and effective but also affordable and convenient. This dedication reflects a commitment to addressing the unique mobility challenges in these regions by envisioning sustainable, inclusive, and accessible transportation options that enhance the daily lives and economic opportunities of urban dwellers. I hope this research serves as a step toward transforming urban transit systems and creating pathways for cities that prioritize the well-being and needs of their people.

Acknowledgement

I would like to begin by thanking God Almighty for the strength, wisdom, and health granted to me throughout this study period. My sincere gratitude also goes to the Wits-TUB-UNILAG Urban Lab project, led by Professors Mfaniseni Fana Sihlongonyane and Marie Huchzermeyer, for their support and for selecting me as a 2024 scholarship recipient, which enabled my pursuit of this master's program. Their faith in my potential and invaluable guidance have shaped my academic journey.

I am also deeply grateful to my supervisor, Dr. Emmanuel T. Busayo, and to Prof. Sarah Charlton, the research report coordinator for this study. Their expertise, thoughtful feedback, and consistent support were instrumental in the completion of this work.

To my colleagues, particularly the WITS-TUB Lab group of 2024, thank you for your insights, encouragement, and shared moments of laughter that made this period enjoyable.

Finally, my heartfelt thanks to my family: my wife, Joseline, and my brothers, Eng. Tonny and Dr. Hedmon (PhD). Your unwavering support, encouragement, and willingness to review my work have been invaluable.

May God bless you all.

CONTENTS	Page
Declaration.....	i
Abstract.....	ii
Dedications.....	iii
Acknowledgement	iv
List of figures.....	viii
List of tables	ix
Lists of acronyms and abbreviations	x
Submitted articles and presentations from this research report	xi
CHAPTER ONE: INTRODUCTION	1
1.1 Introduction.....	1
1.2 Problem statement and rationale.....	2
1.3. Aim of the study	2
1.4. Research questions.....	3
1.4.1. Main research question.....	3
1.4.2. Research sub-questions	3
CHAPTER TWO: RESEARCH METHODOLOGY	4
2.0. Introduction.....	4
2.1. Research Methods	4
2.1.1. Research paradigm	4
2.1.2 Case study approach.....	4
2.1.3 Data collection methods	4
2.1.4. Sampling techniques used.....	7
2.2. Data Analysis	7
2.3 Ethical Considerations.....	8
2.4 Limitation of the study	8
2.5 Structure of the report	9
CHAPTER THREE: LITERATURE REVIEW OF KEY CONCEPTS OF THE TOPIC.....	10
3.1. Introduction	10
3.2 Definitions of key terms.....	10
3.3 Sustainable Urban Mobility.....	11
3.3.1 Barriers to sustainable urban Mobility Transition	11
3.4 The Concept of just transition	15

3.4.1 <i>Implementing just transition concept using Justice theory</i>	16
3.4.2. <i>Limitation of the concept of just transition</i>	17
3.5 Theoretical framework	17
3.5.1 <i>Backcasting a sustainable city</i>	17
CHAPTER FOUR: RESEARCH CONTEXT.....	21
4.1 Introduction.....	21
4.2 The case study of Kampala	21
4.3 The current transport governance systems of Kampala City	22
4.4 Public Transport context of Kampala city	22
3.5 The symbiotic relationship of taxi operations in Kampala city.	23
4.6 The key challenges associated with the current mobility systems of Kampala	25
CHAPTER FIVE: RESULTS AND DISCUSSIONS	27
5.1. Introduction.....	27
5.2. Global policy frameworks and legislative instruments on sustainable urban mobility transition	27
5.3. Systematic literature review of the global paradigm of electrification of mobility, mass transit and active mobility.....	28
a) <i>Electrification of Mobility</i>	28
b) <i>Active mobility</i>	31
c) <i>Mass Transit</i>	31
5.3.1 <i>The justice pitfalls of Sustainable urban mobility transition</i>	35
5.3.2 <i>What lessons can be drawn from existing sustainable mobility practices to guide other cities toward a just transition?</i>	36
5.4. The Current predicament of Mobility system of Kampala City	40
5.4.1. <i>Key challenges of mobility situation of Kampala.</i>	40
5.4.2 <i>Existing strategies aimed at addressing the mobility situation in Kampala</i>	45
5.4.3 <i>The Bus Rapid Transit (BRT) Debate</i>	47
5.5. Towards a just urban mobility transition in Kampala.....	48
5.5.1. <i>Visioning</i>	48
5.5.2. <i>Pathways</i>	48
<i>Foundation phase (2025-2030)</i>	49
<i>Acceleration Phase (2030 – 2040)</i>	50
<i>Consolidation phase (2040-2050)</i>	52

5.6. Proposed framework for formalizing the existing paratransit public transport system	52
CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS	56
6.1. Introduction.....	56
6.2. Summary of key findings.....	56
6.3. Conclusion	58
6.4 Recommendations	58
6.5. Areas for future research	59
References	60
Appendix I: Wits Ethic Clearance Certificate	72
Appendix II: Plagiarism Declaration Form	73
Appendix III: Participant Information Forms.....	74
Appendix IV: Participants Consent Forms	84
Appendix V: Semi structured interview guides: CFAO Mobility.....	85
Appendix VI: Semi structured interview guides: Kampala Capital City Authority.....	86
Appendix VII: Semi structured interview guides: Academia	87
Appendix VIII: Semi structured interview guides: Federation of Uganda Taxi operators	88

List of figures

Figure	Page
1.1: Research sub questions and methods.....	3
2.2: Backcasting method.....	8
2.3: Structure of the report.....	9
3.1: Backcasting method.....	18
3.2: Complementary between Just transition concept and backcasting framework.....	19
4.1: Study area map of Kampala showing urbanisations trend.....	21
4.2(a) A section of main taxi ranks of Kampala city.....	23
4.2(b) Boda-bodas parked on one of the streets in Kampala.....	23
4.3(a): Informal trading in clothes at the taxi rank.....	24
4.3(b): Food vending next to the main taxi ranks.....	24
4.4: A typical peak hours traffic situation in Kampala.....	25
5.1: Global electric car stock trend 2010-2023.....	29
5.2: Electric Bus sales and sales shares by region 2015-2023.....	30
5.3: Taxis on Burton streets in Kampala.....	42
5.4: Street vending on the sidewalks in Kampala city.....	44
5.5: A section of Non-motorized streets in Kampala taken-up by boda-bodas.....	46
5.6: A systematic framework for transforming the existing paratransit public transport system.....	53

List of tables

Table	Page
2.1: Participants groups who participated in the semi-structured interviews.....	6
3.1: Overviews of sustainable urban mobility transitions barriers.....	11-12
5.1: Status of HEVs, EVs, PHEVs in selected countries of Global North.....	29
5.2: Costs of BRT infrastructure in African cities.....	32
5.3: The costs of Rail infrastructure in African region.....	32
5.4: Potential benefits of BRT.....	33
5.5: Synopsis of common policy measures on sustainable urban mobility transition	37
5.6: Current paradigm of transport planning and implementation in Kampala city.....	47
5.7: Synopsis of pathways to sustainable urban mobility transitions for Kampala city.....	49

Lists of acronyms and abbreviations

BRT: Bus Rapid Transit

CO: Carbon monoxide

CO₂: Carbon dioxide

EV: Electric Vehicles

GHG: Greenhouse gas

GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit

GKMA: Greater Kampala Metropolitan Area

HEV TCP: Hybrid and Electric Vehicle Technologies and Programmes

HEV: Hybrid Electric Vehicle

IEA: International Energy Agency

JT: Just Transition

JTT: Just Transportation Transition

KCCA: Kampala Capital City Authority

LRT: Light Rail Transit

NDC: Nationally Determined Contributions

Nox: Nitrogen oxides

PHEV: Plug-in hybrid electric vehicles

SUM: Sustainable Urban Mobility

UBOS: Uganda Bureau of Statistics

UN DESA: United Nations Department of Economic and Social Affairs

UNEP: United Nations Environment Programme

UNFCCC: United Nations Framework Convention on Climate Change

USD: United States of America Dollar

Submitted articles and presentations from this research report

Articles under review

1. Rapa. C., and Busayo, E. (2024). Global paradigm of sustainable urban mobility systems: Towards just transportation transitions. *Submitted to Journal of Urban Mobility*
2. Rapa. C., and Busayo, E. (2024). Transformative pathways to a just, sustainable urban mobility Systems in Kampala: Using Backcasting and adaptation frameworks. *Submitted to the Journal of Urban Planning and Transport Research.*

International conference presentation.

1. Global paradigm of sustainable urban mobility systems: Towards just transportation transitions. African Urbanism Conference, 25th October 2024, University of the Witwatersrand, Johannesburg, South Africa

CHAPTER ONE: INTRODUCTION

1.1 Introduction

The current climate science clearly shows that it is still possible to limit global warming to 1.5°C. However, this will call for a substantial global effort to reduce greenhouse gas (GHG) emissions. Specifically, according to UNEP (2023) by 2030, global emissions must be cut by approximately 50%, and the world must reach net-zero emissions by 2050 to avert the most severe impacts of climate change. Net zero refers to the concept of reducing carbon emissions to a point where only a small number of residual emissions remains (*ibid.*). This ambitious target calls for rapid and transformative changes across all sectors of society. A critical sector where transformation is particularly urgent is urban transportation. As Griffiths, Furszyfer Del Rio and Sovacool (2021) argue, cities must rethink how they manage transportation systems, especially how they facilitate the movement of people, to stabilize atmospheric carbon dioxide levels and contribute to the broader climate mitigation goals.

According to the Intergovernmental Panel on Climate Change, in 2019 transportation accounted for 15% of all human-induced greenhouse gas (GHG) emissions and 23% of GHG emissions linked to energy use (IPCC, 2022), making transport the “second largest carbon-emitting sector after electricity generation” (International Energy Agency (IEA) as cited in Fan *et al.* (2023:879). This high level of emissions is largely due to overreliance on private vehicles, which as of 2020 stood at approximately 1.42 billion worldwide (Shah *et al.*, 2021), most of which running on fossil fuels (Ferrer and Thomé, 2023). These figures could be more today. These vehicles not only contribute significantly to air pollution, releasing hazardous substances like carbon monoxide (CO) and nitrogen oxides (NO_x) (Jelti, Allouhi and Tabet Aoul, 2023), but they also lead to social problems like traffic congestion and accidents (Whittle *et al.*, 2019). As urbanisation accelerates, with over 70% of the global population estimated to reside in urban areas by 2050 (UN DESA, 2023), the transport sector presents significant environmental, social, and economic challenges. These challenges not only hinder efforts to combat climate change but also complicate urban management worldwide. Without substantial changes in urban mobility policies and strategies, future emissions will likely fall short of global reduction targets.

In response to the challenges posed by the transport sector, the concept of sustainable urban mobility (SUM) has emerged as a crucial strategy for addressing environmental and socio-economic issues. However, implementing SUM requires a significant and unprecedented transformation. While this shift has the potential to enhance energy governance systems (Allen, Lyons and Stephens, 2019) and address environmental justice concerns (Ehresman and Okereke, 2015), the associated costs and risks are substantial (Wang and Lo, 2021), affecting various aspects of life in different ways (Abram *et al.*, 2022). Notably, marginalized populations, who contribute the least to greenhouse gas emissions, often bear the brunt of climate change mitigation efforts and the urban mobility transition process (Markkanen and Anger-Kraavi, 2019).

In recent years, the concept of SUM has garnered considerable focus within the academic domain. Numerous studies have however primarily focused on various aspects of sustainable urban mobility, including the transition process and associated challenges (Corais et al., 2022; Kovačić, Mutavdžija and Buntak, 2022), a framework for assessing sustainable urban mobility (Ngossaha et al., 2024), and the design and implementation of sustainable urban mobility plans (Cevheribucak, 2024). Taking into consideration and equally considering Williams and Doyon's (2019:144) arguments that “we cannot achieve a sustainability transition without justice, indeed that an unjust transition is not sustainable”, this research, therefore, explores the sustainability and justice questions in the transportation sector of Kampala city. It does so by firstly, generating a general understanding of the current paradigm of sustainable urban mobility, focusing on key lessons for electrification of mobility and active mobility (Walking and Cycling) from the Global North cities and adoption of mass transit especially Bus Rapid Transit (BRT) through a systematic literature review. These mobility options were chosen based on the understanding that they are currently the main mobility systems being adopted by different cities across the globe. The key lessons from these global paradigms are then used to develop pathways for sustainable urban mobility transition in Kampala and a framework for inclusive and equitable transformation of the existing paratransit in Kampala city.

1.2 Problem statement and rationale

Throughout the world, transportation is the engine for local and national economic growth (Jelti, Allouhi and Tabet Aoul, 2023). And yet transportation emissions such as greenhouse gasses (GHGs) have a tremendous impact on climate change. While much progress is being made in the technical aspects of reducing carbon emissions through different mitigation strategies, especially in the Global North, in the Global South cities, the holistic convergence of climate change adaptation and social justice remains largely underexplored within existing urban policy frameworks, leaving the gap both in theory and practice. As a result, the existing urban transportation systems in cities like Kampala, Uganda are still largely socially unfair. This is possibly due to the failure to integrate the principles of just transition to ensure that the progress on environmental sustainability does not exacerbate social inequalities but instead promotes fairness and inclusivity.

This gap emphasises the necessity for a more comprehensive and innovative strategy for urban mobility systems, one that moves beyond purely technological solutions and addresses climate action as a transformative and multidimensional issue, prioritizing equitable outcomes for all urban communities, and ensuring that no one is left behind in the pursuit of sustainability. By viewing climate action through this broader lens, the study believes that cities can avoid the reproduction of the central failures of past transitions to just-sustainable urban mobility from other countries and develop truly equitable and sustainable mobility systems.

1.3. Aim of the study

The primary aim of this study is to explore the pathways for transitioning towards a just sustainable urban mobility system in Global South cities, with a particular focus on Kampala. Specifically, the study seeks to:

1. To examine lessons from global sustainable urban mobility systems to identify best practices, challenges, and strategies that can be adapted to Global South cities.

2. To assess the current state of urban mobility in Kampala City.
3. To explore potential pathways for transitioning Kampala towards sustainable urban mobility.
4. To develop an inclusive and equitable transformation framework for integrating paratransit operators into a formalized sustainable urban transport system.

1.4. Research questions

To achieve the research aim, the study was guided by the following questions (Figure 1.1)

1.4.1. Main research question

How can sustainable urban mobility systems evolve in ways that not only reduce greenhouse gas emissions but also address the needs of the vulnerable population who may be disproportionately affected by the transition process?

1.4.2. Research sub-questions

Research sub questions (RSQ)	Methods
RSQ 1. What lessons can Global South cities draw from the global paradigm of sustainable urban mobility systems to promote and integrate low-carbon transportation modes?	A systematic literature review
RSQ 2. What is the current mobility situation of Kampala city? RSQ 3. What strategies have been employed to address the current mobility systems in Kampala?	Semi structured interview Field observations Review of secondary data (policies, peer-reviewed literatures, reports, policy briefs)
RSQ 4. What could be the potential pathways for achieving a sustainable urban mobility transition in Kampala city? RSQ 5. How can the existing paratransit operators in Kampala be inclusively and equitably transformed and integrated into a sustainable urban mobility system?	Analysis and interpretation following backcasting and just transition principles

Figure 1.1 Research sub-questions and methods

CHAPTER TWO: RESEARCH METHODOLOGY

2.0. Introduction

This chapter presents the research methodology employed to address the central questions and objectives of the study. It details the research design, data collection methods, and data analysis techniques, as well as the ethical considerations observed during the research process and the limitations encountered. The choice of an appropriate methodology is essential to ensuring the credibility, validity, and overall relevance of the study's findings.

2.1. Research Methods

2.1.1. Research paradigm

This study depended on non-quantifiable data; therefore, it was qualitative in nature. This was chosen because the qualitative approach can help in the identification and improvement of existing patterns, ideas, or variables that may be relevant in a particular study (Fischer and Guzel, 2023). In the field of urban transportation, the qualitative method is increasingly being adopted due to its capacity to deliver in-depth insights into complex mobility systems.

Unlike quantitative methods, this approach emphasizes the subjective experiences and perspectives of different users, shedding light on aspects often overlooked in numerical analyses. For example, studies like Mars, Arroyo and Ruiz (2016) successfully used qualitative approaches to examine travel behavior, revealing the underlying motivations and contextual factors that shape individuals' transportation decisions. This approach is particularly significant in urban environments, where diverse populations engage with intricate and multifaceted transport systems.

2.1.2 Case study approach

This study adopts a case study approach, focusing on Kampala City, Uganda. Case studies are particularly effective in qualitative research for providing in-depth insights into contextual factors (Yin, 1991). Kampala was chosen as the focal area due to its status as Uganda's capital and primary economic center, making it the most rapidly urbanizing city in the country. Consequently, addressing the challenges of affordable, efficient, cost-effective, and reliable urban mobility emerges as a critical priority for city management. A more comprehensive exploration of this issue is presented in Chapter Three.

2.1.3 Data collection methods

As detailed below, the research questions were thoroughly addressed using qualitative approach. It included a comprehensive literature review, semi-structured interviews, and direct observations.

(a) Literature review

A systematic literature review was employed which is a research method designed to provide a comprehensive overview of the existing knowledge in a particular subject (Snyder, 2019). This review followed a four-step process to gather and synthesize evidence on global trends and strategies for implementing sustainable urban mobility in selected cities worldwide. The

chosen cities were identified for their notable advancements in fostering sustainable transportation transitions.

Step 1.

The study began by generating research questions, as a justification for the need for the review, followed by listing of appropriate search key words.

Step 2.

The selection of databases for this study included peer-reviewed journal articles from the Web of Science and Google Scholar. These databases were chosen for their extensive coverage and the reliability of their academic records. In addition to these sources, grey literature such as government reports and policy documents from reputable websites was also utilized. Furthermore, some articles were retrieved from the reference lists of previously reviewed studies to ensure a comprehensive and well-rounded collection of relevant literature.

Step 3.

Database search. The keywords used while searching the databases were “urban mobility”, “Urban Mobility transitions”, “Sustainable Urban mobility strategies”, “Barriers to Sustainable Urban Mobilities”, “Just transportation”, “BRT implementations”, “BRT in African cities”.

Step 4.

Inclusion and exclusion criteria. The gathering of relevant articles for this study was guided by four inclusion criteria: The title of the paper, the year of publication, the language of the paper, the reliability (peer-reviewed), and the relevancy to the research questions.

Articles that were not written in English, book chapters, and conference proceedings were all excluded. The titles of the articles were used to check for potential duplicates, while the abstracts of the articles were read to determine if they could answer the research questions.

Only papers that were published between 2008 and 2024 were included in the synthesis lists. This time frame was chosen to ensure that the literature reviewed captures not only the recent trends and innovations in the field of sustainable urban mobility but also the evolution of sustainable urban mobility ideas. The initial search using the same keywords on the Web of Science database identified 1037 articles, while a search on Google Scholar identified 529 papers and reports from websites were 07, and materials retrieved from references to the original articles were 53, while grey literature were 07. After filtering using the inclusion and exclusion methods, the total number of papers reviewed in this paper is 106.

(b) Policy document Analysis

The analysis focused on reviewing existing reports on transportation in Kampala City to gain insights into the urban transport policy frameworks and urban planning strategies that have been proposed or implemented. It also aimed to understand Kampala's urban mobility context. Key sources included government reports, particularly from the Kampala Capital City Authority and the Ministry of Lands, Housing, and Urban Development, as well as

publications from international organizations such as the World Bank and private consultants. These reviews were conducted to complement and support the findings from interviews.

(c) Observations

To supplement results from field interviews, observations were also conducted across key areas in Kampala to assess the current state of urban mobility. This method involved systematic monitoring of traffic patterns, public transport usage, pedestrian behaviour, and the condition of transport infrastructure. Key patterns were photographed, and it provided real-time insights into the operational challenges of Kampala's transportation system and informed the development of pathways and frameworks to answer the main research question of this study.

(d) Semi-structured interviews

The interviews involved a diverse group of stakeholders from the public sector, private sector, and academia. The aim was to collect in-depth qualitative data on stakeholder perceptions of Kampala's urban mobility challenges, current and proposed strategies, and aspirations for future mobility systems. A semi-structured interview format was used for its ability to balance structured guidance with flexibility for exploring emerging themes (Kallio et al., 2016).

Initially, 13 participants were planned for the study, but only 9 responded to cold emails and were subsequently interviewed (Table 2.1). Five interviews were conducted in person, and four were conducted online via Google Meet. Each session, conducted in English by the author, lasted 36–48 minutes. All interviews were audio-recorded and later transcribed.

Table. 2. 1: *Participants groups who participated in the semi-structured interviews.*

Interviewee ID	Participant's group	Interviewee role	Organization	Interview Mode
A	Civil servants	Land Use Planning	Kampala Capital City Authority (KCCA)	Physically
	Civil servant	Traffic and Transport Planning	Kampala Capital City Authority (KCCA)	Physically
C	Private sector	Strategic Planning, Desired future.	Cfao Mobility, formerly Toyota Uganda.	Physically
D	Private sector	National Chairperson	Federation of Uganda Taxi operators	Physically
E	Private Sector	Businessman	Car Importer	Physically
F	Professional Transport Planning consultant	Consultancy	Urban Research and Training Consultancy	Virtually
G	Transport Planning Consultant	Research and Development		Virtually
H	Academia	Research and Teaching	Institute of Surveys and Land Management, Entebbe	Virtually
I	Academia	Research and Teaching	Makerere University	Virtually
TOTAL	09			

2.1.4. Sampling techniques used

The research participants were purposively selected based on their specialized knowledge, professional experience, and the relevance of their organizational roles to the subject of sustainable urban mobility. This sampling approach was adopted to ensure that the study gathered rich, context-specific insights from individuals who are directly involved in planning, implementing, or regulating urban transport systems in Kampala. By targeting key stakeholders, including officials from government agencies, representatives of transport associations, and experts in urban mobility and climate policy, the study aimed to capture a broad yet informed perspective on the challenges, opportunities, and pathways for transitioning to a sustainable mobility system in the city.

2.2. Data Analysis

The data gathered from observations, literature review, and semi-structured interviews were analysed using qualitative method. Thematic analysis was applied on the transcribed interview audio. The process involved, firstly, familiarizing with the data by re-listening to the recordings for 3 times, and re-reading the transcribed audios. The transcriptions were then analysed and summarized by generating key themes and quotes for each question, and from each research participant. This provided a comprehensive understanding of the current mobility practices in Kampala, and how the system interacts with other informal operations within the city. This context was the main foundation that facilitated the development of evidence-based pathways.

To develop the pathways for sustainable urban mobility transition for Kampala, the backcasting framework was employed. This method typically consists of several stages, with the sequence and number of steps varying based on the specific approach used (Banister and Hickman, 2013). In this study, three steps were followed (Figure 2.1), guided by the research questions.

Step 1. Understanding of the current mobility system of Kampala city, which is a critical foundation for applying a backcasting approach (Camilleri, Attard and Hickman, 2024).

Step 2. Generating a vision for the desired future.

Step 3. Developing pathways to achieve a sustainable urban mobility transition for Kampala city.

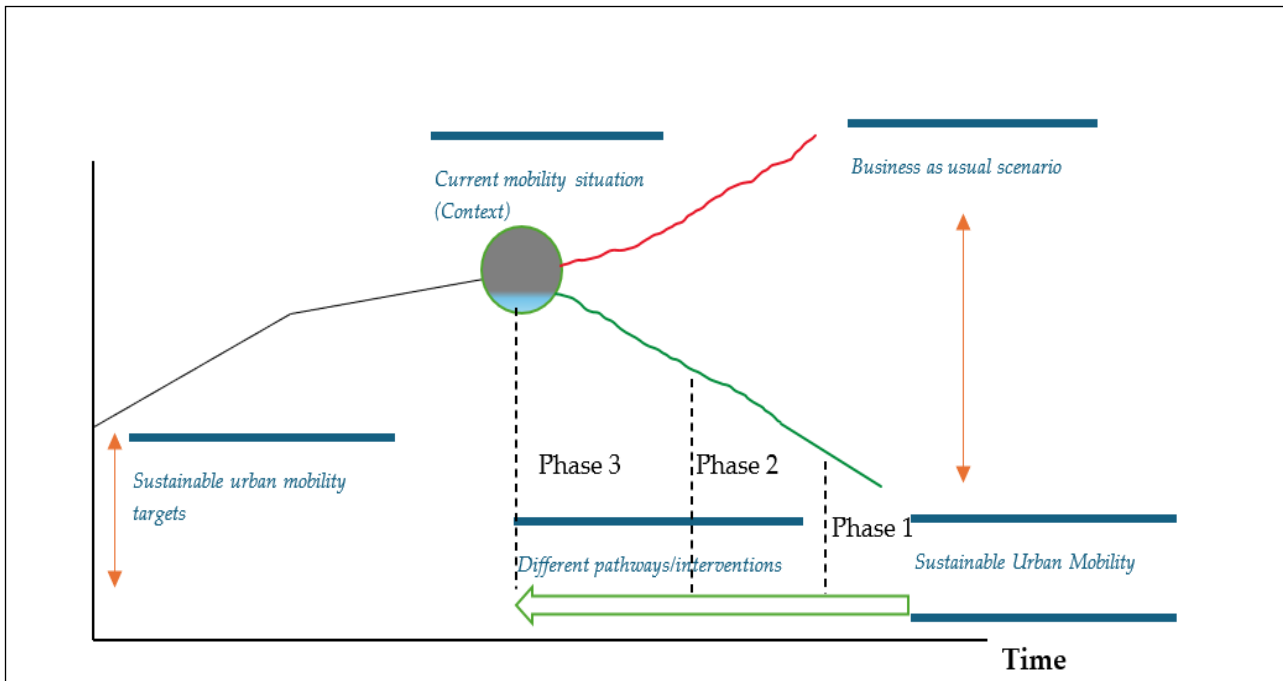


Figure 2. 1. *Backasting framework*

Source: Modified by the author based on Camilleri, Attard and Hickman (2022)

2.3 Ethical Considerations

Ethical considerations were fundamental to this research. As highlighted by Kvale (1996), confidentiality and informed consent are critical components of qualitative research. Prior to data collection, ethics clearance was secured from the University of the Witwatersrand. All participating organisations also gave permissions to their staff to participate in the interviews. All participants in the semi-structured interviews were fully informed about the study's objectives and provided their informed consent. Participants in face-to-face interviews signed formal consent forms, while those interviewed virtually provided verbal consent. Confidentiality was meticulously upheld, with all interview data anonymized to safeguard the identities of respondents.

Furthermore, during field observations and photography, the study adhered to ethical guidelines for conducting research in public spaces, ensuring the privacy of individuals was respected at all times.

2.4 Limitation of the study

Limited involvement of stakeholders.

During the data collection process, despite efforts to engage all the identified key stakeholders, not all of them were available, resulting in only 9 participants taking part in the study. This insufficient diverse input may have resulted in pathways that overlook key community needs, concerns, and preferences. In future studies, additional time will be allocated to this process to ensure broader participation and mitigate such challenges.

Word limit constrains. The university's word limit for research reports also restricted this study's ability to thoroughly explore the implementation and impact of various strategies,

such as carpooling, car-sharing, and other global urban mobility alternatives that could reduce traffic congestion and carbon emissions.

2.5 Structure of the report

This report is organised into five chapters as follows:

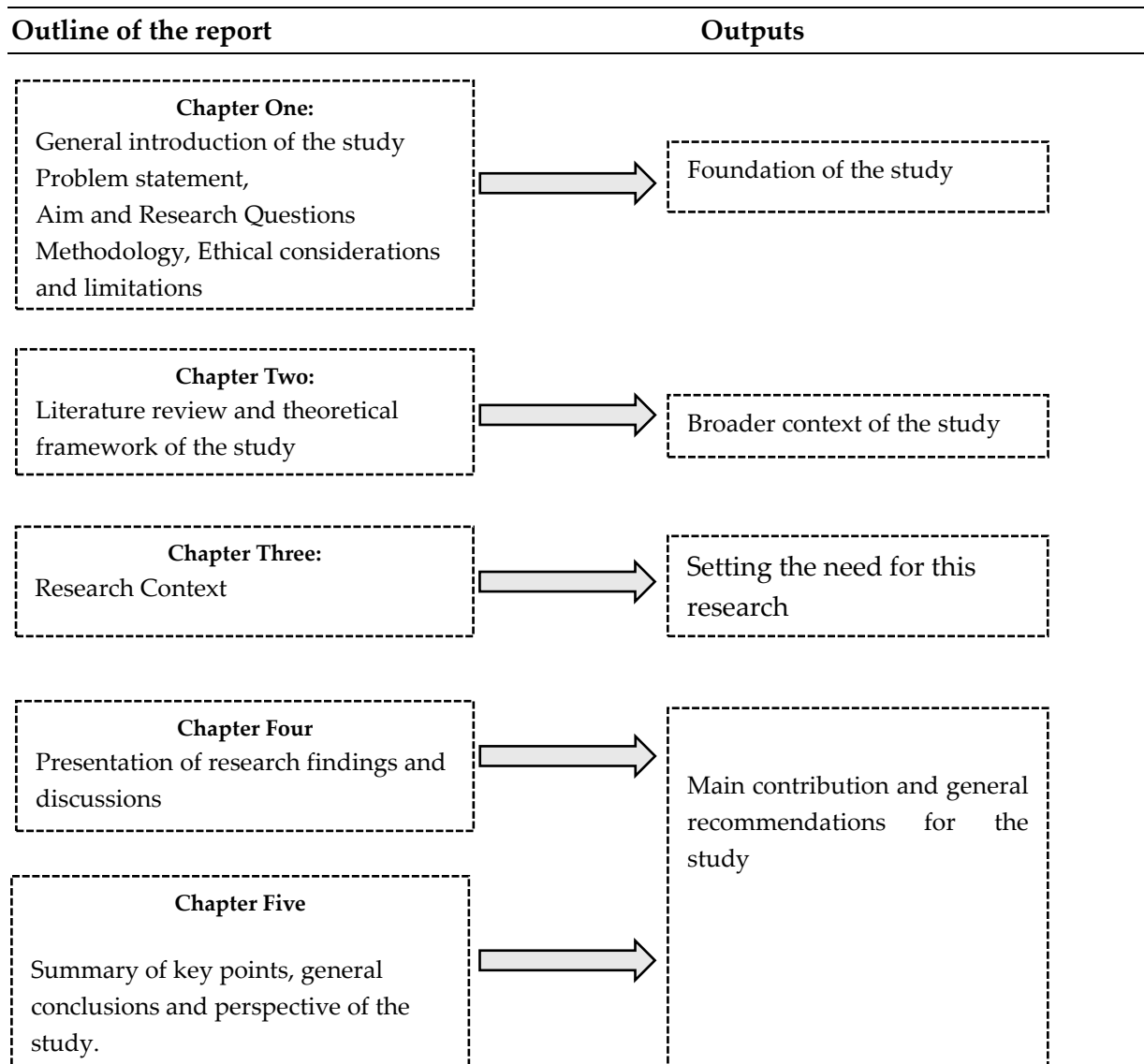


Figure 2.2: *Structure of the report*

Conclusion

This chapter lays the foundation for the study by outlining the broader context and identifying the research gap. It also defines the objectives and research questions that guide the analysis in Chapter 5. Chapter 3 follows with a comprehensive literature review, exploring the key concepts that inform the study

CHAPTER THREE: LITERATURE REVIEW OF KEY CONCEPTS OF THE TOPIC

3.1. Introduction

This chapter begins by defining key terms central to the study, providing foundational explanations that are later enriched with diverse perspectives. The primary discussion focuses on the concept of sustainable urban mobility, examining the social, economic, institutional, and infrastructural barriers to achieving a transition toward it. The chapter also explores the concept of a just transition, emphasizing its importance in promoting equitable outcomes. Additionally, the theoretical framework of backcasting is introduced as the methodological foundation of the study, offering a structured approach for envisioning and planning sustainable mobility transitions. While this chapter lays the theoretical groundwork, the literature review is extended in Chapter Five, which specifically addresses the first research sub-question by systematically examining the global paradigm of sustainable urban mobility.

3.2 Definitions of key terms

Urban mobility

This is the movements of people and goods within urban areas. It involves the use of modes such as private vehicles, busses, walking and cycling (Cheba and Saniuk, 2016).

Sustainable Mobility

With no formal definitions, sustainable mobility encompasses the provision of transport systems that promotes maximum energy efficiency (Brůhová Foltýnová *et al.*, 2020)

Climate Change Mitigation

These are interventions or actions aimed at reducing the emissions or sources of emissions that causes climate change (Sharifi, 2021, citing IPCC, 2014).

Climate Change Adaptation

These are actions prepared to manage the risks of climate change impacts on both natural and human systems (Sharifi, 2021, citing IPCC, 2014)

Just Transition

Transition refers to a fundamental and systematic shift in societal structure that occurs gradually over a given period (Loorbach *et al.*, 2021). The concept of just transition, therefore, means that, as the transition is happening, it should consider the existing workers that currently depend on the existing systems by avoiding the creation of socioeconomic injustices and inequality (Wang and Lo, 2021).

3.3 Sustainable Urban Mobility

Sustainable urban mobility (SUM) refers to transportation systems that are environmentally friendly, socially inclusive, and economically viable. This concept encompasses various strategies and technologies aimed at reducing the negative impacts of urban transport while enhancing accessibility and quality of life for all residents. According to Canitez, Alpkokin and Kiremitci (2020), SUM emphasizes traffic capacity, speed, accessibility, participatory and transparent transport planning, and decision-making. It promotes affordability for marginalized and economically disadvantaged communities (Kunskaja and Budzyński, 2024), and it promotes environmental justice (Al-lami and Torok, 2023). SUM enhances human liveability and reduces dependence on private vehicles (Filippi, 2022), reinforcing the connections between land use and transportation (Banister, 2008). Contrary to the traditional transport planning methods, SUM underscores the need for a cohesive set of actions that blend various policy areas, including “land use, health, environment, and social services” (Canitez, Alpkokin and Kiremitci, 2020:1149). These interplays are vital for improving the investment environment and guiding urban mobility systems towards sustainability and low carbon emissions. Rather than focusing solely on infrastructure within specific administrative areas, SUM also aims at an integrated set of actions to achieve cost-effective solutions and create functional areas based on “travel-to-work patterns” (Wefering *et al.*, 2014:7).

3.3.1 Barriers to sustainable urban Mobility Transition

Despite the already known and accepted benefits of sustainable urban mobility transition, significant challenges and obstacles remain, with different cities finding it difficult to achieve large-scale just transition towards sustainable urban mobility. As summarised in Table 3.1, the barriers are categorized into four key factors: Economic, institutional, infrastructural, and social factors. These categories have equally been emphasized in several other studies such as Åkerman *et al.* (2011); Henkel and Hugging (2017), which strengthens the needs for focused attention to address them.

Table 3. 1. *Overview of Sustainable mobility transition barriers*

Category	Challenges	Description
Infrastructural and technological Challenges	Infrastructure limitations	Old or inadequate available infrastructure
	Costs of construction	Urban sprawl makes it expensive to expand and construct new roads
	Innovation gap	Implementing and maintaining required SUM technologies requires expertise
Economic	Inadequate fundings	Insufficient fundings and investments in sustainable mobility strategies
Social	Economic disparities	Unequal development making other cities lag
	Cultural resistance	People resist to change mobility choices due to cultural norms
	Behavioural change	Difficult to change behaviours to more sustainable options

Institutional	Governance fragmentations	Different government entities have similar roles with lack of coordination and continuity
	Institutional inertia	Resistance within existing institutions to adopt new sustainable practices

Social barriers

Public acceptance and behavioral changes are crucial for the success of sustainable urban mobility strategies. However, in many cities around the world, people are still hesitant to change their social and cultural practices, consumption behaviors, and mobility preferences. This is attributed to the fear of the unknown, most especially in terms of affordability, reliability, safety, and comfort (Caulfield, Paraic and Aoife, 2020), and lack of awareness about the overall benefits of sustainable mobility options (Okyere *et al.*, 2024). This therefore calls for a clear transformational strategy at various levels. For instance, at the individual level, a change in mindset is very crucial. This is what Schlitz *et al.* (2010) called an overall transformation.

Transformation is a psycho-social process that unlocks one's ability to participate, nurture, and drive change for a better life, or as an internal transformation that results in long-term adjustments in the way people engage with themselves and other people around them. O'Brien and Sygna (2013) however note that it is even very challenging to identify exactly what requires transformations and how to undertake transformations, and the likely results to different individuals and organisations. This is because while others may gain positively from transformations, some other people may be affected. This can either lead to conflict or failures of the transformation efforts, which is another barrier to transition that Kammerlander *et al.* (2015:8) called "overcoming vested interest in the status quo". For instance, while the transition to the BRT system may help in reducing greenhouse gas emissions, the informal transport operators may see it as a hindrance to their source of livelihood. To some extent, this may also cause a loss of revenue from fossil fuels by the government. This debate underscores the challenges of balancing economic concerns with environmental imperatives in the sustainable urban mobility transition.

Another barrier is the difficulty of navigating the existence of different actors. Transitioning can be very complex due to the existence of various stakeholders involved in the public transport sector and with varying interests, priorities, and capabilities. These actors mainly include civil society, Non-governmental organisations, business communities, and local communities. According to Kammerlander *et al.* (2015:6), it is important that "bottom-up movements and top-down processes are interlinked, so that the new institutions, productions and life modes can be co-created by different actors". Several authors however do not consider many actors as a challenge for transition. Lättman and Otsuka (2024) for instance view the presence of many actors as an opportunity for consideration of the diversity of citizens and the different transportation needs and preferences during the planning for a sustainable mobility system. For Greene and Wegener (1997) and Loorbach *et al.* (2021), when various stakeholders such as governments, businesses, and communities collaborate to align policies with the goals of sustainability and social justice, it becomes easier to reinforce the necessary actions.

Economic barriers

The implementation of different modes of transport requires sufficient finances. The creation of cycle lanes, separate lanes for buses, electric vehicle charging stations (Egnér and Trosvik, 2018), real-time traffic management systems (Milakis, Van Arem and Van Wee, 2017), and quality data management (Acheampong and Elisabete A, 2015) are all capital-intensive elements of mobility. Unfortunately, due to competing priorities, these funds are hardly available, especially in the global South (Tuydes-Yaman *et al.*, 2024). As a result, most cities in developing countries have been relying on the World Bank to fund their public transport improvement projects. These funds however come with conditions (Bokolo, 2023), and it takes time (Klopp and Quarshie, 2019). In a study conducted by Pinna, Masala and Garau (2017) in 22 cities in Italy, they found that between 2005, 2010, and 2015, the amount of money allocated to each city was the dominant factor in the level of implementation of sustainable mobility strategies. The need for adequate funds is therefore very critical in supporting full-scale transition to sustainable mobility options.

In the context of replacing public transit vehicles with electric buses or vans, it is essential to acknowledge that many public transport systems in African cities are operated by financially unstable paratransit operators. These operators often rely on second-hand internal combustion engine vehicles due to their lower costs and wider availability (Ndibatya and Booysen, 2021). However, affordable second-hand electric vehicles (EVs) are either unavailable or extremely scarce (Collett *et al.*, 2021), making the transition to EVs particularly challenging in low-income countries. Furthermore, the lack of formalisation within this paratransit sector prevents many operators from accessing incentives that would support them in changing their fleets from internal combustion fleets to electric mobility. This highlights the compounded difficulties of transitioning to electric transportation in financially constrained environments.

The limited availability of electricity in Africa poses a significant challenge for transitioning to electric vehicles (EVs). For instance, charging an EV typically takes 6-8 hours with slower chargers, and 20-40 minutes with faster ones (Gicha, Tufa and Lee, 2024). If 50% of Africa's road transportation were to transition to electric vehicles, it would generate an estimated annual demand of 200 TWh (terawatt-hours) in Sub-Saharan Africa (Collett *et al.*, 2021). This is problematic, given that the region's electricity generation and supply are already insufficient (Giliomee *et al.*, 2024), with access to electricity in most countries still below 45% as of 2022 (IEA, 2023). Therefore, the current level of electricity distribution and access is one of the significant barriers to sustainable urban mobility transition.

Institutional and governance barriers

Effective policy frameworks and governance structures are critical in promoting and implementing sustainable mobility options. The reality in most countries is that similar roles and responsibilities related to transport planning and implementation are distributed to different government agencies. This has always created difficulties in aligning local and national policies, and a lack of coordination, leading to resistance and inconsistent strategies for sustainable urban mobility (Baltazar et al., 2023). In Nairobi for example, Klopp and Quarshie, 2019:18) report that “high level of institutional fragmentation or “polycentricity” over decision-making has been one of the reasons for the delays in the implementation of Bus Rapid (BRT) system. Similarly, unstable political systems in cities often result in a lack of long-term vision and commitment to sustainable mobility options (Harber and Bryer, 2020). Transitioning to sustainable mobility options therefore requires a proper institutional setup with clear roles and responsibilities to different government agencies.

Infrastructure and technological barriers

One of the primary barriers to sustainable mobility transition is the inadequacy of the existing infrastructures. Many cities across the globe were designed for a certain number of people, but in many cases, the existing population has significantly surpassed these planned capacities, leading to strained infrastructure networks, coupled with urban sprawl. This uncontrolled urban expansion has become a substantial hindrance to sustainable urban mobility (Canitez, Alpkokin and Kiremitci, 2020; Papadakis *et al.*, 2024). This is because it not only makes it more expensive to upgrade and improve the existing road infrastructures but also fosters car dependency and increases travel distances.

Additionally, the 21st-century technology evolutions were not accurately predicted 50 or 100 years ago, as such massive incompatibilities exist, requiring significant upgrades of infrastructures to be able to accommodate sustainable, low economies. This affects not only mobility systems but more broadly the energy infrastructures and everything that depends on it. Moreover, retrofitting cities to support and accommodate new mobility options together with their associated infrastructures is both complex and costly (Panakaduwa, Coates and Munir, 2024), which requires comprehensive planning and investments to ensure future resilience.

In terms of technological innovations, the integration of Intelligent Transport Systems (ITS), such as Bus tracking and passenger information systems, serves as a prime example of how technology can enhance mobility by improving reliability and efficiency (Sami and Sara, 2023). However, the implementation of such systems is challenging, as it requires significant technical expertise, financial investments, and transformation of current operational models. For instance, in Dar es Salam, challenges with ITS implementation have resulted in the current BRT operating without accessible real-time bus location information for passengers at bus stops (Andrew *et al.*, 2022). A similar situation occurs in Johannesburg city, where there is always a constant mismatch between the scheduled arrival times displayed on the station screens and the actual arrival and departure times of buses (Khumalo and Ogra, 2018). These failures can be attributed to the lack of a robust framework for integrating the technologies into the existing transport ecosystem.

3.4 The Concept of just transition

While the transition to sustainable urban mobility is widely recognized as a critical strategy for addressing the climate change impacts of transportation, reducing air pollution, and achieving sustainable development goals (Ehresman and Okereke, 2015), these transition processes are not necessarily a guaranteed path to a more equitable world, due to the different unique barriers as discussed in section 2.3.1. These barriers manifest in different ways. In that regard, the concept of a "just transition" has become central in climate change discussions as a strategy to address the complexities of sustainable development transitions.

Although the term "just transition" lacks a universally agreed-upon definition (Henry, Bazilian and Markuson, 2020), it broadly refers to the principle of ensuring fairness and equity in the shift toward "a low-carbon society" (McCauley and Heffron, 2018:2). A just transition seeks to ensure that the benefits of sustainable mobility interventions are shared across all community groups. The term has also been used to refer to the connection between labor and environmental reforms, stressing the importance of considering work and jobs in environmental decision-making (Eisenberg, 2019).

Following the global acknowledgment that rapid reduction of carbon emissions is crucial in averting the severe impacts of climate change, and yet transitioning to low-carbon economies through strategies such as "green growth and green capitalism" affect countries and communities in varied ways (Stavis and Felli, 2020:3), the concept of just transition has evolved as part and parcel of climate change policies for international bodies and countries, aimed at ensuring that the benefits and costs of transitions are distributed fairly.

In the Paris Agreement of 2015 (COP 21), just transition was adopted as a key pillar of the United Nations Framework Conventions on Climate Change (UNFCCC) (UNFCCC, 2016). As such, several countries and organizations have adopted it in their efforts to address climate change. For instance, in 2018, the Scottish government established an independent Just Commission committee with the cardinal role of enhancing decarbonization efforts by promoting fair work, tackling injustice, inequalities and creating a sustainable and inclusive labor market as the country moves towards a carbon-neutral economy (Just Transition Commission, 2023). In 2020, the European Commission equally adopted the concept of just transition as a mechanism for ensuring that no one is left behind in the process of achieving climate neutrality by 2050 in Europe (European Commission, 2020). In 2020, South Africa also established a Presidential Climate Commission as an independent, multi-stakeholder body. Meeting quarterly, the commission is responsible for overseeing and facilitating a just transition towards a low-carbon and climate-resilient economy, with the President serving as the Chairperson (Abram *et al.*, 2022; Presidential Climate Commission, 2022).

Beyond government and international organisations, the academic domain has also widely embraced the concept of just transition, with several authors underscoring the importance of just transition in achieving climate justice (Routledge, Cumbers and Derickson, 2018), environmental justice (Farrell, 2012; Kubanza, Das and Simatele, 2017) and energy justice (Healy and Barry, 2017; Carley and Konisky, 2020; Kime *et al.*, 2023). Therefore, it is safe to say

that the concept of just transition has become a prominent tool in achieving overall transition in the field of sustainable development.

3.4.1 Implementing just transition concept using Justice theory

Justice theory provides the ethical foundation upon which the concept of just transition is built. McCauley and Heffron (2018) emphasise two main dimensions of justice that determine the coverage of inequalities related to the transition to low-carbon emissions. Distributive justice, and procedural justice.

Distributive justice refers to the fair and just distribution of resources and benefits in a transportation system, by providing equitable access to services and infrastructure for everyone (Martens, 2012). While the fair distributions of resources are based on the consideration of the unique needs and circumstances of various population groups, accessibility, in this case, refers to how easily individuals can access desired services and opportunities from a given location in space (*ibid.*). It is a multifaceted idea that includes not only the physical availability of transportation options, but also their affordability, reliability, and safety. Social justice on the other hand implies guaranteeing that everyone, irrespective of their social, and economic background has fair access to transportation services and infrastructure (Pereira et al., 2017).

Bell (2004:295) provides two fundamental questions needed to construct a distributive justice claim: (1) What is being distributed? (2) What principle guides the distribution? Understanding what is being distributed is critical because it identifies specific burdens or opportunities involved in the transition process. This helps in assessing the fairness of the distribution process. The principle guiding the distribution, on the other hand, helps in determining how resources or burdens should be allocated among different groups. This is paramount because it establishes a fair and non-arbitrary framework for the distribution process.

Procedural justice on the other hand is a crucial aspect of transport justice theory, stressing the importance of inclusive decision-making processes. It ensures that the affected communities, especially the marginalized have the opportunity to participate in transport planning and policy development (Trimmel *et al.*, 2024). According to Pereira et al. (2017) and Karner et al. (2020), participatory planning is crucial for attaining transport justice, as it guarantees that the voices of marginalized groups are heard and considered in transportation decisions. This, in turn, helps to correct historical injustices and empowers communities to influence decisions that impact their mobility and access.

While the importance of procedural justice is widely recognized, its practical implementation remains controversial. Nicola and Schmitz (2022) point out governance challenges and mistrust between government officials and local communities as a significant barrier to the effective application of procedural justice principles. These challenges complicate the inclusion of marginalized voices in decision-making processes, often undermining efforts toward equitable transportation systems. Therefore, achieving procedural justice in urban mobility transitions requires the development of context-specific frameworks and strategies to ensure that the principles of inclusivity and fairness are genuinely realized.

3.4.2. Limitation of the concept of just transition

Despite the increasing recognition of the just transition concept in the shift toward a low-carbon future, several challenges and limitations remain in its implementation and interpretation. A major limitation is that its lack of a universally accepted definition allows for a range of interpretations, from labor-focused approaches that emphasize protecting worker's rights and job security to a broader framework that encompasses social and environmental justice. This interpretative flexibility can either be seen as a strength, allowing for context-specific applications, or a limitation, as it can lead to different policy priorities intended to promote equitable transitions (Wang and Lo, 2021). Boss et. al. (2023) however argue that the challenge extends beyond defining just transition, as the process of deciding how to pursue such a transition is often highly exclusionary, particularly towards women and ethnic minorities. Similarly, Krawchenko and Gordon (2021) also point out that an environment-tailored interpretation of just transition often places environmental goals above social equity, potentially marginalizing the very communities it aims to support. Thus, while just transition holds great promise, careful attention must be paid to ensure that it is inclusive and equitable in practice.

3.5 Theoretical framework

3.5.1 Backcasting a sustainable city

To address the limitations of the concept of Just Transition, this study also adopts the framework of Backcasting. The concept of "backcasting" originated in the 1970s as an alternative to traditional methods of energy forecasting and planning. Initially, it was introduced as an analytical tool for energy planning through the use of normative scenarios (Bibri, 2018). Since the 1990s, backcasting has evolved into a key approach for promoting sustainable development. Unlike forecasting, which projects future scenarios based on current trends, backcasting starts by defining a desired future outcome and then works backward to determine the necessary steps to reach that goal (Tuominen *et al.*, 2014).

In the context of sustainable urban mobility transitions, backcasting has gained significant importance due to its ability to foster transformative change, steering away from conventional "business-as-usual" models. It enables long-term visioning, which is essential for driving systemic changes in policies and practices needed to achieve sustainability (Camilleri, Attard and Hickman, 2022). Backcasting encourages the involvement of multiple stakeholders, making it particularly effective in the creation of comprehensive climate policies (Camilleri, Attard and Hickman, 2024). This inclusive approach ensures that sustainable mobility solutions address not only transport issues but also broader social dimensions, enhancing the overall impact of interventions and the general implementation of justice theories.

The application of backcasting in urban mobility involves a series of structured steps, each aimed at creating a detailed and practical roadmap for transitioning to sustainable mobility systems (Figure 3.1). The process begins with conducting a thorough analysis of the current transport system. This helps identify key challenges and areas in need of improvement, allowing for the development of targeted interventions that directly address these issues.

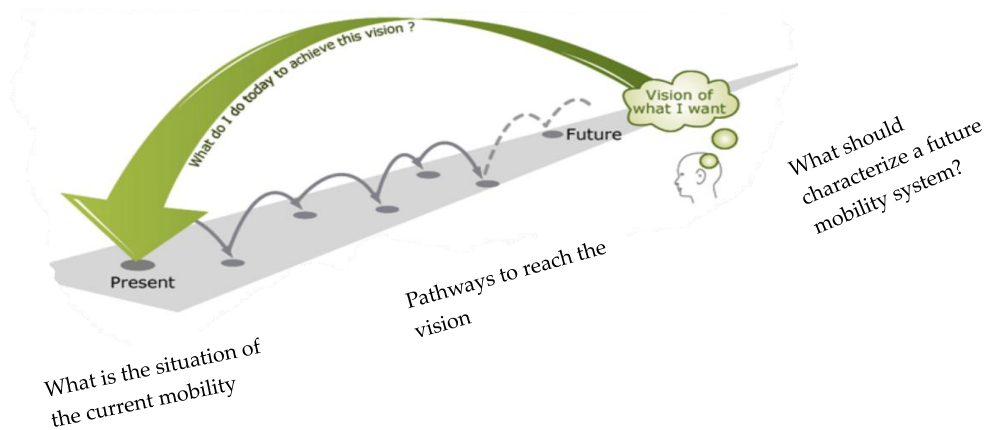


Figure 3.1. *Backcasting framework*

Source: Modified by the author from Camilleri, Attard and Hickman (2022)

Once the current mobility situation is fully understood, the next step is the formulation of a clear vision of the desired future for urban mobility. This vision acts as a guiding reference for all future interventions, such as reducing greenhouse gas emissions, improving air quality, and enhancing overall transportation efficiency.

The last phase involves creating action plans that connect the present situation with the envisioned future. These plans outline the necessary steps, both incremental and transformative, required to achieve the desired mobility outcomes. Overall, backcasting provides a flexible framework that supports both gradual improvements and large-scale transformations, making it an effective tool for fostering sustainable urban mobility transition. Several studies have demonstrated the successful use of backcasting methods in urban mobility projects around the world. One example is the work of Neuvonen and Ache (2017), who applied backcasting as a strategic learning process for facilitating the long-term transition to a low-carbon, resource-efficient Helsinki metropolitan region, in Finland. Their study introduced the concept of "emancipatory backcasting," which actively involves stakeholders in imagining future urban scenarios and devising strategies to address the complexities of metropolitan transitions. This approach emphasizes collaboration and inclusivity, helping to create shared visions of sustainable urban futures.

Another notable example is the work of González-González, Nogués and Stead (2020), who employed backcasting to identify the critical policy decisions and actions needed before the widespread adoption of autonomous vehicles. Their research focused on cities within the European Union and aimed to ensure that these technologies contribute to the creation of more appealing, high-quality, and sustainable urban environments. The study underscored the importance of early, strategic policy interventions to guide the development of autonomous mobility in ways that enhance the liveability and sustainability of cities.

3.5.2 Limitations of Backcasting framework

While these examples highlight how backcasting can facilitate proactive planning for technological advancements and ensure that urban mobility aligns with sustainability goals, the approach also faces certain challenges. One significant issue, as noted by Schulte and

Hallstedt (2018), is that backcasting's heavy reliance on stakeholder involvement can make it difficult for large groups to reach a consensus on a shared vision for the future. Disagreements over the preferred scenario can hinder the development of cohesive and actionable mobility strategies. Additionally, urban environments are dynamic, and this evolving nature requires plans created through backcasting to remain adaptable. Factors such as technological innovations, shifts in public policy, and societal changes necessitate flexible strategies that can be modified over time to stay relevant and effective.

3.5.3 Backcasting framework and Just transition concept complementarity

To overcome these limitations, this study combines the backcasting approach with the principles of a just transition. Both frameworks are employed to facilitate the creation of pathways for a sustainable urban mobility transition. While each framework has its strengths and weaknesses, integrating them provides a more comprehensive strategy for addressing the complexities of such transitions.

The backcasting approach excels at long-term visioning and strategic planning, while the principles of just transition ensure that the shift toward sustainability is equitable, addressing the social and economic impacts on various stakeholders. By pairing these two frameworks, as summarized in Figure 3.2, the research aims to leverage their complementary strengths. This integration offers a more robust method for managing the challenges of sustainable urban mobility, ensuring that the process is both transformative and inclusive.

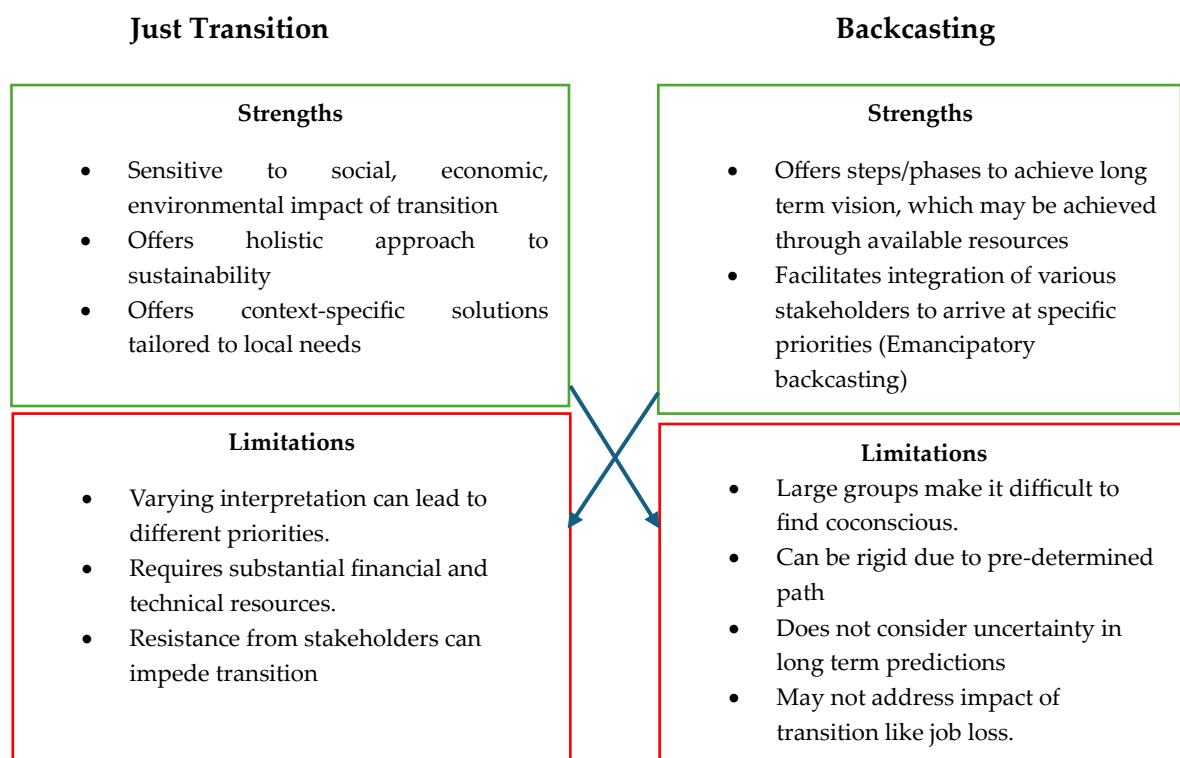


Figure 3.2. Complementarity between Just transition concept and Backcasting framework as applied to this research.

Conclusion

This chapter has presented the review of literature of key terms which underpins the study. While it points out how transition to sustainable urban mobility is essential for addressing equity and fairness in the implementation of climate change mitigation strategies and achieving sustainable development goals, it also notes that there are social, economic, institutional and infrastructural barriers that can hinder these smooth transition process. These barriers provide valuable lessons for the planning and implementation of SUM transition for cities like Kampala, Uganda where urban mobility is still a critical challenge of urban management as contextualized in chapter 4.

CHAPTER FOUR: RESEARCH CONTEXT

4.1 Introduction

This chapter provides an overview of Kampala City, highlighting its expansion to include neighbouring districts, which together constitute a larger metropolitan area. It further analyses the city's current transportation landscape, focusing on the existing public transport infrastructure and its symbiotic relationships with another informal economy. Additionally, it examines the challenges associated with the current transport system, emphasising the urgent need for a transition to a more sustainable and efficient transport framework. Such a transition is essential to address the challenges of rapid urbanisation and to ensure equitable and improved mobility for all residents.

4.2 The case study of Kampala

Kampala is the capital and the main administrative and commercial hub of Uganda. It contributes approximately 60% of the country's GDP (Kasimbazi, 2018). As of 2024, the city had an estimated population of over 1.9 million, growing at an annual rate of 4% (UBOS, 2024). However, rapid urbanization and sprawl have rendered the original administrative boundaries of Kampala nearly obsolete (Figure 4.1). Consequently, Kampala has expanded to encompass the neighbouring districts of Wakiso, Mpigi, and Mukono, forming the Greater Kampala Metropolitan Area (GKMA), which covers approximately 1,000 square kilometres (Hamza *et al.*, 2023). The GKMA houses 10% of Uganda's national population, 40% of the total urban population, 46% of its formal sector workers, and 70% of its manufacturing firms with five or more employees (The Republic of Uganda, 2022)

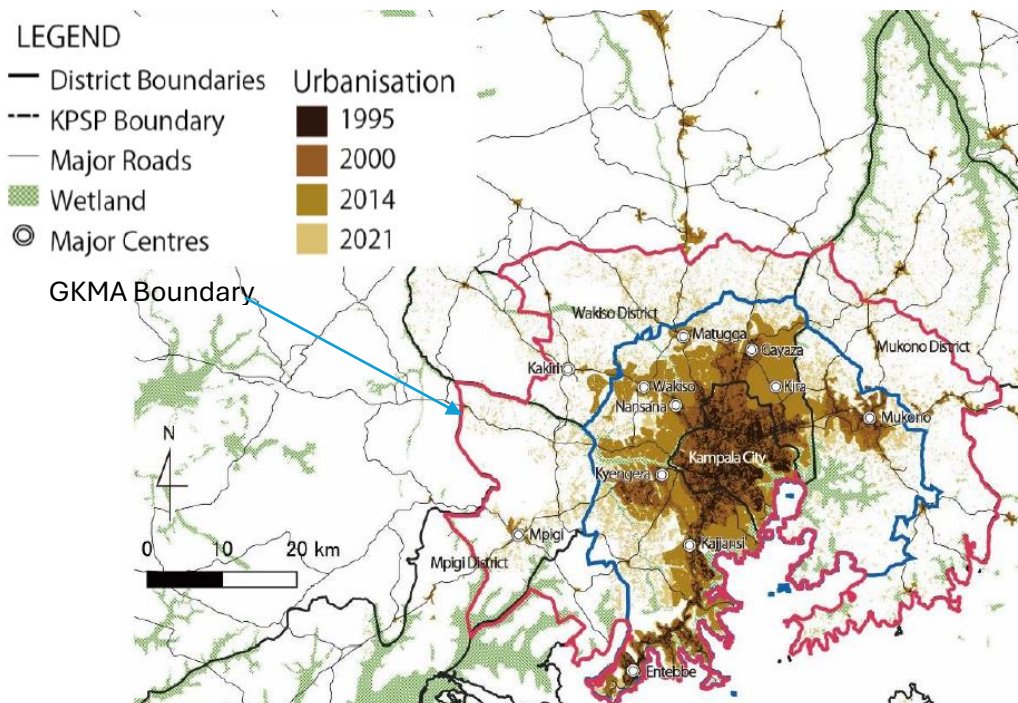


Figure 4.1: Study area map of Kampala showing urbanisation trend

Source: Adopted from Kampala Master Plan (2024)

As of June 2024, the daytime population of the original Kampala had risen to 2.5 million, as people from across the metropolitan region and beyond flocked to the inner city for economic, social, political, and cultural activities (UBOS, 2024), a figure which could be likely higher due to the difficulty of undertaking an enumeration in urban areas. Amid the increasing impacts of climate change, providing accessible, safe, environmentally friendly, and affordable public transport for the 2.5 million people in Kampala remains one of the city's most pressing challenges.

4.3 The current transport governance systems of Kampala City

In Uganda, the provision and management of transport services involve various government ministries, departments, and agencies, with the Ministry of Works and Transport serving as the central authority responsible for policy formulation and oversight. Uganda's road network is classified into three main categories: national roads, district roads, and urban roads. National roads, which primarily connect different districts, are managed by the Uganda National Roads Authority (UNRA), including the operation of ferries, through its regional offices. District roads, also known as community access roads, are under the management of respective district councils, while urban roads fall under the authority of urban administrative bodies, such as cities, municipalities, and town councils.

These entities receive quarterly funding for road maintenance from the Uganda Road Fund (URF), a government agency established by Parliament. While there are several criteria for the allocation of funds, the common method is the use of total road lengths within the jurisdiction of each urban authority, district, or city. Once the funds are received by respective entity, which in most cases is less than the figures in the budget, the council decides on the roads to prioritize for maintenance, often with limited or without technical inputs. This process can sometimes result in conflicts, particularly between different political groups within the councils, as competing interests and priorities emerge.

4.4 Public Transport context of Kampala city

Kampala city does not have a formal, publicly managed public transport system. The existing system is largely informal, characterized by the use of 14-seater minivans, commonly referred to as 'taxis' (Figure 3.2.a), and motorbikes for passenger transport, locally known as "boda-bodas" (Figure 3.2. b). The taxis and boda boda services are unregulated and operate primarily as private businesses, with little emphasis on efficiency or sustainability. According to the Federation of Uganda Taxi Operators, over 60,000 taxis are operating within the GKMA, although the Kampala Capital City Authority has not been able to verify this figure. In 2018, it was estimated that more than 80% of the city's transportation needs were being met by taxis (UBOS, 2019). Alongside taxis, it is also estimated that over 140,000 boda-bodas enter the city center daily, with many riders being young urban dwellers seeking a livelihood (*ibid.*). This highly informal system underscores the need for better regulation and planning to improve the efficiency and safety of Kampala's transport network



Figure 4.2.a: A section of main taxi ranks in Kampala city. Figure 4.2.b: Boda-bodas parked on one of the streets.

Source: Author, 2024

3.5 The symbiotic relationship of taxi operations in Kampala city.

The operation of taxis in Kampala involves a form of symbiosis among different stakeholders (Figure 4.3.a and 4.3.b). This interdependence ensures that public transport, mainly provided by these taxis, functions effectively in the city's bustling and growing urban environment. This study believes that understanding these intricate relationships is crucial for shaping any potential transition pathways toward a more organized and sustainable transport system. Some of the critical relationships include;

a) Taxis and Owners (Investors)

- **Ownership model:** Most of the taxis are owned by individuals or companies who lease them to drivers. The individual owners or companies receive daily or weekly payments from the drivers. The amounts are normally fixed, irrespective of whether the driver and conductor made the required money or not.
- **Vehicle Maintenance:** Owners of the taxis are often responsible for the major repairs of the taxis, while the drivers are responsible for minor repairs and services like washing, night parking fees and the general daily smooth operations.



Figure 4.3.a: Informal trading in clothes at the taxi rank. Figure 4.3.b: Food vending next to the rank

Source: Author, 2024

b) Taxis and Drivers/Conductors:

- **Employment and Livelihood:** Taxi owners offer employment opportunities for drivers and conductors. (Conductors, normally one person works with the driver). They depend on passengers for their daily income, which is usually based on the number of trips made in a day rather than fixed salaries.
- **Revenue Sharing:** Typically, the driver and conductor share the daily earnings. The driver operates the taxi while the conductor manages passenger boarding, and collects fares, and handles other logistics such as parking fees and fuelling.

c) Taxis and informal sector integration:

- **Informal Economy Support:** The taxi industry is deeply embedded in the city's informal economy. Most food vendors, and other hawkers rely on taxi stages and ranks as strategic location to sell their goods. The taxi drivers themselves often engage in inside businesses like delivering goods, creating a network of economic support.
- **Dependence on Informal Systems:** In return, the taxi operators benefit from the informal economy by forming networks of informal support, including mechanics, fuel suppliers, and car washers, nigh parking attendants, who are all part of the ecosystem.

This symbiotic relationship between taxis and various stakeholders makes the current transport system function as an integrated part of Kampala's economy and society. Even though it faces challenges, it suggests that to achieve a just transition during the formalization process, due considerations must be made to integrate the needs and roles of all stakeholders involved.

4.6 The key challenges associated with the current mobility systems of Kampala.

Air Pollution

Despite the essential role taxis and boda-bodas play in meeting Kampala's transportation needs (Ndibatya and Booysen, 2020), they also pose significant challenges. A large portion of the city's air pollution and greenhouse gas emissions is attributed to these vehicles, many of which are over 15 years old and poorly maintained (Ghaffarpasand *et al.*, 2024). Additionally, both taxis and boda-bodas predominantly run on petrol and diesel (Uganda Bureau of Statistics, 2022), which worsens the emission levels. In terms of safety, over 40% of emergency trauma admissions in Kampala are boda-boda accident related, with many patients sustaining neurosurgical and orthopaedic injuries (Kituuka *et al.*, 2023). Therefore, while these modes of transport are essential, their environmental and safety impacts cannot be overlooked, which highlights the urgent need for reforms in Kampala's transport system.

Traffic congestions

The movement of boda-bodas, taxis, and the growing number of private vehicles is the primary cause of traffic congestion in Kampala (Figure 3.4). According to Katushabe, Kumaran and Masabo, (2021), this congestion has significantly contributed to the overall decline in the city's quality of life. The issue is especially severe during peak hours when roads become packed with vehicles moving in the same direction. Poor road infrastructure, particularly in the city centre, exacerbates the situation, with some interviewees attributing these conditions to poor governance of the city.



Figure 4.4: A typical traffic situation on Jinja road, Kampala city during peak hours.

Source: Author, 2024

Conclusion

Kampala's rapid urbanization and expanding metropolitan area present significant challenges in public transport, active mobility, and private motorization. The city's informal taxi and boda-boda systems, while vital for daily commutes, remain largely unregulated, contributing to inefficiencies and safety concerns. This study believes that addressing these issues requires an integrated approach for the development of a long-term urban mobility solution for the city. The next chapter further presents detailed findings on the Kampala urban mobility landscape and proposes how holistic approach can be undertaken to address the current mobility challenges in Kampala.

CHAPTER FIVE: RESULTS AND DISCUSSIONS

5.1. Introduction

This chapter presents and analyses the responses to the research questions outlined in Chapter 1. It is organized into five sections. Part 1 (Section 5.2) presents the overview of existing global policy frameworks supporting the transition to sustainable urban mobility. Part 2 (section 5.3) presents a systematic literature review, exploring the global paradigm of sustainable urban mobility. This section focuses on the electrification of mobility, the adoption of mass transit systems, and the transition to active mobility modes such as walking and cycling. These areas were selected based on their critical role in facilitating sustainable urban mobility transitions, particularly for cities in the Global South.

Part 3 (Section 5.4) discusses the findings from the review of secondary data, field observations, and semi-structured interviews. This section examines the current mobility systems in Kampala and envisions the desired future mobility framework for the city.

Building on the findings from Parts 1 and 2, as well as the principles of just transition and backcasting framework introduced in Chapter 3, Part 4 (Section 5.5) outlines the pathways for transitioning to mass transit and active mobility in Kampala. Part 5 (Section 5.6) proposes a framework for the transformation and formalization of the existing paratransit industry. Parts 4 and 5 therefore represent the primary contributions of this study.

5.2. Global policy frameworks and legislative instruments on sustainable urban mobility transition

Sustainable urban mobility has emerged as a critical component of global climate action and inclusive urban development. Increasing urbanisation, growing greenhouse gas (GHG) emissions from transport, and rising social inequalities have necessitated the development of mobility systems that are low-carbon, accessible, efficient, and resilient. Globally, there are several international frameworks that have significantly influenced the formulation of national and urban mobility policies, particularly in guiding efforts toward more sustainable, inclusive, and low-carbon transport systems. The most notable ones include;

The Paris Agreement (2015) marked a pivotal moment in global climate governance, establishing a framework for reducing greenhouse gas (GHG) emissions across all sectors, including transportation. The agreement has accelerated the development of national and urban low-emission mobility strategies, encouraging countries to promote electrification, public and non-motorized transport, and carbon reduction targets in urban mobility (UNFCCC, 2015).

The United Nations Sustainable Development Goals (SDGs) have also been instrumental in shaping transport agendas, particularly SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action). SDG Target 11.2 calls for providing access to safe, affordable, accessible, and sustainable transport systems for all by 2030 (United Nations, 2015). These goals have driven cities and nations to integrate equity and environmental sustainability into their transport planning.

The New Urban Agenda (2016), adopted at Habitat III, advocates for compact, connected, and resilient urban development. It emphasizes integrated land use and mobility planning and prioritizes walking, cycling, and mass transit as central components of sustainable cities (UN-Habitat, 2017).

Nationally Determined Contributions (NDCs) under the UNFCCC framework have become key instruments for embedding transport in national climate action. Many countries now include explicit transport-sector targets in their NDCs, demonstrating a shift toward aligning mobility reforms with global climate commitments (GIZ, 2020).

The European Green Deal (2019) represents one of the most ambitious regional policies promoting sustainable transport. As part of the EU's strategy to achieve climate neutrality by 2050, the Deal outlines measures for clean, smart, and fair mobility, including support for zero-emission vehicles, modal shifts, and active mobility infrastructure (European Commission, 2019). While focused on Europe, its comprehensive approach serves as a model for global transport decarbonization.

Together, these global frameworks not only provide normative direction but also establish targets, incentives, and policy models that influence how national and local governments conceptualize and implement sustainable urban mobility. They also foster cooperation and capacity-building to support localized action, especially in low- and middle-income countries

5.3. Systematic literature review of the global paradigm of electrification of mobility, mass transit and active mobility.

a) Electrification of Mobility

The electrification of mobility represents a crucial paradigm shift in pursuing sustainable urban mobility systems. This is due to its ability to reduce urban air pollution and greenhouse gas emissions from the transportation sector (Lazzeroni *et al.*, 2021). Globally, there are three major types of EVs available in most markets. Hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and battery electric vehicles (BEVs) (Yang *et al.*, 2023). BEVs rely entirely on batteries, and they recharge through the electric grid (Hoang, Pham and Vu, 2022). HEVs, on the other hand, combine internal combustion engines and electric motors. It starts on electric power and switches to internal combustion engines when needed, with regenerative braking recharging the battery (Liu *et al.*, 2022). PHEVs, known for their significant emission and fuel consumption reductions compared to HEVs (Gicha, Tufa and Lee, 2024), use both internal combustion engines and electric motors just like HEVs, but have larger batteries and rely more on electric propulsion, offering an extended electric range (Gong, Xu and Lin, 2024). These different types of EVs contribute uniquely to reducing environmental impacts from transportation.

According to the International Energy Agency (2024), the number of electric vehicles worldwide increased from 7.2 million in 2019 to 40 million in 2023, with greater concentrations in China, Europe, the UK, and the United States (Figure 5.1), encompassing over 600 models. In the UK alone, over 1.67 million EVs are on the road. The government plans that by 2030, 80

percent of all cars and 70% of vans to be sold will be emission-free. This means that they will likely be powered by electricity or other non-polluting energy sources (*ibid.*). An ambition that seems unlikely to be achieved due to several challenges associated with the necessary infrastructures, and global political instabilities. In Europe, Belgium, Norway, Switzerland, Sweden, and Poland have all improved their sales of electric buses as of 2023 (International Energy Agency, 2020), although this growth may not necessarily reflect a broader domestic adoption of electric vehicles (EVs) for personal use.

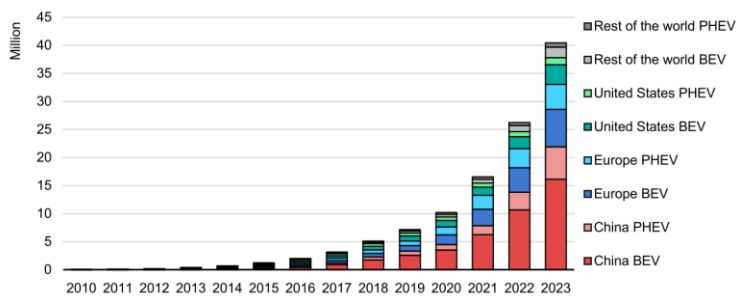


Figure 5.1 Global electric car stock trend, 2010-2023

Source: International Energy Agency, 2024

Table 5. 1. Status of HEVs, EVs and PHEVs in selected countries of the Global North (2020-2023)

Country	2020 HEVs	2021 HEVs	2022 HEVs	2023 HEVs	2020 EVs & PHEVs	2021 EVs & PHEVs	2022 EVs & PHEVs	2023 EVs & PHEVs
Austria	59,582	107,111	147,968	158,867	68,286	106,402	178,345	213,985
Belgium	N/A	N/A	110,532	181,685	N/A	181,685	275,679	N/A
Canada	318,827	107,878	496,802	612,316	209,075	93,236	420,360	550,846
China	1,490,000	1,730,000	3,110,000	4,020,000	4,910,000	7,830,000	13,090,000	20,640,000
Denmark	29,726	36,510	43,150	47,500	61,607	144,489	217,625	323,000
Finland	N/A	105,651	N/A	N/A	55,868	99,911	154,937	N/A
France	534,000	N/A	1,284,455	1,288,560	292,658	785,245	1,049,188	1,020,065
Germany	724,228	1,103,095	1,482,895	1,989,376	588,944	1,184,416	2,005,259	2,330,561
Ireland	N/A	85,072	110,112	134,585	17,990	44,976	72,574	104,906
Italy	N/A	964,918	1,502,771	2,132,100	99,519	235,676	368,425	472,828
Netherlands	261,400	342,270	451,724	543,298	292,240	390,438	650,918	706,522
Norway	N/A	115,924	151,357	151,090	486,037	647,691	829,399	896,803
Rep. of Korea	674,461	908,240	1,170,507	1,541,747	134,962	231,443	389,855	472,084
Spain	139,609	684,873	928,587	1,213,938	148,983	153,195	316,436	345,902
Sweden	122,290	152,738	152,900	190,756	186,195	299,675	452,037	564,020
Switzerland	126,175	185,061	245,462	304,457	83,329	139,540	224,668	260,503
UK	667,519	N/A	1,200,900	1,594,479	409,184	710,259	1,002,200	1,357,865
USA	5,800,523	6,435,669	7,200,520	8,547,004	1,741,530	2,322,291	3,277,936	4,797,163
TOTALS	10,948,340	13,065,010	19,680,110	24,165,616	9,846,439	15,600,568	24,976,401	35,057,053

Source: Adopted from Gong, Xu and Lin (2024)

Like private vehicles, the transition to electric commercial buses is also notable in the global mobility paradigm. As of 2023, there were 635,000 electric buses worldwide, with China being the largest manufacturer, seller, and user (Figure 5.2) in the past 9 years.

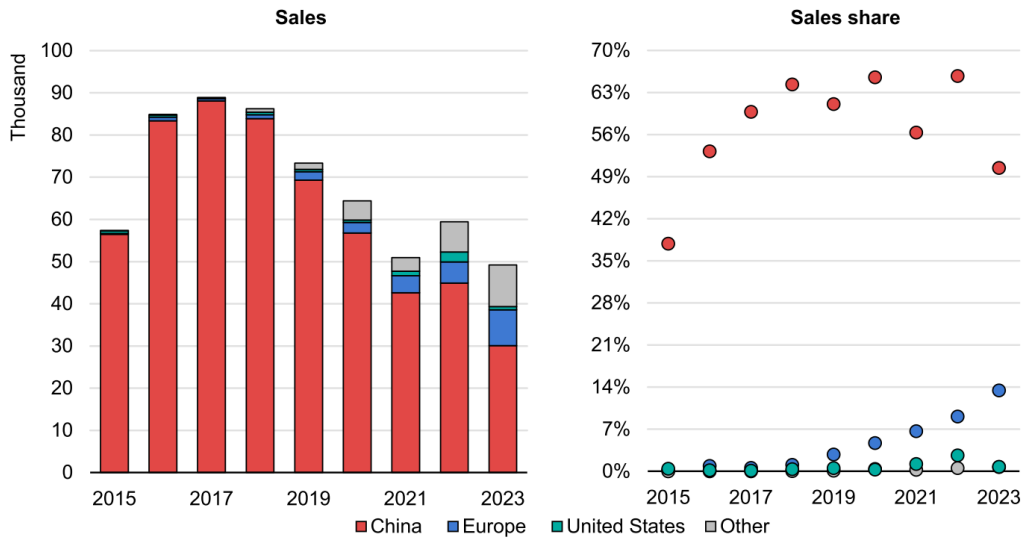


Figure 5.2. Electric bus sales and sales share by region, 2015-2023

Source: International Energy Agency, 2024

In addition to electric cars and buses, the rise of micro-mobility solutions, such as e-bikes and e-scooters, is also reshaping urban transport systems. By 2020, more than 600 cities across 50 countries had adopted these modes of transport (International Energy Agency, 2020). For example, in Paris, e-scooters accounted for up to 2.2% of all trips within a year of their introduction, which reflects the growing consumer interest in micro-mobility solutions. If the current trends continue, micro-mobility could account for up to 21% of all trips in cities like Paris by 2030, significantly contributing to reductions in greenhouse gas emissions (Schuller and Aboukrat, 2019). Furthermore, the integration of micro-mobility solutions into existing public transport systems can also create a seamless, multi-modal transport experience, reducing the need for personal car ownership.

While the Global North cities are committing to reducing GHG emissions from transportation, the Global South's role in this transition, especially in the adoption of EVs is still emerging. By 2023, the adoption rates of EVs in Africa, the Middle East, and Asia remained below 1 % of the total car sales (International Energy Agency, 2024). In South Africa, the leading country in Africa for EV adoption, the number of EVs was only 500 in 2019 (Collett *et al.*, 2021). By 2022, the number had reached 1000 out of the 12 million vehicles on the road (Gicha, Tufa and Lee, 2024, citing IEA, 2023). Similarly, in Kenya, only 350 of the 3.5 million registered vehicles were electric by January 2021 (Feris, Jerome and Clarice, 2024). Although these trends signify a significant gap in the adoption rates between cities of the Global North and Global South, it highlights Africa's gradual entry into the global EV transition, underscoring the significant room for growth in this sector.

Despite the clear benefits of electrifying mobility, significant safety concerns have emerged, particularly regarding the fire risks posed by lithium-ion batteries. These batteries can be difficult to extinguish due to the intense heat they generate. In London, for example, the fire brigade responded to over 116 cases of e-bike and e-scooter-related fires in 2022, with the frequency of incidents rising a staggering 78 % in 2023, sometimes resulting in fatalities (BBC, 2024). These incidents highlight the need for stringent safety regulations, particularly

concerning battery management and charging protocols. Due to these concerns, the use of privately owned e-scooters on public roads is now illegal in London (Transport for London, 2021), reflecting the necessity for balanced regulation that ensures safety, while encouraging innovation.

b) Active mobility

Active mobility has also recently gained recognition as a pivotal element in advancing the sustainable mobility paradigm. It encompasses physically engaging modes of travel, such as walking and cycling. These are crucial not only in promoting public health and reducing greenhouse gas emissions (Distefano and Leonardi, 2023), but also in promoting mobility justice (Mullen, 2021). Active mobility also facilitates community connectivity, and fosters sustainable urban planning and development (Messeidy, 2019). Although such benefits have been seen, an increase in cycling in most cities, especially in the UK and European cities, cycling in African cities presents a unique set of cultural-economic, infrastructural and urban planning challenges (Dossa and Miassi, 2024) that hinder the widespread adoption of cycling.

In Europe, Copenhagen, Denmark, and Amsterdam, Netherlands are known for their leading roles in promoting cycling as one of the key modes of transport in their cities (Ingeborgrud *et al.*, 2024). In Copenhagen for instance, 84% of residents have access to a bicycle, and 68% of them cycle at least once a week (Biswas, Mittal and Padmakar, 2019). Additionally, 15% of those who rely on public transit or cars also bike at least once a week. In Amsterdam, around 57% of residents commute by bicycle daily. By 2019, bicycle usage had increased by over 40% in the last 20 years (*ibid.*). These statistics highlight both cities' strong commitment to fostering cycling as a sustainable and accessible form of transportation.

The successes of Copenhagen and Amsterdam have also inspired other cities and contributed significantly to social and cultural shifts in mobility choices. In Paris, for example, Copenhagen's achievements led to the strategic development of cycling networks, coordinated by the central government to reduce the impact of local political interests (Davis *et al.*, 2022). Similarly, in Berlin, Germany, the installation of physical barriers to protect cyclists from other traffic resulted in a 73% increase in cyclists within just 12 months (Papadakis *et al.*, 2024). These examples illustrate how effective infrastructure can drive widespread adoption of cycling as a mode of transport.

Despite the success in promoting active mobility in European cities, these are not without challenges. While Vyborno et al. (2022) highlight that Copenhagen continues to face difficulties in creating a fully safe bicycle network, Freudendal-Pedersen (2015) underscores the emotional and rational experiences of cyclists, noting that although Copenhagen is marketed as a cycling hub, car-centric urban planning is still common, which affects cyclists. This demands continuous investment in infrastructure, public awareness initiatives, and policies that better balance cycling with car use to improve the overall cycling experience.

c) Mass Transit

The shift to mass transit has also become a crucial aspect of policy changes in sustainable urban mobility transitions, addressing the pressing challenges of urbanisation, environmental degradation, and social equity. Studies indicate that mass transit systems emit roughly 42 percent less CO₂ than private vehicles (Jasim, Farhan and Hasan, 2021). A reduction which is significant in decreasing greenhouse gas emissions and air pollution, while also promoting

social inclusivity through guaranteed accessibility and affordability for all categories of people (Brand *et al.*, 2021).

Across the globe, there are several mass transit modes being used to address transportation challenges. These include the metro, light rail system, and Bus Rapid System (BRT). According to Mimano *et al.* (2024) local context, capacity, capital and operation costs, flexibility, and implementation timelines are some of the critical determinants of modes of mass transit to be adopted by cities. Because of those factors, recent years have seen Bus Rapid Transit (BRT) systems emerge as the common and vital component of sustainable mobility solutions, attributed mainly to its affordable implementation capital costs which are estimated at 10 million USD per kilometer on average (Table 5.2) compared to other modes of transport such as light rail transit and metro whose costs can go up to 100m USD per kilometre (see figure 5.3)

Table 5.2: *The costs of BRT infrastructures in African cities.*

City	Phase/ line	Length(km)	Cost (USD)	Cost per Km (USD)
Johannesburg	Rea Vaya Phase1	25.5	362,100,000	14,200,000
Dar es Salam	Phase 1	20.9	241,314,113	11,546,130
Cairo	Western Corridor	40.0	150,093,056	3,752,326
Addis Ababa	B2 BRT corridor	19.2	202,054,795	10,523,687
Agadir	BRT line 11	15.0	108,042,698	7,202,847
Dakar	BRT Phase 2	18.4	342,850,000	18,633,152
Dar es Salam	BRT Phase 2	20.3	165,153,657	8,135,648
AVERAGE COST				10,230,258

Source: Mimano *et al.*, (2024)

Table 5.3: *The costs of Rail infrastructure in Africa region.*

City	Mode	Length(km)	Cost (USD)	Cost per Km (USD)
Cairo	Metro, Phase 1, Line 4	19.0	2,450,000,000	128,947,368
Cairo	Metro, Phase 2, Line 3	7.2	525,000,000	72,916,667
Cairo	Metro, Phase Line 4	17.7	5,800,000,000	327,683,616
Casablanca	Light Rail Transit	31.0	745,000,000,	24,032,258
Addis Ababa	Light Rail Transit	34.0	558,823,529	16,435,986
Abidjan	Metro	37.5	1,923,913,043	51,304,348
AVERAGE COST				103,553,374

Source: Mimano *et al.* (2024)

The difference in costs between these cities could be associated with the combination of factors such as land acquisitions and displacement. In highly dense areas, land acquisition may be more complex, and expensive. Condition of existing infrastructure. For instance, cities with poorly developed roads may require extensive constructions, including road widenings. Economic contexts such as the difference in the labour costs and taxation and local inflation rates.

BRT systems are prepaid, high-capacity bus-based mobility solutions that operate on dedicated lanes with scheduled routes, upgraded stations, and customised and branded buses (Asimeng, 2021), offering numerous social, economic, and environmental advantages (Table 5.4). As of June 2024, BRT systems were operating in 191 cities across the globe, with 31,596,612 passengers being transported every day (Global BRT Data, 2024). Most of these cities, however, have adopted BRT in various forms and names, such as “high-level bus

services,” “metrobus,” and “surface metro” (Deng and Nelson, 2011:70-71), as such, there are varying practices and standards (Merkert, Mulley and Hakim, 2017). These range from high-end BRT quality services to BRT lite with moderate quality services (Cervero, 2013).

Table 5.4: Potential benefits of BRT

Types	Benefits	Source
Economic	Attractive, convenient, and cost-effective manner compared to heavy rails and underground metros.	(Chaurasia, 2014)
	Enhance economic productivity, and ensure reliable product deliveries	(Attard, 2023).
	Improve urban land value and promote sustainable urban development by increasing accessibility and attracting investments along its routes.	(Cervero and Dai, 2014; Perdomo Calvo, 2017; Rodriguez and Vergel-Tovar, 2018; Zhang <i>et al.</i> , 2020)
	The phased implementation approach enables cities to adopt the BRT system gradually based on demand, available financial resources and the ever-changing urban environments.	(Deng and Nelson, 2011)
Social	Promotes equitable mobility within cities	(Hidalgo and Carrigan, 2011),
	Improve justice in urban transport	(Attard, 2023),
Environmental	When run on green buses, the systems are considered one of the most effective methods for reducing greenhouse gas emissions due to its lower emissions intensity (KgCO ₂ /Passenger) compared to personal vehicles in peak hours.	(Chaurasia, 2014; Hidalgo, Giesen and Muñoz, 2024).
	Their flexibility allows a faster transition to cleaner fuels, improving air quality	(Su, 2024).

Motivations for BRT adoption

Latin American cities

The development of the BRT system started in Latin America and was initiated by Mayor Jaime Lerner of Curitiba, Brazil, in 1974. In 1995, Ecuador adopted the Curitiba passenger bus system and introduced its “Electric Trolley Bus based BRT” (Chaurasia, 2014:55). This was subsequently followed by different cities of Latin America such as the TransMilenio in Bogota, Colombia in the year 2000, TransJakarta, Indonesia in the year 2004. Although different studies present different statistics regarding the number of daily passengers using BRT in different cities across Latin America (Hidalgo and Carrigan, 2011; Hidalgo, Giesen and Muñoz, 2024), globally, Latin America still has the most extensive networks of BRT corridors, with more than 60 percent of passengers relying on these systems daily.

The adoption and expansion of BRT in Latin American cities have been driven by a combination of factors. One of the main reasons is the severe traffic congestion experienced in most of these cities. According to Cruz-Daraviña, Sánchez-Díaz and Bocarejo Suescún (2021), cities such as Bogota, Rio de Janeiro and Mexico are some of the most congested cities in the

world, prompting the need for a shift from the traditional bus services to a faster, and more reliable transport service, capable of reducing delays caused by traffic congestion and ensuring smoother transit for large volumes of passengers. Additionally, the adoption of BRT has also been influenced by the need for cost-effective transportation solutions. As noted before, BRT is more affordable than other modes such as subways or heavy trains (Chaurasia, 2014).

China

After the success of BRT in Curitiba (Brazil) and Bogota (Colombia), China also adopted the BRT system. This was however driven by the urgency to transport large numbers of people during the 2008 Beijing Olympics (Deng, Ma and Wang, 2013). After the Olympics, China streamlined the bureaucratic processes for BRT approval, and it was made simple and easier compared to the more complex requirements for Light Rail Transit (LRT) systems. This facilitated BRT's swift adoption in other cities. As of 2024, 20 cities had implemented different BRT systems with a combined total of 672 km, ranging from single lines to comprehensive networks as a strategy for addressing traffic-related challenges (Global BRT Data, 2024). This highlights how BRT in China serves not just as a transportation solution, but as a tool for achieving broader urban planning and development goals, particularly in the context of urban growth.

African cities

In Africa, there are currently six countries with BRT operations (Table 2). These include Nigeria, South Africa (2009) Tanzania (2016), Ethiopia, Senegal, and Egypt. Cities such as Kigali, Nairobi, (Klopp and Quarshie, 2019) and Kampala, are still in the preliminary stages of implementing the BRT system. However, the motivations for adopting BRT systems by African cities diverge from those in Latin America and China. In Africa, the primary reasons have been the desire to replace or reduce the presence of privately owned and run aging, poorly maintained minibuses (Krüger *et al.*, 2021), which are the dominant providers of public transport services in most African cities. The BRT system is therefore viewed as a modernised urban transportation, that can improve road safety and enhance the overall quality of life by providing a more reliable and appealing alternative to paratransit.

These regional variations in the motivations for BRT adoption indicate that BRT systems are often perceived and implemented as strategic tools for addressing specific urban mobility challenges, rather than primarily as mechanisms for reducing greenhouse gas (GHG) emissions from transportation. This leaves environmental benefits from BRT a secondary occurrence because the primary drivers of BRT adoption in these regions are rooted in the practical and immediate needs of the cities and their populations.

Effectiveness of BRT in Latin America and Africa.

While the adoption of BRT systems has seen growth, user satisfactions present different experiences, which challenges the overall effectiveness of BRT in achieving its full sustainability potential. These satisfaction levels tend to be high in the first few years of BRT implementation but often decline during the later stages of its operations. For example, while TransMilenio in Bogota had a 93 percent approval rating amongst BRT users during the first

years of operations, six years after, the ratings dropped to 66 percent (Gilbert, 2008). This decline is associated with overcrowding, and safety concerns especially at BRT stations.

In Curitiba, where Bus Rapid Transit (BRT) was first introduced, a 2018 study found that passenger satisfaction was only 50% among those fully reliant on BRT and 48% among those with other transportation options (Hidalgo, Giesen, and Muñoz, 2024, citing Caracas, Bernardinis, and Bastos, 2018). Similarly, in Quito, Ecuador, a 2022 survey conducted 27 years after BRT's implementation showed a 50.06% satisfaction rate with its effectiveness (Oña Caizaluisa, 2022). Regarding safety, a 2007 poll in Bogotá's TransMilenio system revealed that only 27% of frequent BRT users felt safe (Gilbert, 2008), while in Bogotá's overall public transport system, this figure was just 38%. Furthermore, over 60% of women in Barranquilla's BRT system reported experiencing sexual harassment (Orozco-Fontalvo *et al.*, 2019).

In Dar es Salam, overcrowding during peak hours (Andrew *et al.*, 2022) and long waiting times of 30-60 minutes instead of the planned 11-15 minutes (Kazaura, 2023), remain a common challenge. In Johannesburg city, despite BRT being operational and highlighted as a model for integrating public transport with existing taxi services (Mbara and Maseko, 2020), on the ground, the paratransit taxis have continued to be favoured by many users because they are cheaper and they have different routes distributed throughout the city centre and in peripheral neighbourhoods (Khumalo and Ogra, 2018). These challenges highlight the gap between policy and practice in improving the urban transport system.

These findings indicate that during the conceptualization of the BRT systems, a lot of attention should not only be focused on making people move, but due consideration of other sustainable mobility principles such as comfort and safety should also be a priority.

5.3.1 The justice pitfalls of Sustainable urban mobility transition

While the transition to electric vehicles (EVs), cycling, and mass transit presents significant opportunities for enhancing environmental sustainability, reducing urban congestion, and mitigating climate change, it simultaneously raises critical justice concerns. These concerns are particularly pressing when considering equity in access and the distribution of benefits and burdens of sustainable urban mobility transition among different socio-economic groups.

For instance, one of the primary issues with the electrification of mobility is the possibility of exacerbating existing income inequalities that exist among different categories of people. Across the globe, the substantial upfront costs of EVs are known to be high (Graham and Brungard, 2021). In most cases, these are not affordable for the low-income groups, effectively excluding them from the direct benefits associated with EVs. Pereira *et al.* (2016) also noted that, even with incentives designed to make it easy to acquire EVs, access to these benefits is always easier for the elites, thereby, reinforcing the existing economic disparities. This creates a troubling scenario where wealthier individuals, who can afford the upfront costs of EVs, enjoy its direct benefits, at a lower operating expense, while the disadvantaged communities remain reliant on older, more fuel-consuming vehicles.

Additionally, while many countries and car manufacturers are announcing the phasing out of the sale and manufacturing of internal combustion engine vehicles (Brand *et al.*, 2020), these

decisions are being made without due consideration of the existing economic and social disparities across the globe. A practice that will continue perpetuating the cycles of poverty and disenfranchisement, undermining the very goals of urban development initiatives aimed at fostering inclusive growth (Nsafon *et al.*, 2023). Thus, while the adoption of some of these strategies is a positive step, a more nuanced and context-specific approach is necessary to ensure that the transition in the mobility systems is both sustainable and just.

Several studies have also indicated that the policies and implementation of infrastructures often intensify existing inequalities instead of mitigating them (Pereira, Schwanen and Banister, 2017; Pereira *et al.*, 2019; Randal *et al.*, 2020). Nanayakkara *et al.* (2023) for instance observed that traditional transport planning processes have always ignored the specific gender needs, especially for women. While in most urban areas, public infrastructure investments tend to overlook low-income neighbourhoods (Ward and Walsh, 2023), leaving the low income and the marginalized groups with difficulties in accessing reliable transportation amidst deepened inequalities (Winters *et al.*, 2018). Campbell (2013) also notes that efforts to merge environmental sustainability with social justice are often shallow, with middle-class concerns taking precedence over the needs of marginalized communities, which normally results in an exclusive model of sustainability that overlooks the needs of those most impacted by urban mobility decisions. This can lead to a future where low-income groups continue to face barriers to accessing sustainable technologies, deepening social and economic divides. These challenges underscore the need for policies and approaches that prioritize social equity in transportation planning.

The development of cycling infrastructure also presents a mixed picture in meeting the transport justice principles. The examinations on equity in spatial access to bicycle infrastructures in the three Canadian cities by Winters *et al.* (2018) revealed that cycling infrastructure planning often emphasizes factors like population density and traffic management, sometimes at the expense of equity considerations. A situation that can result in unequal access to cycling facilities across different communities. Strengthening the implementation of a transport justice framework that emphasizes prioritizing the needs of disadvantaged populations in planning and policymaking is therefore very necessary in addressing the disparities in the cycling infrastructures.

Therefore, while governments in the Global South strive to implement some of the lessons learned from cities of the Global North, the goal should aim to facilitate the transition process that does not only improve the mobility system and address the GHG emission, but the process and outcome should not exacerbate injustices.

5.3.2 What lessons can be drawn from existing sustainable mobility practices to guide other cities toward a just transition?

As discussed above, the transitions to sustainable urban mobility have become essential for addressing contemporary urban challenges such as congestion, emission, and social inequality. Drawing lessons from the current sustainable mobility practices is therefore very essential in guiding policy makers, urban planners in their efforts to foster sustainable urban

mobility transition. Some of the key lessons learned in the transition to electric mobility, mass transit and active mobility are synthesised below:

(a) Electrification of mobility

In Climate change related actions, policies are very critical for achieving sustainable development goals. As such, the countries with considerable increases in EV adoption rates have used policy and institutional changes (Table 5.5) to influence EVs as a new paradigm of sustainable urban mobility in their cities (Graham and Brungard, 2021). For instance, in Austria, with 231,150 EVs by December 2023, the purchase subsidies, free parking, and environmental tax exemptions have been the key measures influencing the increase in the number of EVs. In Belgium, which is one of Europe’s top vehicle manufacturing countries, the policy of “charging point follow the electric car” has led to intensive investments in charging infrastructure and subsequently a significant increase in the rate of transition to EVs. In Canada, Zero-emission purchase incentives, the free charging corridor between Canada and the USA, and electric vehicle annual sale targets set for manufacturers and importers are all playing significant roles in influencing the adoption of electric vehicles in the country, (HEV TCP, 2024).

Table 5.5: Synopsis of common policy measures on sustainable urban mobility transitions

Financial	Infrastructural	Traffic Management
Tax exemptions	Building bike lanes	Restriction on certain roads
Incentives	Building Mass transit infrastructure	Traffic Calming
Public-private partnerships		
Free parking services	Building EV charging stations	Using high parking fees

Other current policy measures across the globe include the Zero Emission Vehicle (ZEV) mandate in California, vehicle fuel-economy regulations and/or CO2 emissions regulations in the European Union as well as the New Energy Vehicle (NEV) mandate in China (International Energy Agency, 2024). These initiatives have typical target timeframes which has made it easier for the transition to electric vehicles.

In China, Europe, US, the high rates of electric vehicle manufacturing and use can also be attributed to significant institutional shifts (International Energy Agency, 2024) and sufficient fundings towards the electrification of mobility (Åslund and Pettersson-Löfstedt, 2023). Additionally, public pronouncements aimed at encouraging citizens to embrace environmentally friendly mobility alternatives like electric vehicles is also playing a key role in the transition process. All these are a demonstration of positive political ambitions in those countries regarding the fight against climate change impacts.

Within the Global South especially in the Sub-Saharan Africa, continuous knowledge sharing is beginning to narrow down the gaps in the EV adoption, with many countries like Rwanda, Kenya, Ghana, Morocco, and Egypt borrowing ideas from countries like South Africa to set clear targets for transitioning towards EVs. In Rwanda, for instance, the current Nationally

Determined Contribution (NDCs) underscores the importance of EVs and enforcement of vehicle emission standards in reducing GHG emissions.

Throughout Africa, Asia, and the Middle East, partnerships with Chinese car manufacturers are also playing key roles in the electrification of Mobility, although at a slow pace (International Energy Agency, 2024). Strengthening this approach however requires an effective governance structure that support public-private partnerships, through its policies and strategies.

It is also important to emphasise that the global policy goal is to reduce GHG emission, not electrification of mobility. Global South countries, therefore, especially Africa should tailor their efforts towards addressing the existing barriers by for instance exploring the possibilities of tapping the abundant renewable energy resources such as solar power as enablers to sustainable urban mobility. This will save the continent from the concern that reliance on EVs might simply shift carbon emissions from internal combustion engines to coal-powered electricity generation (Li *et al.*, 2016). Lessons from China, Europe and USA therefore cannot be applied without understanding the differences in the local contexts. Additionally, building the technical capacity to maintain and repair EVs should be one of the priority areas for the governments in the transition process.

(b) Mass Transit

The nuanced understanding of the motivations behind adopting BRT systems and their operational status offers valuable lessons for other cities in the Global South that are in the early stages of developing mass transit solutions. For instance, identifying the specific reasons for adopting BRT is essential not only for meeting immediate transportation needs, but also for ensuring the system contributes to broader social, economic, and environmental goals. This clarity helps guide decision-makers, particularly in choosing bus types and designing and operating the system effectively. As Pérez *et al.* (2024) note, while BRT can enhance mobility by offering efficient and reliable public transportation, its full environmental potential is only realized when energy-efficient buses are used. Therefore, a holistic approach to BRT planning is needed, one that ensures these systems are not only efficient and cost-effective, but also directly contribute to social equity, reduced greenhouse gas emissions, and sustainable urban development.

Efficient fare collection systems are also crucial in reducing delays and increasing boarding speeds. In most cases, this is the most difficult tasks to achieve due to its technological demands. Hensher and Golob (2008) suggest off-board ticket collection systems and prepaid bus cards as alternatives when modern electronic systems are not feasible.

Whereas BRT is viewed as the most affordable mass transit modes when compared to others such as rail, the average cost of 10 million USD per kilometre is still expensive for most countries of the global South. To minimize the overall costs, Pojani and Stead (2015) suggest using the existing road networks without incurring costs of expansion. The success of this approach however depends on the width of current road infrastructure to accommodate both dedicated bus lanes and other modes of transport. In some cases, light rail may present a more

cost-effective alternative, particularly when BRT would necessitate significant land acquisition. This underscores the importance of conducting thorough feasibility studies to determine the most suitable mass transit solution for each context. According to IEA (2002), BRT systems that struggle for space and operate in general urban traffic do not qualify as BRT systems. Acquiring these spaces is however costly, especially in developing countries where illegal commercial developments occupy road reserves. Long-term financial and procurement strategies and cost-effective designs can address these challenges.

While BRT systems offer a cost-effective and fast alternative to traditional bus services, the low satisfaction levels and safety concerns highlighted in these studies suggest that their long-term success depends on addressing critical service quality and security issues. Passenger dissatisfactions are often influenced by factors such as overcrowding, inconsistent service, or limited comfort. Safety, especially for vulnerable populations like women, needs to be prioritized through both physical infrastructure improvements and social interventions. Without addressing these issues, the full potential of BRT systems to provide reliable, safe, and equitable public transport could remain unrealized.

The political and administrative support for BRT initiatives is pivotal. The increasing expansion of BRT in China is due to its promotion as part of Chinese broader urban development strategy, recognizing its potential to alleviate traffic issues and improve public transport services across major cities (Zhang et al., 2013). This support is often reflected in the allocation of resources and the establishment of favourable policies that facilitate the development and expansion of BRT networks, which is a key lesson that cities of the Global South could learn from. As Bokolo (2023) also suggests, developing policies and interventions that align with the sustainability vision and mission of the city can help in reducing uncertainty that hinders project implementation.

Because of complexities associated with the existence of various stakeholders with different interests, priorities, and capabilities, like the paratransit sector, it is essential to ensure the integration of bottom-up movements with top-down processes. This integration can facilitate the co-creation of new institutions, production methods, and ways of life by diverse actors, thereby fostering a just transition process with effective outcomes. Loorbach *et al.* (2021), also contend that when various stakeholders such as governments, businesses, and communities collaborate to align policies with the goals of sustainability and social justice, it becomes easier to reinforce the necessary actions.

(c) Active Mobility

Just like in mass transit and electrification of mobility, policies also play key roles in advancing active mobility. In Copenhagen for instance, the city's first cycle strategy, "Cycle Policy 2002-2012," emerged in response to public demand for better cycling infrastructure and laid the groundwork for the current system. This was subsequently followed by further initiatives, such as the "Bicycle Track Priority Plan 2006-2016" and the "Bicycle Strategy 2011-2025," which continued to enhance cycling infrastructure (Biswas, Mittal and Padmakar, 2019). These policies have led to heavy investments in non-motorized infrastructure, such as dedicated green bike lanes in Copenhagen (Papadakis *et al.*, 2024). These kinds of investments are crucial

for building public confidence and influencing changes in social and cultural behaviours, which subsequently shape mobility choices.

Active mobility also requires changes in cultural shifts. Meadowcroft (2009) refers to this as the shifts in the "dominant rules of the games." Since behaviours are inherently challenging to change, these social and cultural transformations represent one of the most difficult aspects of mobility transitions. However, Böcher (2012) posits that information instruments, such as posters, can effectively promote behavioural and cultural changes. These information-based policy tools are designed to disseminate targeted information that influences behaviours in line with specific policy objectives. Although Walker *et al.* (2020) argue that information policy instruments are among the least effective for inducing behavioural changes, if combined with continuous sensitisation, it can be essential for causing behavioural changes. For example, in Singapore, cultural shifts toward public transport have been facilitated by continuous public involvement and feedback mechanisms in transport planning and decision-making processes (Tan and Taeihagh, 2020). This approach of joint decision-making can help facilitate a smooth and just transition, especially in Africa where walking and Cycling are largely associated with poverty, inferiority and failure, while driving is linked to wealth, success and importance in the society.

5.4. The Current predicament of Mobility system of Kampala City

This section presents key results based on the analysis of the semi-structured interviews, and review of relevant literature, in addition to observations, as explained in the methodology section. The section is organised into four interrelated components. Component one provides the detailed understanding of the challenges associated with the current mobility situations in Kampala. Component two provides the proposed 2050 vision to change the current mobility systems. Component three provides the possible transition pathways for achieving the vision, and Component four provides the framework for formalization of the current paratransit system of Kampala.

5.4.1. Key challenges of mobility situation of Kampala.

As pointed out during interviews and field observations, the current predicament of Kampala mobility system reflects a combination of infrastructural challenges, governance challenges, and unsustainable mobility practices. These are presented below:

a) Poor road infrastructures

Participants and field observations revealed widespread public dissatisfaction with the deteriorating road infrastructure in Kampala. Roads across the city are frequently riddled with potholes, poorly maintained, and predominantly designed as single-lane corridors, which significantly contributes to traffic congestion, accidents, and overall commuter frustration. As one respondent noted, "Look at our city roads; ever since the former ED left [referring to the Kampala Capital City Authority Executive Director], the city is in a mess, potholes everywhere" (Participant D). Another participant echoed this sentiment more humorously but poignantly: "Our roads are so bad that it gives you a free massage" (Participant C).

The ramifications of these inadequate road conditions extend beyond congestion and safety concerns. Critically, poor infrastructure has also emerged as an under-discussed barrier to the adoption of sustainable transport technologies, such as electric vehicles (EVs). There is a growing perception among Kampala's residents that the city's uneven, dusty, and pothole-ridden roads are unsuitable for EVs, which are seen as fragile and better suited to well-maintained urban environments. This perception underscores how infrastructural neglect can constrain transitions to low-carbon mobility systems, reinforcing dependence on aging, high-emission vehicles.

Moreover, the narrow, two-lane design of most city roads (one lane per direction) is insufficient to accommodate the growing volume of traffic, particularly during peak hours. The limited road capacity is further strained by erratic and aggressive driving behaviors, informal traffic practices, and frequent encroachments by street vendors and boda-boda riders, all of which contribute to an unpredictable and often hazardous commuting environment.

According to the Kampala Capital City Authority (KCCA), the root of these persistent road infrastructure challenges lies in chronic underfunding from the central government. This financial shortfall severely constrains KCCA's ability to undertake routine maintenance, upgrade existing roads, or implement strategic improvements aligned with the city's rapid urban growth. As a result, Kampala's road network continues to operate below optimal conditions, affecting not only daily mobility but also broader aspirations for sustainable urban transformation.

This situation reflects broader urban governance challenges facing African cities, where decentralization without adequate fiscal transfers often results in institutional fragmentation and the inability of local authorities to deliver basic infrastructure services. Addressing these challenges will require a combination of increased investment in urban infrastructure, institutional reforms to strengthen local government capacity, and the integration of sustainable mobility goals into broader urban planning frameworks. Without such interventions, Kampala risks entrenching a cycle of infrastructural decay, inefficient mobility, and deepening spatial inequality.

b) Lack of enforcement of traffic laws

The analysis also revealed a multidimensional perspective on operational patterns of the only public transport system of Kampala. One significant finding is that the number of informal taxis stops, locally known as "stages" in Kampala's city centre far exceed the number of formal ones. In the absence of designated taxi stops for passengers to board, taxis frequently roam the streets in search of passengers while en-route to their destinations (Figure 5.3). It was observed that taxis often pull over at the roadside to wait for passengers. While within the city center, they continuously navigate the streets in a seemingly chaotic manner, honking, shouting out destinations, and randomly inviting pedestrians to board.

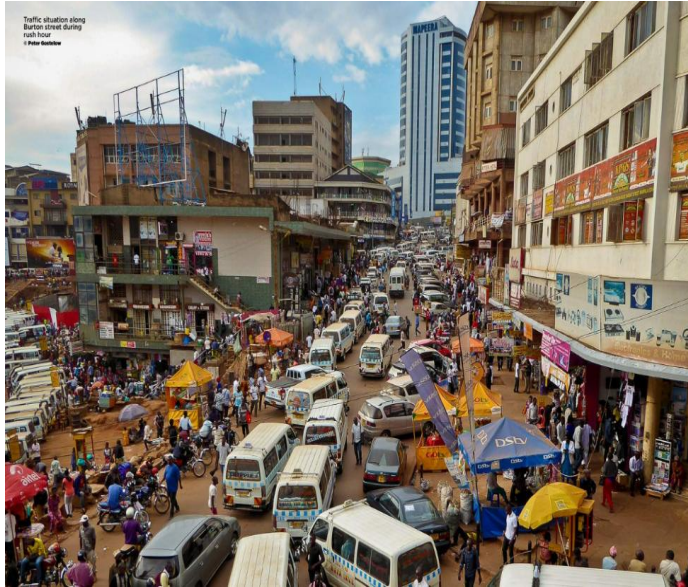


Figure 5.3. Taxis on Burton street moving slowly as they keep picking up passengers
Source: KCCA, 2022

This erratic behaviour, which often disregards traffic rules, aligns with what Ndibatya and Booysen (2021) describe as a "Levy walk pattern" where taxis' movements are largely random, dictated by passenger availability rather than predetermined stops. While these patterns provide flexibility, it also reveals deep-rooted inefficiencies and challenges in regulating Kampala's informal transport sector, highlighting the need for a more organized public transit system.

Similar to taxis, boda-bodas also exhibit comparable movement patterns throughout the city. While there are numerous informal boda-boda stages across the metropolitan areas, these stages are sparse within the city centre. As a result, most boda-bodas spend their days continuously riding in search of passengers traveling in any direction. However, towards the evening hours, they shift focus, primarily seeking passengers heading toward their residential areas. In the mornings, boda-bodas typically pick up passengers going in any direction, with the ultimate goal of reaching the central business district to continue their daily operations. These flexible movement patterns, particularly during peak hours, are highly favoured by Kampala residents. Boda-bodas offer convenience, as passengers can disembark at their preferred locations. Additionally, riders' ability to navigate through traffic, often using pedestrian walkways or bypassing red traffic lights, saves valuable time. This makes boda-bodas an attractive option for those looking to avoid traffic congestion.

As noted by the participant I, different categories of people in Kampala tend to prefer different modes of transport. For instance, male working youth without private cars and informal businesswomen often favour boda-bodas, possibly due to the inconveniences associated with taxis. A study by Kumar (2011) further revealed that many women, especially at night, prefer boda-bodas over taxis, perceiving them as safer and more suitable for addressing last-mile mobility needs (Mwebesa *et al.*, 2021). This highlights the importance of boda-bodas in meeting diverse transport preferences and addressing mobility gaps within the city.

c) Over reliance on private transport

In recent years, there has been growing concern over the rising number of private vehicles in Kampala, a trend that is increasingly straining the city's already limited transport infrastructure. Transport experts and planners often attribute this surge in car ownership to the inadequacies of the public transport system, which remains fragmented, unreliable, and largely informal. However, as noted by Research Participant A, the increasing preference for private cars is also closely linked to socio-cultural and economic factors, particularly the "aspirational" value attached to car ownership. For many Ugandans, especially within the emerging middle-income group, owning a car is not only a symbol of social mobility and personal success but also a perceived necessity for accessing economic opportunities and maintaining a certain quality of life.

This phenomenon is not unique to Kampala but reflects broader patterns of car-oriented development seen in many rapidly urbanizing cities of the Global South. In the case of Kampala, growing car ownership is contributing to the outward expansion of the urban footprint, as middle-income households opt to relocate to peri-urban areas such as Gayaza, Matuga, and Mukono, where land and housing are more affordable. While these areas offer improved living environments compared to congested inner-city neighbourhoods, the reliance on private vehicles to access jobs and services in the city centre introduces new sustainability challenges.

First, the majority of vehicles used are older, fuel-inefficient imports that contribute significantly to air pollution and greenhouse gas emissions, thereby undermining environmental sustainability goals. Second, the increasing volume of car commuters from the urban periphery exacerbates traffic congestion, not just in the central business district but across the wider metropolitan region. This pattern of car-dependent suburbanization undermines efforts to promote compact, transit-oriented urban development and adds pressure on infrastructure and public service delivery systems.

More broadly, this trend raises critical questions about the future of urban mobility and spatial equity in Kampala. The current trajectory reflects a transport and land use model that privileges private over collective mobility and risks deepening inequalities in access to urban opportunities. If not addressed, the continued proliferation of private vehicles will entrench unsustainable mobility practices, increase spatial fragmentation, and lock the city into a high-carbon development path. Addressing this issue requires a multi-pronged approach that integrates land use planning with sustainable mobility strategies

d) Non prioritization of active mobility planning

In addition to public transport, active mobility, particularly walking accounts for an estimated 70% of all trips made in Kampala (KCCA Planner). This figure underscores the essential role that walking plays in the daily lives of city residents, especially those from low-income groups. A significant proportion of these pedestrians are informal traders and workers who reside in high-density, low-income settlements such as Bwaise, Kakosokoso, and Kalerwe. These areas are typically located on the periphery of the city's economic centers, compelling residents to

undertake long daily commutes on foot in order to access markets, jobs, schools, and essential services.

However, the high reliance on walking as a primary mode of transport presents considerable challenges, particularly in the context of Kampala's inadequate pedestrian infrastructure. Outside the central business district (CBD), there is a marked absence of well-maintained sidewalks, pedestrian crossings, and safety features such as traffic calming measures and street lighting. Where sidewalks do exist, they are frequently obstructed by street vendors, encroaching vehicles, or informal activity, or they are poorly maintained and unsafe for use (Figure 5.4). As a result, pedestrians are often forced to walk on the edges of busy roads, exposing them to traffic hazards, pollution, and the risk of accidents.



5.4: Street Vending on the sidewalks in Kampala city

Source: Author 2024

This situation exemplifies a broader pattern observed across many African cities, where transport planning continues to prioritize motorized mobility while neglecting the needs of the majority who walk. As Lucas (2011) notes, inadequate transport infrastructure tends to disproportionately affect vulnerable populations, deepening existing inequalities in access to urban opportunities. In Kampala, this has created a spatial mismatch between where people live and where opportunities are located, which is further compounded by unsafe and poorly connected walking environments.

Moreover, the marginalization of pedestrian needs has significant social and environmental implications. From a social justice perspective, it denies a dignified and safe commuting experience to those who cannot afford motorized transport. From an environmental standpoint, it undermines efforts to promote low-carbon urban mobility and reduce traffic congestion. The failure to plan for active mobility also signals a missed opportunity to address broader development goals related to public health, equity, and inclusive urban growth.

Addressing these challenges calls for a deliberate policy shift towards inclusive and sustainable transport planning. This includes investing in pedestrian infrastructure that is continuous, safe, and accessible, particularly in informal settlements and along key commuting routes. It also requires integrating walking into the broader urban mobility framework and ensuring that street space is equitably shared among all users. Such measures would not only enhance safety and access for the majority of Kampala's residents but also promote a more just and resilient urban mobility system.

5.4.2 Existing strategies aimed at addressing the mobility situation in Kampala

In response to these mobility related challenges in Kampala, several strategies have been implemented, while others are still in planning stages. These are being done in collaboration between Kampala Capital City Authority (KCCA), the central government through other agencies such as the Ministry of Works and Transport, the Uganda National Roads Authority (UNRA), district local governments that forms the GKMA. For instance;

Regulatory Measures

To address the persistent challenges associated with boda-boda and taxi operations in Kampala, the city authorities have introduced a series of regulatory interventions in recent years. In 2020, for instance, proposals to establish boda-boda-free zones within the central business district were tabled as part of broader efforts to decongest the city and enhance traffic safety. However, these strategies quickly faltered due to strong political resistance. As one participant observed, "Many politicians opposed the move, arguing it would undermine people's livelihoods" (Participant C). This political pushback underscores the complex socio-economic entanglements of informal transport in Kampala, where large segments of the urban poor rely on boda-bodas both for income and as their primary mode of transport. Consequently, regulatory measures that threaten these livelihoods are often viewed as politically risky and socially insensitive.

In early 2024, the traffic police department launched a new initiative aimed at improving compliance and safety within the boda-boda sector. The policy required all riders to wear reflector jackets, distinguishing them from other motorcyclists and enabling easier monitoring of traffic violations. Initially, this initiative showed promising results, with high levels of compliance recorded in the first few months. However, field observations and interviews reveal that enforcement has gradually weakened. Today, compliance is largely restricted to areas with a strong and visible traffic police presence, suggesting that the effectiveness of such initiatives is heavily dependent on sustained enforcement capacity.

These patterns highlight several critical issues in urban mobility governance. First, there is a clear disconnect between policy formulation and implementation, with regulatory efforts often introduced without adequate stakeholder engagement, public education, or long-term enforcement strategies. Second, the socio-political dimensions of informal transport regulation particularly the fear of political backlash and the absence of viable alternative livelihoods, continue to impede transformative change. Third, the inconsistent enforcement of mobility

regulations undermines public trust in governance and perpetuates a culture of impunity among road users.

This case illustrates the need for a more holistic and inclusive approach to urban mobility regulation in Kampala one that balances the imperatives of safety, order, and environmental sustainability with the socio-economic realities of informality. Policymakers must prioritize participatory frameworks that involve boda-boda associations, local leaders, and community members to co-design solutions that are both enforceable and socially equitable. Without this, attempts at regulation risk becoming short-lived, symbolic gestures rather than components of a coherent and sustainable urban transport strategy

Non-Motorised Transport (NMT) Pilot:

To support walking and cycling in the city, the Kampala Capital City Authority (KCCA) initiated the implementation of a 1.5 km long Non-Motorized Transport (NMT) pilot project within the city center. This project is designed to promote walking and cycling by providing dedicated infrastructure that caters for pedestrians and cyclists, encouraging a shift away from motorized transport. Despite these positive efforts, the city authorities have struggled to control unpermitted activities on the same space. As seen in figure 5.5, many *boda-bodas* view it as a safe route for them, undermining the actual purpose. This is an indication that the city authorities need to evaluate and provide necessary infrastructures for all modes of transport within the city. It also highlights the need for continuous adaptive monitoring and evaluation of the impact of such interventions to ensure their effectiveness and proper use.



Figure 5.5. Sections of Non-motorized streets in Kampala city taken up by Boda-bodas.

Source: Author, 2024

Infrastructure Projects

The development of road infrastructure, such as the construction of flyovers at major intersections to facilitate smoother traffic flow and the creation of expressways to better connect suburban areas have also been adopted as one of the strategies. These are in addition to the installation and regular maintenance of traffic lights. The intentions behind all these interventions are to alleviate traffic congestion by improving road capacity and efficiency.

While these are well-intentioned interventions, the traffic-centred approach and a strong belief in mega-road infrastructural projects may not lead to the desired long-term sustainable urban

mobility outcomes in Kampala. For instance, given Uganda’s prevailing culture of car ownership (aspirations), expanding road networks could inadvertently encourage even greater reliance on private vehicles, further increasing car ownership and usage. As a result, this may ultimately lead to more traffic congestion, air pollution, and strain on infrastructure, undermining the original objectives. This is equally made worst by the systemic flaws in the current practices (Table 5.6). This therefore calls for a change in strategy that goes beyond seeing traffic congestion as the only challenges associated with mobility in the city, but considers broader issues such as environmental sustainability, public transport efficiency, and equitable access to mobility services in the city.

Table 5.6: *Synopsis of the current paradigm of transport planning and implementation in Kampala city*

Existing practices
Affordability is assumed, with minimal focus on feasibility of implementation
Technical experts decide all the projects
Planning is influenced by politics
Technical analysis are used to justify political choices
Minimal stakeholder involvement

5.4.3 The Bus Rapid Transit (BRT) Debate

The BRT system has been widely proposed by research participants as a solution to Kampala's mobility issues. The Kampala Master Plan 2024 has also heavily emphasised BRT as a solution to the city’s mobility challenges. While BRT is gaining popularity as a mass transit system, especially in African cities, it requires thorough feasibility studies to assess its suitability. For instance, implementing BRT demands wide corridors and substantial financial resources to support ongoing expansion, including bus acquisitions, corridor development, and operations. However, field findings revealed that Kampala lacks the necessary wide roads to accommodate a BRT system. Creating the BRT corridors would require significant compensation to property owners. As noted by Participant D, there was an attempt to build flyovers on Ben Kiwanuka Street, but this was abandoned because KCCA could not afford to compensate building owners, despite having secured funding from the Japanese government for the construction itself.

The average cost of constructing a BRT corridor in African cities is approximately 10 million USD per kilometer. Meanwhile, the cost of a five-story commercial building outside Kampala's central business district ranges from 3 to 5 million USD, according to Participant H (a non-expert estimate). This suggests that compensation costs for the corridors alone could exceed the costs of building the BRT infrastructure itself, making it an expensive solution for Kampala. Additionally, Kampala's current public transport system, dominated by informal paratransit services, poses another challenge. The strong ties between the paratransit sector and the informal economy suggest that the introduction of BRT without proper consultations and involvements of different stakeholder may face resistance from those stakeholders who could be directly or indirectly impacted. Therefore, given these complexities, this study emphasises

that while BRT has significant potential for the future, it may not be the most viable immediate solution for Kampala's mobility challenges. Besides, studies like the one by Venter *et al.* (2018) has showed that the benefits of BRT implementation in Africa, Asia and Latin America often disproportionately favour medium-income users, due to poor urban planning , resulting in less equitable outcomes of BRT than anticipated.

5.5. Towards a just urban mobility transition in Kampala

Given the limitations of current strategies, it is a conclusion that Kampala's mobility system cannot continue operating under a "business as usual" model and calls for strategic and systemic reforms capable of making urban mobility works for rather than against the citizens. To effectively address these urban mobility challenges, it is essential to first establish a forward-looking vision for the city's future mobility system.

5.5.1. Visioning

Although an ideal visioning process is supposed to be participatory, involving stakeholders such as experts, community leaders, and residents (Camilleri, Attard and Hickman, 2022), this study independently develops a vision statement for Kampala, based on research participants' perspectives on the desired future mobility system. The proposed vision is set for 2050, aligning with global targets for achieving net-zero greenhouse gas emissions.

Vision statement for Kampala city mobility system (2050)

By 2050, Kampala will have a zero-emission, integrated, and resilient urban mobility system, where public transportation, cycling, and walking are the primary modes of travel. Private car use will be minimal, relying on green technologies. Smart infrastructure will efficiently connect all parts of the city. This future mobility system will ensure that every resident, regardless of income or background, has access to affordable, reliable, and sustainable mobility options.

5.5.2. Pathways

Achieving the desired future will require the development of clear pathways. These pathways are essential for facilitating the integration of climate change adaptation, mitigation and a just transition in the transportation sector, as they act as "the link between two end points: a current state and a future end state" (Givoni, 2013: 210). Essentially, they provide a structured framework or roadmap to guide cities through the complex, long-term process of transforming unsustainable mobility systems into sustainable, efficient, and inclusive ones.

The study therefore organises the pathways into three distinct phases: the foundation phase, the acceleration phase, and the consolidation phase (Table 5.7). Each phase outlines specific interventions, with a focus on what needs to be done, when it should be implemented, and how to effectively achieve these interventions.

Table 5.7. Synopsis of pathways to SUM transition for Kampala

Phases	Climate change Mitigation	Climate Adaptation	Change	Just Transition
Foundation phase	Policy realignment Institutional and governance system	Formalizing taxis Development of taxi stages, ranks and waiting areas		Equity focused policy design Capacity building, public awareness campaign
Acceleration phase	Incremental infrastructure development Low emission zones	Promotion of green transport Shift to active mobility		Equitable access to green public transport Community participation in policy reforms and implementations
Consolidation phase	Comprehensive emission control.	Unified transport system (<i>Resilient urban transport networks</i>)		Equitable and inclusive mobility

Foundation phase (2025-2030)

The objective of this phase is to set the foundation for long term transition process through policies, infrastructures investments and public engagements.

Setting the right policies as part of climate change adaptation and just transition strategy

Recognizing the uniqueness of the Kampala city, the first emphasis should be put on getting the right transport policies which aligns with the city's specific needs, socio-economic context, and environmental challenges. The policies should aim at reducing vulnerabilities to climate change impacts by addressing emission and pollution levels, with an emphasis of building resilient and adaptable transport system. The process of policy formulation should consider public participation as a key pillar of urban governance.

It is however worth noting that policymaking often follows a "muddling through" approach, involving small, incremental changes rather than an ideal, optimal plan (Smeds and Jones, 2020). On that premise, the policy makers should understand that this is sometimes a process of trial and error, with potential challenges, rather than following a straight path, where adjustments are made gradually as policies evolve. But at the end of the day, the city should ensure that the existing policies addresses specific urban mobility related concerns by employing sufficient participation of the different categories of people to ensure that their interests, and views are addressed in the respective policy.

Establishing a strong institutional and governance systems to support policy changes

The duplications of roles and responsibilities to different government agencies is one of the barriers to a smooth sustainable urban mobility transition. Therefore, in the initial phase of the transition, the city should establish an independent department responsible for urban mobility to coordinate the implementation of sustainable urban mobility policies and projects within the Kampala metropolitan area. This department will help in ensuring that different

strategies are aligned, well-coordinated, and maintained over time to achieve long-term environmental, social, and economic resilience of the metropolitan area. Additionally, other related agencies like the central government, local governments forming the metropolitan area should have their clear roles and responsibilities in the transport sector demarcated but functioning like a cooperative government to achieve one goal of a sustainable urban mobility systems.

Initiating infrastructural improvements

The city could begin by developing the necessary infrastructures such as modern stages, with ramps and waiting areas. The locations of these stages should however consider movement patterns of passengers along the specific routes. It should include amenities such as toilets, and some kiosks for groceries. Additionally, at the initial phase, dedicated lanes for public transport can be created using existing road carriageways. This phased and incremental approach will help lay a foundation for long-term improvements in urban mobility infrastructure.

Capacity building

In preparation for the comprehensive transition process, trainings and capacity buildings of relevant stakeholders are very essential. Some of the stakeholders in this case would include current workers in the informal transport businesses, other informal traders with symbiotic relationships with the taxi operations, among others. The training should also cover aspects of electric vehicle maintainance.

Formalizing the existing informal transport system.

Given that this study is against the adoption of Bus Rapid Transit (BRT) as an immediate solution to the current mobility challenges of Kampala, the city authorities could focus on transitioning the existing informal transport operators into a formalized, regulated, and sustainable system. The detailed framework for this formalization is provided in **Figure 4-7**. As the informal transport system improve, the city authorities can begin introducing low-emission vehicles necessary to reduce the carbon footprint of the city.

Public awareness campaigns.

These campaigns should aim at promoting the benefits of sustainable mobility, safety, and cleaner transport options.

Acceleration Phase (2030 – 2040)

The objective of this phase would be to scale up infrastructure and entrench sustainable practices through planning and incremental adaptation improvements to ensure resilience, lower emission, and social equity. The key areas of focus should be the following:

Promotion of green public transport

Continue modernizing public transport by gradually transitioning from 14-seater to 35–60-seater environmentally friendly busses/vans. This should be supported by expansion of charging infrastructures in government buildings, bus and taxi ranks, and markets. The

transitioning can be achieved through public-private partnership, and provision of concession loans by government to taxi association to upgrade their fleets. In this case, proper attention should be put on route efficiency by the public transport associations, supervised by the city authority. The efficiency reports should be used to guide licence renewals. This comprehensive approach will modernize the transport system while supporting climate mitigation efforts and overall improved transport service delivery.

The government can further strengthen this objective by lowering import taxes on eco-friendly vehicles. At the national level, the government can collaborate with green mobility manufacturers to build local capacity and explore renewable energy sources like solar, reducing reliance on electric vehicles which requires electricity for charging.

As a way of ensuring equitable access to green mobility by individuals, government can introduce special financial incentives and subsidies targeting certain lower income groups and individuals in order to ensure that the benefits of transitions and green mobility benefit different socio-economic groups.

Promotion of active mobility

To promote non-motorized transport, the city authorities should prioritize redesigning specific precincts within the city centre. One approach is to designate fuel stations as drop-off points, reducing the need for motorized vehicles to enter densely populated areas. Additionally, new road constructions in suburban areas such as Kiira, Namugongo, and Najjera, presents a valuable opportunity to integrate non-motorized lanes. Introducing dedicated lanes for cyclists and pedestrians on these new roads would not only reduce traffic congestion but also contribute to better air quality and a more sustainable urban transport system.

To ensure maximum traffic safety in areas where active mobility infrastructures, such as cycling and walking lanes, are shared with motorized traffic, strict speed limit measures should be implemented. Reducing speed limits to below 20 km/h in these shared zones will significantly improve safety for cyclists and pedestrians. This will not only encourage more people to opt for cycling and walking but also discourage use of motor vehicles in these areas, making driving less attractive. Such measures would contribute to a safer, more balanced, and sustainable urban transport environment.

In the subsequent years, the city can further enhance safety by introducing physical barriers to separate non-motorized lanes from motorized traffic. These barriers would provide a clear division between cyclists, pedestrians, and vehicles, significantly reducing the risk of accidents and creating a safer environment for active mobility. By gradually introducing such infrastructure, the city can promote non-motorized transport as a viable and secure option, encouraging more people to walk and cycle, while reducing reliance on motorized vehicles.

Introduction of low emission zones

This can be explored by introducing specific soft policy instruments and interventions that will not only help in addressing the negative environmental impact, but it will also help raise funds for implementation of sustainable urban mobility project. For example;

- a) Introduce car free zones especially in densely populated areas like down-town Kampala where low-income people often rely on walking as a form of transport. This is one way of achieving climate justice and environmental equity.
- b) Impose higher fees for on-street private vehicle parking to discourage private cars and reduce congestion. Additionally, limit motor vehicle lanes within the city centre.

Consolidation phase (2040-2050)

This phase is aimed at achieving full scale integration of sustainable urban mobility system, with enhanced resilience. In this phase, the focus should aim at the following:

Comprehensive emission control.

To reduce emissions, the city should mandate that all private vehicles entering the city be zero-emission vehicles. This initiative should be complemented by integrating various public transport modes into a unified system, offering easy intermodal transfers and coordinated schedules. This approach would not only minimize urban pollution but also create a more efficient and sustainable transport network.

Resilient urban transport networks

At this stage, the various public transport modes should be integrated into a unified system, ensuring smooth intermodal transfers that enhances overall system resilience to future climate risks. This system should be capable of maintaining efficiency even in the face of severe weather events.

Equitable and Inclusive Mobility.

Achieving equity and inclusive mobility requires a multi-faceted approach to ensure that all individuals, regardless of income level, physical ability, or location, have access to safe, affordable, and sustainable transport options. To achieve this, government can establish its owned buses for low-income neighbourhoods and subsidize fares for these disadvantaged groups. The city should also continuously expand safe, eco-friendly pedestrian and cycling infrastructure, prioritizing strong connectivity between residential and business areas. By ensuring inclusivity and accessibility, the city can promote mobility options that serve all residents, fostering social equity and sustainable urban growth.

5.6. Proposed framework for formalizing the existing paratransit public transport system

The proposed framework seeks to guide a coherent and integrated transition towards a sustainable public transport system. It is grounded in the recognition that an uncoordinated transition process is likely to provoke conflicts and resistance from existing paratransit operators. Paratransit, being a significant source of employment, plays a critical role in urban

mobility, but its informal nature presents challenges for policy implementation aimed at improving service quality and addressing the precarious working conditions of operators. This framework (Figure 5.6) further acknowledges the importance of organized associations in ensuring a just and sustainable urban transport transition. The following are the proposed steps for a just formalization process in Kampala.

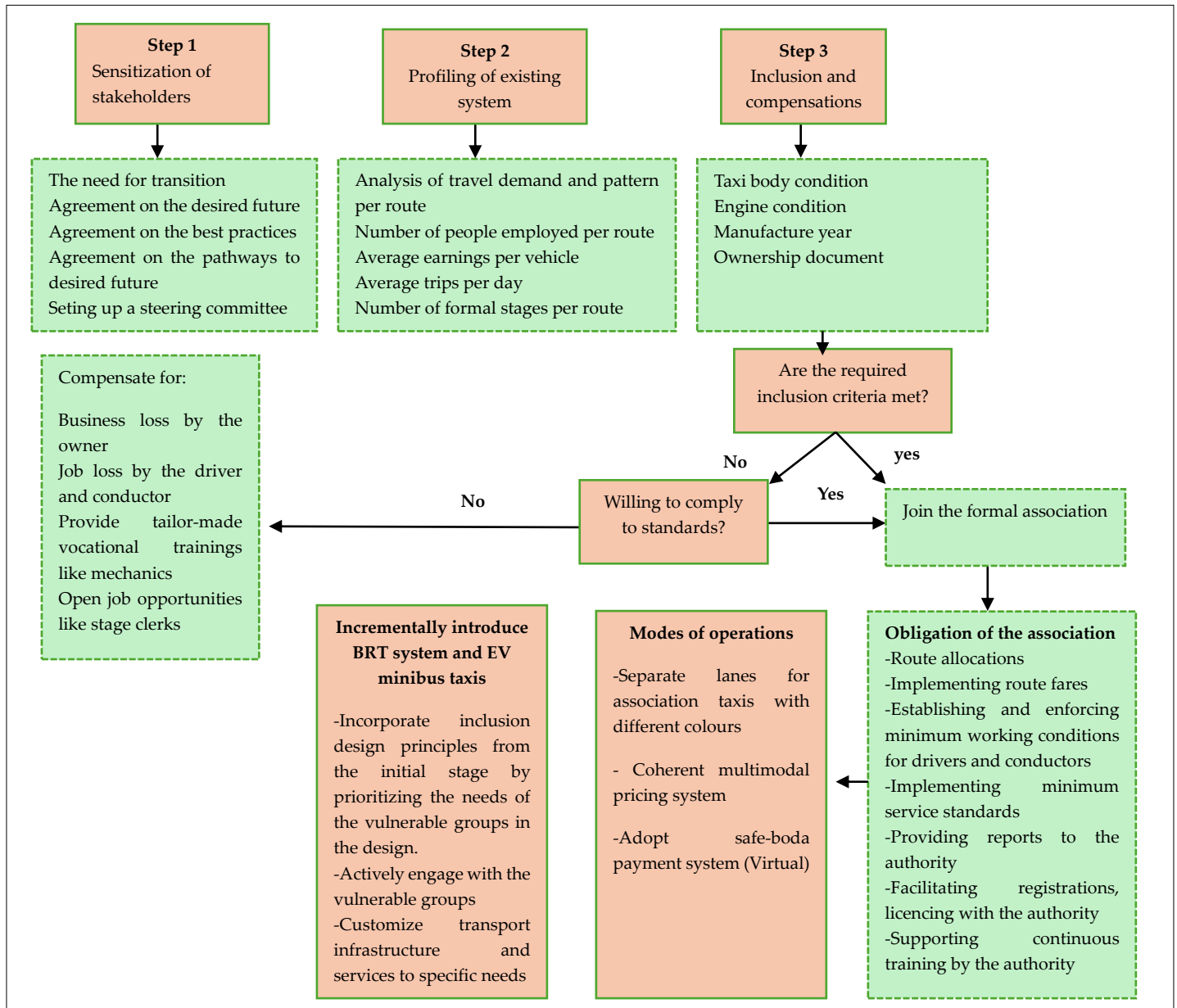


Figure 5.6. A systematic framework for transforming the existing paratransit public transport system

Step 1: Stakeholder Identification and engagement

The first step in this framework involves identifying and grouping relevant stakeholders who are essential to the transition process. These stakeholders may include paratransit operators, city authorities, transport unions, civil society, and the affected communities. The primary objective of this step is to bring these diverse groups together to create a shared vision for the

future of urban mobility. A consensus on the desired outcomes and transition pathways from the perspective of public transport should be established. This participatory approach will foster a sense of ownership and commitment to the proposed interventions.

One tangible outcome of this phase could be a formal agreement between the city authorities and the paratransit sector, where roles and responsibilities for various aspects of the transition are clearly defined. Such agreements will ensure that all parties are aligned and that the transition progresses smoothly.

Step 2: Assessment of the existing paratransit system

The second step involves conducting a comprehensive analysis of the existing paratransit system. This assessment should focus on determining whether the current fleet of taxis adequately meets demand, evaluating the accessibility of taxi stages, and examining the overall business operations of the sector. Understanding these dynamics is crucial for designing effective formalization strategies that addresses both supply and operational inefficiencies of public transport.

Step 3: Formalization of the paratransit sector

The third and most critical step is the initiation of the formalization process. In this phase, criteria for inclusion and exclusion, as determined in Step 1, are implemented. Existing operators whose vehicles meet the agreed-upon standards are integrated into formal associations. Formalizing these operators will help ensure that they meet regulatory standards, improve service quality, and contribute to a more organized urban transport system.

For operators whose vehicles fail to meet the standards or who are unwilling to transition, a compensation mechanism is suggested. This compensation is intended to address business losses for vehicle owners as well as job losses for drivers and conductors. The criteria for determining the one-year compensation package may include factors such as the vehicle's condition, the expected annual turnover of the business, and the annual income of both the driver and conductor. In addition to financial compensation, vocational training programs should be provided to enable these individuals to transition into alternative employment opportunities.

Step 4: Training and route assignment

After formalizing the eligible operators, the next step is the assignment of routes and the comprehensive training of drivers and conductors. Each route is suggested to have different marking of the taxis. The training is suggested to focus not only on technical driving skills but also on customer service, safety standards, and regulatory compliance. Formal contracts should be established between workers and the associations to ensure job security and compliance with labour standards. This step marks the beginning of a more organized and structured public transport system where operators are accountable to associations and regulatory bodies.

Step 5: Gradual Introduction of Bus Rapid Transit (BRT)

Once formalization has reached a critical mass, the framework proposes the gradual introduction of a Bus Rapid Transit (BRT) system. The aim of the BRT should be to enhance mobility for the least privileged members of society while eventually expanding into middle-income neighbourhoods.

This approach contrasts with current proposals in the Kampala Master Plan, which prioritize introducing BRT along expressways leading to suburban areas predominantly inhabited by middle-income earners. Many of these areas are far from the city centre, while a significant portion of the least privileged population resides within 10 kilometres of the city centre, often in informal settlements. The study posits that focusing BRT development in suburban areas risks exacerbating the mobility challenges faced by low-income residents, as it diverts resources away from improving access for those who need it most.

Conclusion

This chapter provided the main contribution of this study. It was guided by systematic literature review, observations and in depth semi structured interviews of experts and key private sectors in the urban mobility based in Kampala. It gave an insight into the adoption and implementation of electrification of mobility, active mobility and mass transit, in addition to understanding the current mobility situations, and the desired urban mobility of Kampala. Some of the findings points out the mobility injustices raised in chapter two of this study. These were crucial in the development of the transition pathways to achieve the mobility vision 2050. The detailed summary of the findings is restated in the next, and final chapter of this study.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1. Introduction

This study sought to identify pathways that balance three interconnected objectives: mitigating greenhouse gas emissions from transportation, enhancing resilience through climate adaptation, and promoting a just transition to ensure equitable outcomes. Drawing on a systematic review of 106 peer-reviewed articles, the research synthesized how various cities have implemented mass transit systems, active mobility strategies, and the electrification of mobility. These insights informed two main contributions: (a) proposed pathways for a sustainable urban mobility transition in Kampala, utilizing the backcasting method and adaptation pathways, and (b) frameworks for transforming paratransit operations in the city. This chapter presents the key findings corresponding to each research sub-question and concludes with the main outcomes and policy recommendations.

6.2. Summary of key findings

What lessons can Global South cities draw from the global paradigm of sustainable urban mobility systems to promote and integrate low-carbon transportation modes?

The transformation of mobility systems is increasingly being recognised as a crucial solution for addressing the multifaceted challenges posed by urbanisation and climate change by subsequently reducing greenhouse gas emissions and promoting social equity. Studies from cities around the world provide a variety of perspectives on transitioning to the adoption of mass transit, the electrification of transportation, and the broader implementation of SUM strategies.

Electrification of mobility is more common in China, the UK, Europe, and the USA, while cycling is becoming a key mobility mode in European cities. In contrast, Bus Rapid Transit (BRT) systems as a mass transit mode are the prevailing trend in African cities. This is due to its affordable implementation costs compared to other mass transit modes such as rail, and metros. While these sustainable modes of transport contribute to improved mobility, various barriers impede a full transition. In the Global South, financial limitations often hamper the development of sustainable mobility infrastructure.

Additionally, institutional fragmentation, where transport responsibilities are distributed across multiple government agencies creates difficulties in harmonising local and national policies, leading to resistance and inconsistent strategies. In African cities, a primary challenge to electrifying mobility lies in the high costs of electric vehicles, limited supply, and access to affordable and reliable electricity. Access to electricity in most African countries is still below 45% as of 2022. Additionally, there is a widespread perception that electric vehicles cannot manage the poor road conditions that exist in most African cities.

Effective planning, rooted in local context and supported by strong leadership, is therefore crucial to meeting the 2050 net-zero goals in a just and inclusive manner. Given the diverse stakeholders involved in the transportation sector, it is important to integrate bottom-up initiatives with top-down policies during these transition planning and implementation processes. This is essential for co-creating new institutions and making a common decision

that enables a fair and effective transition. Continuous policy reform, international collaboration, knowledge sharing, and a favourable investment climate are also critical for advancing the sustainable urban mobility transition. Generally, by adapting lessons from the Global North to their specific contexts, countries in the Global South can develop more tailored, transformative pathways toward sustainable urban mobility.

What is the current mobility situation of Kampala city?

The main empirical findings regarding Kampala's mobility landscape reveal that public transport service provision is predominantly managed by paratransit operators. These operators function as businesses with minimal focus on efficiency, comfort, or affordability. Consequently, private motorization is increasingly perceived as a preferable alternative to meet mobility needs. This shift has significantly contributed to rising traffic congestion, a challenge exacerbated by the city's narrow roads and the reactive nature of road maintenance practices in Kampala.

What strategies have been employed to address the current mobility systems in Kampala?

Strategies such as the establishment of boda-boda-free zones, improvements to traffic signal functionality, and the construction of flyovers and expressways have been key attempts to address Kampala's current mobility challenges, alleviating some traffic bottlenecks. However, this study critiques these traffic-centred approaches for their misalignment with the core principles of sustainable urban mobility. These strategies often neglect the needs of pedestrians and cyclists, limiting their ability to foster inclusive and environmentally sustainable transport systems."

What could be the potential pathways for achieving a sustainable urban mobility transition in Kampala city?

The key pathways proposed for this study include getting the right transport policies that align with the city's specific needs, socio-economic context, and environmental challenges. Establishing an independent department responsible for urban mobility to coordinate the implementation of sustainable urban mobility policies and projects, formalising and regulating the existing informal transport sector. Implementing these measures within the first five years can lay the groundwork for long-term urban mobility improvements in Kampala.

Furthermore, a gradual shift from 14-seater to 35–60-seater environmentally friendly buses and vans, supported by expanding charging infrastructure in government buildings, transport hubs, and markets would be crucial. Reducing import taxes on eco-friendly vehicles, along with financial incentives and subsidies for lower-income groups, would ensure that the benefits of green mobility reach diverse socio-economic sectors. Introducing low-emission zones between 2030 and 2040 will further accelerate Kampala's transition to sustainable urban mobility.

How can the existing paratransit operators in Kampala be inclusively and equitably transformed and integrated into a sustainable urban mobility system?

Through a comprehensive stakeholder engagement as the first step of paratransit transformation, followed by a detailed assessment of the business and service perspectives of the existing paratransit operations in Kampala, registrations of operators, and assignments of routes as per the agreed upon standards, supported with continuous training, monitoring and evaluation, and an efficient public transport system that prioritises the mobility needs of the most disadvantaged can be achieved in Kampala. By aligning the interests of all stakeholders and ensuring a more equitable urban mobility transition, the potential conflicts, and resistance by the existing paratransit and other stakeholders, can be mitigated.

6.3. Conclusion

In conclusion, the pathways proposed in this study provide a structured bridge between Kampala's current mobility system and a future sustainable model. Through the integration of backcasting and adaptation frameworks, these pathways offer a roadmap to guide the city through the complex and long-term process of transforming unsustainable mobility systems into efficient, inclusive, and sustainable ones. However, it is important to point out that achieving a sustainable mobility transition will require more radical changes. Such changes may provoke political contention, as they disrupt established structures and interests, making it unlikely that powerful stakeholders will relinquish their influence voluntarily. This challenge underscores the importance of adopting a structured approach, guided by the principles of distributive and procedural justice as reflected in the framework developed for transforming Kampala's paratransit sector.

The framework emphasizes the dual importance of addressing operational challenges while acknowledging the paratransit sector's role as a critical source of employment. It advocates for a holistic strategy that integrates technological, regulatory, economic, and social measures to achieve just and sustainable urban mobility. Therefore, by promoting low-carbon transport systems, investing in resilient infrastructure, and ensuring equitable transitions for all communities, cities like Kampala can effectively tackle the challenges posed by climate change while fostering a more just and inclusive future for all.

6.4 Recommendations

Establish a monitoring and evaluation (M and E) system

Because the transition is a process, it is important to establish mechanisms that track progress, identify gaps, and ensure accountability. These M and E systems must align with the overarching vision of the mobility systems. Some of the critical performance indicators could include air quality, equity of access in terms of geographical and socio-economic coverage of the transport system, affordability of transport modes by different income groups, and public transport ridership trends and modal splits, among others. Adopting these M and E systems may help in enhancing decision-making, promoting transparency and accountability, and achieving inclusivity.

Adaption to emerging challenges/changes

As noted, before, urban areas are subject to uncertainties. It is important to continue refining and adapting the transport systems in response to these changing demands associated with population growth and technological advancements to achieve an efficient and resilient transport system. This should also involve allowing flexible use of spaces as new urban patterns emerge. In all these interventions, it is important to establish feedback strategies where urban residents can engage in decision-making processes and provide input on transport services and infrastructures.

Regular policy updates. Hold annual or bi-annual policy reviews in order to help maintain urban mobility systems aligned with evolving social, economic, or environmental conditions and to ensure that the mobility system remains just and sustainable.

6.5. Areas for future research

The study recommends several research areas to further contribute to the discourse on sustainable urban mobility and to advance the global paradigm of sustainable urban mobility systems, with the goal of achieving a just transition in transportation.

Governance Models for Just Transitions: Investigating the practical governance frameworks that can promote fair and inclusive transitions to sustainable mobility in global cities.

While this research also recommends the adoption of incentives to support the transition, more studies are needed to assess the effectiveness of measures such as electric vehicle subsidies and tax breaks for public transit providers, particularly in contexts where major barriers, such as inadequate infrastructure, persist.

The framework for the transformation of paratransit provides compensation for job and business losses. Further study is, however, needed on the identification of job opportunities, and determining how to support workers from traditional sectors during the shift.

This study primarily focused on drawing lessons from the Global North to inform sustainable urban mobility transitions in Kampala. However, future research could be undertaken to generate insights from the Global South that may offer valuable perspectives for addressing the justice-related shortcomings observed in the mobility transition processes of the Global North. Such a South-to-North knowledge exchange could contribute to more equitable and context-sensitive mobility paradigms globally.

References

- Abram, S., Atkins, E., Dietzel, A., Jenkins, K., Kiamba, L., Kirshner, J., Kreienkamp, J., Parkhill, K., Pegram, T., Santos Ayllón, L. (2022). Just Transition: A whole-systems approach to decarbonisation, *Climate Policy*, 22 (8), 1033–1049.
- Acheampong, A.R. and Elisabete A, S. (2015). Land use – transport interaction modelling: A review of the literature and future research directions, *The Journal of Transport and Land Use*, 8 (3), 11–38.
- Åkerman, J., Gudmundsson, H., Sørensen, Claus Hedegaard., Isaksson, Karolina., Olsen, Silvia., Kessler, Florian., Macmillan, J. (2011). How to manage barriers to formation and implementation of policy packages in transport, *OPTIC. Optimal policies for transport in combination: 7th framework programme: Theme 7 transport*, 1-73.
- Al-lami, A. and Torok, A. (2023). Sustainability Indicators of Surface Public Transportation, *Sustainability (Switzerland)*, 15(21).
- Allen, E., Lyons, H. and Stephens, J.C. (2019). Women’s leadership in renewable transformation, energy justice and energy democracy: Redistributing power, *Energy Research and Social Science*, 57 (01), 1-11
- Andrew, L., Kitali, A., Sando, T., Musagasa, J. (2022). Operational evaluation of the bus rapid transit system: Case study of Dar es Salaam city, *Journal of Public Transportation*, 24 (04), 1-8.
- Asimeng, E.T. (2021). Bus rapid transit implementation with the inclusion of incumbent paratransit operators in African cities: lessons from Accra, *Urban, Planning and Transport Research*, 9 (1), 534–548.
- Åslund, V. and Pettersson-Löfstedt, F. (2023). Rationales for transitioning to electric buses in Swedish public transport, *Research in Transportation Economics*, 100 (11), 1-11.
- Baltazar, J., Bouillass, G., Vallet, F., Puchinger, J., Perry, N. (2023). Towards the Design of Sustainable Mobility Systems: Objectives and Barriers From the French Local Authorities’ Perspective, in *Proceedings of the Design Society*, 3 (7) 3621–3630.
- Banister, D. (2008). The sustainable mobility paradigm, *Transport Policy*, 15 (2), 73–80.
- Banister, D. and Hickman, R. (2013). Transport futures: Thinking the unthinkable, *Transport Policy*, 29 (283)–293.
- BBC (2024). E-bikes London’s fastest growing fire risk says fire service. BBC. 11. February. Internet: <https://www.bbc.com/news/uk-england-london-68234673>, last accessed 29th August 2024.
- Bell, D. (2004). Environmental justice and rawls’ difference principle, *Environmental Ethics*, 26(3), 287–306.
- Bibri, S.E. (2018). Approaches to futures studies: a scholarly and planning approach to strategic smart sustainable city development, *Urban Book Series*, 6(13), 7491, 601–660.

- Biswas, A., Mittal, S. and Padmakar, S. (2019). Why people refrain from cycling in indian cities, *International Review for Spatial Planning and Sustainable Development*, 7 (3), 111–130.
- Böcher, M. (2012). A theoretical framework for explaining the choice of instruments in environmental policy, *Forest Policy and Economics*, (16) 14–22.
- Bokolo, A.J. (2023). Developing green urban mobility policies for sustainable public transportation in local communities: a Norwegian perspective, *Journal of Place Management and Development*, 17(1), 136–155.
- Boss, G., Dietzel, A., Godshaw, D., and Venn, A. (2023). Politics, voice and just transition: who has a say in climate change decision making, and who does not. *Global Social Challenges Journal*, 2, (2), 86-104
- Brand, C., Anable, J., Ketsopoulou, I., Watson, J. (2020) 'Road to zero or road to nowhere? Disrupting transport and energy in a zero carbon world, *Energy Policy*, 139(09), 1-12
- Brand, C., Dons, E., Anaya-Boig, E., Avila-Palencia, I., Clark, A., de Nazelle, A., Gascon, M., Gaupp-Berghausen, M., Gerike, R., Götschi, T., Iacorossi, F., Kahlmeier, S., Laeremans, M., Nieuwenhuijsen, M., Pablo Orjuela, J., Racioppi, F., Raser, E., Rojas-Rueda, D., Standaert, A., Stigell, E., Sulikova, S., Wegener, S., Int Panis, L. (2021). The climate change mitigation effects of daily active travel in cities, *Transportation Research Part D: Transport and Environment*, 93(02), 1-18
- Brůhová Foltýnová, H., Vejchodská, E., Rybová, K., Květoň, V. (2020). Sustainable urban mobility: One definition, different stakeholders' opinions, *Transportation Research Part D: Transport and Environment*, 87(08), 1-14
- Camilleri, R., Attard, M. and Hickman, R. (2022). Future low-carbon transport scenarios: Practice theory-based visioning for backcasting studies, *Sustainability (Switzerland)*, 14(1).
- Camilleri, R., Attard, M. and Hickman, R. (2024). Participatory policy packaging for transport backcasting: a pathway for reducing Co2 emissions from transport in Malta, *Sustainability (Switzerland)*, 16(1), 1–19.
- Campbell, S.D. (2013). Sustainable development and social justice: conflicting urgencies and the search for common ground in urban and regional planning, *Michigan Journal of Sustainability*, 1(20181221), 75–91.
- Canitez, F., Alpkokin, P. and Kiremitci, S.T. (2020). Sustainable urban mobility in Istanbul: Challenges and prospects, *Case Studies on Transport Policy*, 8(4), 1148–1157.
- Carley, S. and Konisky, D.M. (2020). The justice and equity implications of the clean energy transition', *Nature Energy*, 5(8), 569–577.
- Caulfield, B., Paraic, C. and Aoife, A. (2020). Transitioning to low carbon mobility, climate change advisory council. Dublin, ireland.
- Cervero, R. (2013). Bus Rapid Transit (BRT): An efficient and competitive mode of public transport.

- Cevheribucak, G. (2024). Effects of multilevel governance on the design and implementation of sustainable mobility plans, *Management and Analysis of Public Policy*, 34, 95–108.
- Chaurasia, D. (2014). Bus Rapid Transit System (BRTS): A sustainable way of city transport (case study of Bhopal BRTS), *International Journal of Engineering and Advanced Technology (IJEAT)*, (3), 2249–8958.
- Cheba, K. and Saniuk, S. (2016). Urban mobility - identification, measurement and evaluation', *Transportation Research Procedia*, 14, 1230–1239.
- Collett, K., Hirmer, S., Dalkmann, H., Crozier, C., Mulugetta, Y., McCulloch, M. (2021). Can electric vehicles be good for Sub-Saharan Africa?, *Energy Strategy Reviews*, 38(07), 1-6.
- Corais, F., Bandeira, M., Silva, C., Bragança, L. (2022). Between the unstoppable and the feasible: the lucid pragmatism of transition processes for sustainable urban mobility: A Literature Review, *Future Transportation*, 2(1), 86–114.
- Cruz-Daraviña, P.A., Sánchez-Díaz, I. and Bocarejo Suescún, J.P. (2021). Bus rapid transit (Brt) and urban freight—competition for space in densely populated cities, *Sustainability (Switzerland)*, 13(12), 1–21.
- Davis, D., Dingel, J., Monras, J., Morales, E. (2022). Bike-friendly cities: an opportunity for local businesses? Evidence from the city of Paris, THEMA Working Papers.
- Deng, T., Ma, M. and Wang, J. (2013). Evaluation of bus rapid transit implementation in china: current performance and progress, *Journal of Urban Planning and Development*, 139(3), 226–234.
- Distefano, N. and Leonardi, S. (2023). Fostering urban walking: strategies focused on pedestrian satisfaction, *Sustainability (Switzerland)*, 15(24).
- Dossa, K.F. and Miassi, Y.E. (2024). Urban Planning and green infrastructure under a changing climate in africa, *International Journal of Regional Development*, 11(1), 1-27.
- Di Ciommo, F. and Shiftan, Y. (2017). Transport equity analysis, *Transport Reviews*, 37(2), 139–151.
- Deonarain, B. (2019). Technological change and sustainable mobility: an overview of global trends and south african developments.
- Egnér, F. and Trosvik, L. (2018). Electric vehicle adoption in Sweden and the impact of local policy instruments, *Energy Policy*, 121(11), 584–596.
- Ehresman, T.G. and Okereke, C. (2015). Environmental justice and conceptions of the green economy', *International Environmental Agreements: Politics, Law and Economics*, 15(1), 13–27.
- Eisenberg, A.M. (2019). *Just Transitions*. 7th edn. Southern California Law Review.
- European Commission. (2019). *The European Green Deal*.

- Fan, J., Meng, X., Tian, J., Xing, C., Wang, C., Wood, J. (2023). A review of transportation carbon emissions research using bibliometric analyses, *Journal of Traffic and Transportation Engineering (English Edition)*, 10(5), 878–899.
- Farrell, C. (2012). A Just Transition: Lessons learned from the environmental justice movement, *Duke Forum for Law & Social Change (DFLSC)*, (4). 45–63.
- Feris, J., Jerome, B. and Clarice, W. (2024). E-mobility in Africa critical for Africa's industrialisation.
- Ferrer, A. and Thomé, A. (2023). Carbon emissions in transportation: A synthesis framework, *Sustainability (Switzerland)*, 15(11).
- Filippi, F. (2022). A Paradigm shift for a transition to sustainable urban transport, *Sustainability*, 14(2853), 1–27.
- Fischer, E. and Guzel, G. (2023). The case for qualitative research, *Journal of Consumer Psychology*, 33(1), 259–272.
- Freudendal-Pedersen, M. (2015). Cyclists as part of the city's organism: structural stories on cycling in Copenhagen, *City and Society*, 27 (1), 30-50
- Ghaffarparasand, O., Okure, D., Green, P., Sayyahi, S., Adong, P., Sserunjogi, R., Bainomugisha, E., Pope, F. (2024). The impact of urban mobility on air pollution in Kampala, an exemplar sub-Saharan African city, *Atmospheric Pollution Research*, 15(4), 1-12
- Gicha, B.B., Tufa, L.T. and Lee, J. (2024). The electric vehicle revolution in Sub-Saharan Africa: Trends, challenges, and opportunities, *Energy Strategy Reviews*, 53(2024), 1-11.
- Gilbert, A. (2008). Bus rapid transit: Is transmilenio a miracle cure? *Transport Reviews*, 28(4), 439–467.
- Giliomee, J., Pretorius, B., Füßl, L., Thomas, B., Booysen, M. (2024). Using solar pv and stationary storage to buffer the impact of electric minibus charging in grid-constrained sub-saharan africa, *Energies*, 17(2), 3-18
- Givoni, M. (2013). Alternative pathways to low carbon mobility. In Givoni, M. and Banister, D. (eds). *Moving Towards Low Carbon Mobility*. Cheltenham: Edward Elgar, 209–230
- GIZ. (2020). *Transport in NDCs: Implementation of Nationally Determined Contributions in the Transport Sector*. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).
- Global BRT Data (2024). *Global BRT Data*. Internet: <https://brtdata.org/>. Accessed: 26 June 2024.
- Gong, C., Xu, J. and Lin, Y. (2024). Plug-in hybrid electric vehicle energy management with clutch engagement control via continuous-discrete reinforcement learning, *Energy Technology*.
- González-González, E., Nogués, S. and Stead, D. (2020). Parking futures: preparing european cities for the advent of automated vehicles, *Land Use Policy*, 91, 1-16.

- Graham, J.D. and Brungard, E. (2021). Consumer adoption of plug-in electric vehicles in selected countries, *Future Transportation*, 1(2), 303–325.
- Greene, D.L. and Wegener, M. (1997). Sustainable transport, *Transport Geography*, 5(3), 177–190.
- Griffiths, S., Furszyfer Del Rio, D. and Sovacool, B. (2021). Policy mixes to achieve sustainable mobility after the COVID-19 crisis, *Renewable and Sustainable Energy Reviews*, 143, 1–9.
- Griffin, G. and Sener, I. (2016). Public transit equity analysis at metropolitan and local scales: A focus on nine large cities in the US, *Journal of Public Transportation*, 19(4), 126–143.
- Grin, J., Rotmans, J., Schot, J., with, i. c., Loorbach, D., and Geels, F. W. (2010). Transitions to sustainable development; new directions in the study of long-term transformative change. *Transitions to sustainable development: New directions in the study of long-term transformative change*. New York: Routledge.
- Hamza, S., Yahya, U., Kasule, A., Usama, K., Fahad, P., Ibrahim, K. (2023). Characterizing peak-time traffic jam incidents in kampala using exploratory data analysis, *Journal of Transportation Technologies*, 13(01), 61–86.
- Harber, J. and Bryer, M. (2020). Unrealistic expectations, unrealised: bus rapid transit in Johannesburg.
- Healy, N. and Barry, J. (2017). Politicizing energy justice and energy system transitions: Fossil fuel divestment and a “just transition”, *Energy Policy*, 108(06), 451–459.
- Henkel, A. and Hugging, H. (2017) Programme for sustainable urban mobility South Africa. Pretoria, South Africa.
- Henry, M.S., Bazilian, M.D. and Markuson, C. (2020). Just transitions: Histories and futures in a post-COVID world, *Energy Research and Social Science*, 68, 1–4
- Hensher, D.A. and Golob, T.F. (2008). Bus rapid transit systems: A comparative assessment, *Transportation*, 35(4), 501–518.
- HEV TCP (2024). The Electric drive powers on annual report 2024.
- Hidalgo, D. and Carrigan, A. (2011). Modernizing public transportation: Lessons learned from major bus improvements in Latin America and Asia, World Resources Institute.
- Hidalgo, D., Giesen, R. and Muñoz, J.C. (2024). Bus rapid transit: end of trend in Latin America?, *Data and Policy*, 6.
- Hoang, T.T., Pham, H.T. and Vu, H.M.T. (2022). From intention to actual behavior to adopt battery electric vehicles: A Systematic Literature Review, *The Open Transportation Journal*, 16(1), 1–16.
- IEA (2002). Bus Systems for the Future. Achieving sustainable transport worldwide. Paris.
- Ingeborgrud, L., Suboticki, I., Ryghaug, M., Skjølsvold, T. (2024). Planners as middle actors in facilitating for city cycling, *Mobilities*, 19(1), 103–115.

International Energy Agency (2020). Global EV Outlook 2020: *Technology Report*.

International Energy Agency (2024) Global EV Outlook 2024. Moving towards increased affordability. *Electric Vehicles Initiative*.

IPCC (2022). *Transport*.

Jasim, I.A., Farhan, S.L. and Hasan, H.M. (2021). Ways to activate urban transport to achieve urban sustainability, in *IOP Conference Series: Materials Science and Engineering*, 1-10

Jelti, F., Allouhi, A. and Tabet Aoul, K.A. (2023). Transition paths towards a sustainable transportation system: A Literature Review, *Sustainability*, 15(21), 1-25.

Just Transition Commission (2023). Time to deliver, Annual Report 2023.

Kallio, H., Pietilä, A. M., Johnson, M., and Kangasniemi, M. (2016). Systematic methodological review: Developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, 72(12), 2954–2965

Kammerlander, M., Schanes, K., Hartwig, F., Jäger, J., Omann, I., O’Keeffe, M. (2015). A resource-efficient and sufficient future mobility system for improved well-being in Europe, *European Journal of Futures Research*, 3(1).

Greater Kampala Metropolitan Area (2024). *Draft final report*

Karner, A., London, J., Rowangould, D., and Manaugh, K. (2020). From transportation equity to transportation justice: within, through, and beyond the state. *Journal of Planning Literature*, 35(4), 440-459.

Kasimbazi, E. (2018). Urban expansion in the greater kampala metropolitan area, Uganda, *United Nations Habitat*, 16–60.

Katushabe, C., Kumaran, S. and Masabo, E. (2021). Fuzzy based prediction model for air quality monitoring for kampala city in East Africa, *Applied System Innovation*, 4(3), 1–14.

Kazaura, W.G. (2023). Reliability of rapid bus transit in provision of public transport services in Dar es salaam city, Tanzania. *Journal of Urban and Landscape Planning*, (8), 24–37.

Khumalo, T.N. and Ogra, A. (2018). Effectiveness of Rea Vaya Bus Rapid Transit System (BRTS) in the city of Johannesburg, *Proceedings of the International Conference on Industrial Engineering and Operations Management*, 886–899.

Kime, S., Jacome, V., Pellow, D., Deshmukh, R. (2023). Evaluating equity and justice in low-carbon energy transitions, *Environ.Res. Lett*, 18, 1-36.

Kimuli, I., Lubwama, M., Kirabira, J., Sebbit, A. (2023). Development of a sustainable low-carbon footprint for the Greater Kampala Metropolitan Area: The efficacy of a TIMES/CGE hybrid framework, *Energy Reports*, (9), 19–36.

Kituuka, O., Mwaka, E., Munabi, I., Galukande, M. (2023). Experiences of patients and next of kin on informed consent process for emergency surgery in two Urban university teaching hospitals in Uganda: a comparative cross-sectional study, *BMC Emergency Medicine*, 23(1), 1-8

- Klopp, J.M. and Quarshie, L.M. (2019). A review of BRT as public transport reform in African Cities, 1-31
- Kovačić, M., Mutavdžija, M. and Buntak, K. (2022). New Paradigm of sustainable urban mobility: Electric and autonomous vehicles—A Review and bibliometric analysis, *Sustainability (Switzerland)*, 14(15).
- Krawchenko, T.A. and Gordon, M. (2021). How do we manage a just transition? A comparative review of national and regional just transition initiatives, *Sustainability (Switzerland)*, 13(11).
- Krüger, F., Titz, A., Arndt, R., GroB, F., Mehrbach, F., Pajung, V., Suda, L., Wadenstorfer, M., Wimmer, L. (2021). The bus rapid transit (BRT) in Dar es salaam: A pilot study on critical infrastructure, sustainable urban development and livelihoods, *Sustainability (Switzerland)*, 13(3), 1–30.
- Kubanza, N.S., Das, D.K. and Simatele, D. (2017). Some happy, others sad: exploring environmental justice in solid waste management in Kinshasa, The Democratic Republic of Congo, *Local Environment*, 22(5), 595–620.
- Kumar, A. (2011). Understanding the emerging role of motorcycles in African cities: a political economy perspective. Sub-Saharan Africa Transport Policy Program (SSATP), Sub-Saharan Africa Transport Policy Program, *Urban Transport Series*.
- Kunszaja, S. and Budzyński, A. (2024). Sustainable societal transformation: Shaping renewable energy technologies in transport, in *MATEC Web of Conferences*, 01006.
- Kvale, S. (1996). Interviews: an introduction to qualitative research interviewing. Thousand Oaks: SAGE.
- Lättman, K. and Otsuka, N. (2024). Sustainable development of urban mobility through active travel and public transport, *Sustainability (Switzerland)*, 16(2), 1–8.
- Lazzeroni, P., Caroleo, B., Arnone, M., Botta, C. (2021). A simplified approach to estimate ev charging demand in urban area: An italian case study, *Energies*, 14(20).
- Lamont, J., Favor, C. (2017). Distributive justice, in: E.N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy*, 2017th ed., Metaphysics Research Lab, Stanford University.
- Li, Y., Davis, C., Lukszo, Z. and Weijnen, M. (2016). Electric vehicle charging in China's power system: Energy, economic and environmental trade-offs and policy implications. *Applied energy*, (173) 535-554.
- Liu, H., Liu, R., Xu, R., Han, L., Ruan, S. (2022). Hierarchical energy management strategy considering switching schedule for a dual-mode hybrid electric vehicle, in *Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering*, 938–949.
- Loorbach, D., Schwanen, T., Doody, B., Arnfalk, P., Langeland, O., Farstad, E. (2021). Transition governance for just, sustainable urban mobility: An experimental approach from Rotterdam, the Netherlands, *Journal of Urban Mobility*, (1), 2-9

- Lucas, K., van Wee, B. and Maat, K. (2015). A method to evaluate equitable accessibility: combining ethical theories and accessibility-based approaches, *Transportation*, 43(3), 473–490
- Markkanen, S. and Anger-Kraavi, A. (2019). Social impacts of climate change mitigation policies and their implications for inequality, *Climate Policy*, 19(7), 827–844.
- Martens, K. (2016). *Transport Justice: Designing fair transportation systems*. New York, NY: Routledge.
- Martens, K. (2012). Justice in transport as justice in accessibility: Applying Walzer's "Spheres of Justice" to the transport sector, *Transportation*, 39(6), 1035–1053.
- Mbara, T. and Maseko, B. (2020). The johannesburg negotiated bus rapid transit contract: How has it benefitted the stakeholders?, *Journal of Transport and Supply Chain Management*, 14, 1-11
- McCauley, D. and Heffron, R. (2018). Just transition: Integrating climate, energy and environmental justice', *Energy Policy*, 119, 1–7.
- Meadowcroft, J. (2009). What about the politics? Sustainable development, transition management, and long-term energy transitions', *Policy Sciences*, 42(4), 323–340.
- Merkert, R., Mulley, C. and Hakim, M.M. (2017). Determinants of bus rapid transit (BRT) system revenue and effectiveness – A global benchmarking exercise, *Transportation Research Part A: Policy and Practice*, (106), 75–88.
- Messeidy, R. El (2019). Towards Better Cities: Improving walkability in terms of seven principles, *Journal of Urban Research*, (33), 154–171.
- Milakis, D., Van Arem, B. and Van Wee, B. (2017). Policy and society related implications of automated driving: A review of literature and directions for future research, *Journal of Intelligent Transportation Systems: Technology, Planning, and Operations*, 21(4), 324–348.
- Mimano, C. Kost, C., Reich, T., ITDP, Fulton, L., Davis, U. (2024) Sustainable cities through transport : optimising urban investments in africa.
- Mullen, C.A. (2021). Why mobility justice means prioritising accessible walking environments, *Active Travel Studies*, 1(1), 1–9.
- Mwebesa, M., Chou, C., Yoh, K., Doi, K. (2021). A Cross-sector framework to boost the sustainable implementation of integrated transport and spatial strategies to improve safety and mobility of moto-taxi riders, *Frontiers in Sustainable Cities*, (3), 1–18.
- Nanayakkara, S., Sperling, J., Johnson, C., Morris, E., Bracho, R., Fang, A. (2023). Just and sustainable mobility transition in the transport sector: a conceptual framework and gender-mainstreaming case studies developed through the usaid-nrel partnership's electric mobility and sustainable transport pillar.
- Ndibatya, I. and Booysen, M.J. (2020). Minibus taxis in Kampala's paratransit system: Operations, economics and efficiency, *Journal of Transport Geography*, 88, 1-11

- Ndibatya, I. and Booysen, M.J. (2021). Characterizing the movement patterns of minibus taxis in Kampala's paratransit system, *Journal of Transport Geography*, 92,1-9
- Neuvonen, A. and Ache, P. (2017). Metropolitan vision making – using backcasting as a strategic learning process to shape metropolitan futures, *Futures*, (86), 73–83.
- Ngossaha, J., Ngouna, R., Archimède, B., Negulescu, M., Petrișor, A. (2024). Toward Sustainable Urban Mobility: A Multidimensional Ontology-Based Framework for Assessment and Consensus Decision-Making Using DS-AHP, *Sustainability (Switzerland)* , 16(11), 1–22.
- Nicola, S. and Schmitz, S. (2022). Discordant agendas on a just transition in Romanian coal mining areas: The case of the Jiu Valley', *Moravian Geographical Reports*, 30(4), 257–269.
- Nsafon, B., Same, N., Yakub, A., Chaulagain, D., Kumar, N., Huh, J. (2023). The justice and policy implications of clean energy transition in Africa, *Frontiers in Environmental Science*, 11(01), 1–13.
- O'Brien, K. and Sygna, L. (2013). Responding to climate change: the three spheres of transformation. in *Proceedings transformation in a changing climate : International Conference in Oslo 19-21 June 2013*.
- Okyere, S., Frimpong, L., Boateng, F., Mensah, S., Oviedo, D., Abunyewah, M., Kita, M. (2024). Walking cities that are (un)walkable: exploring everyday lived realities in low-income neighbourhoods in Accra, *Transportation*.
- Oña Caizaluisa, J.F. (2022). Analysis of the level of satisfaction of users of urban transport (buses) in the Metropolitan District of Quito.
- Orozco-Fontalvo, M., Soto, J., Arévalo, A., Oviedo-T. (2019). Women's perceived risk of sexual harassment in a Bus Rapid Transit (BRT) system: The case of Barranquilla, Colombia, *Journal of Transport and Health*, (14), 1-10
- Panakaduwa, C., Coates, P. and Munir, M. (2024). Identifying sustainable retrofit challenges of historical Buildings: A systematic review', *Energy and Buildings*, 313, 1-10
- Papadakis, D., Savvides, A., Michael, A., Michopoulos, A. (2024). Advancing sustainable urban mobility: insights from best practices and case studies, *Fuel Communications*, (20),1-18
- Pereira, R., Banister, D., Schwanen, T., Wessel, N. (2019). Distributional effects of transport policies on inequalities in access to opportunities in Rio de Janeiro, *Journal of Transport and Land Use*, 12(1), 741–764.
- Pereira, R.H.M., Schwanen, T. and Banister, D. (2017). Distributive justice and equity in transportation, *Transport Reviews*, 37(2), 170–191.
- Pérez, J., Correa, L., Østergaard, P., Cabrera, P. (2024). Assessment of energy consumption, environmental effects and fuel costs of the bus rapid transit system in Bogotá (Colombia), *Clean Energy*, 8(3), 34–47.

- Pinna, F., Masala, F. and Garau, C. (2017). Urban policies and mobility trends in Italian smart cities', *Sustainability (Switzerland)*, 9(4).
- Pojani, D. and Stead, D. (2015). Sustainable urban transport in the developing world: Beyond megacities, *Sustainability (Switzerland)*, 7(6), 7784–7805.
- Presidential Climate Commission (2022). Framework for a Just Transition in South Africa. Draft for public comment, (02).
- Randal, E., Shaw, C., Woodward, A., Howden-Chapman, P., Macmillan, A., Hosking, J., Chapman, R., Waa, A., Keall, M. (2020). Fairness in transport policy: A new approach to applying distributive justice theories', *Sustainability (Switzerland)*, 12(23), 1–21.
- Routledge, P., Cumbers, A. and Derickson, K.D. (2018). States of just transition: Realising climate justice through and against the state, *Geoforum*, 88(12), 78–86.
- Sami, M. and Sara, K. (2023). Intelligent transportation systems for sustainable urban environments, *International Journal of Advanced Natural Sciences and Engineering Researches*, 166–177.
- Schuller, A. and Aboukrat, M. (2019). The Role of e-scooters and light electric vehicles in decarbonizing cities, *Carbone 4*.
- Schulte, J. and Hallstedt, S.I. (2018). Workshop method for early sustainable product development, *Proceedings of International Design Conference, DESIGN*, (6) 2751–2762.
- Schlitz, M., Vieten, C., and Miller. (2010). Worldview Transformation and the development of social consciousness. *Journal of Consciousness Studies*, 17(7–8), 18–36. Imprint Academic.
- Shah, K., Pan, S. Lee, I., Kim, H., You, Z., Zheng, J., Chiang, P. (2021). Green transportation for sustainability: Review of current barriers, strategies, and innovative technologies, *Journal of Cleaner Production*, 326(02), 1-13
- Sharifi, A. (2021). Co-benefits and synergies between urban climate change mitigation and adaptation measures: A literature review, *Science of the Total Environment*, 750.
- Smeds, E. and Jones, P. (2020). Developing Transition Pathways towards Sustainable Mobility in European cities.
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines, *Journal of Business Research*, (104), 333–339.
- Stavis, D. and Felli, R. (2020). Planetary just transition? How inclusive and how just?', *Earth System Governance*, (6), 1-11
- Thornton, T.F. and Comberti, C. (2017). Synergies and trade-offs between adaptation, mitigation and development, *Climatic Change*, 140 (1), 5–18.
- Tan, S.Y. and Taeihagh, A. (2020). Smart city governance in developing countries: A systematic literature review, *Sustainability (Switzerland)*, 12(3).

The Republic of Uganda (2022). Ministry of lands, housing and urban development: *Integrated urban strategy for transport*.

Transport for London (2024). TfL announces safety ban of e-scooters on transport network. TfL. 09. December. Internet: <https://tfl.gov.uk/info-for/media/press-releases/2021/december/tfl-announces-safety-ban-of-e-scooters-on-transport-network>, last accessed 26th August 2024.

Trimmel, K., Kriechbaum, M., Lazou, R., Brudermann, T. (2024). Between distributive and procedural justice claims: Reframing patterns of discursive resistance against climate action, *Energy Research and Social Science*, 109(02), 1-11.

Tuominen, A., Tapio, P., Varho, V., Järvi, T., Banister, D. (2014). Pluralistic backcasting: Integrating multiple visions with policy packages for transport climate policy, *Futures*, (60), 41–58.

Tuydes-Yaman, H., Dalkic-Melek, G., Chakarova, K., Ozcelik, A. (2024). Barriers and opportunities (B&O) for developing low carbon transportation (LCT) policies in Turkey, *Journal of Transport Geography*, (118), 1-15

Uganda Bureau of Statistics (2019) *Statistical Abstract 2019*.

UBOS (2024). *National Population and housing Census*, Uganda Bureau of Statistics, Kampala.

UN DESA (2023). *SDGs Report 2023, The Sustainable development Goals Report 2023: Special Edition*, 80.

UNEP (2023). *Emissions Gap Report 2023: Broken Record – Temperatures hit new highs, yet world fails to cut emissions (again)*, Nairobi.

UNFCCC (2016). Just Transition of the workforce and the creation of decent work and quality jobs: technical paper, 1–71.

UNFCCC. (2015). *Paris Agreement*. United Nations Framework Convention on Climate Change.

UN-Habitat. (2017). *New Urban Agenda*. United Nations Human Settlements Programme.

United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. <https://sdgs.un.org/2030agenda>

Venter, C., Jennings, G., Hidalgo, D., Valderrama Pineda, A. (2018). The equity impacts of bus rapid transit: A review of the evidence and implications for sustainable transport, *International Journal of Sustainable Transportation*, 12(2), 140–152.

Vybornova A, Cunha T, Gühnemann A, Szell, M. (2022). Automated detection of missing links in bicycle networks. *Geographical Analysis (in print)*.

Walker, R., Yeung, D., Lee, M., Lee, I. (2020). Assessing information-based policy tools: an eye-tracking laboratory experiment on public information posters, *Journal of Comparative Policy Analysis: Research and Practice*, 22(6), 558–578..

- Wang, X. and Lo, K. (2021). Just transition: A conceptual review, *Energy Research and Social Science*, 82(09), 1-11.
- Ward, C. and Walsh, D. (2023). "I just don't go nowhere:" How transportation disadvantage reinforces social exclusion, *Journal of Transport Geography*, 110(11), 1-8
- Wefering, F., Rupprecht, S., Buhrmann, S., Bohler-Baedeker, S. (2014) Guidelines: Developing and implementing a sustainable urban mobility plan, Workshop.
- Welton, S., Eisen, J. (2019). Clean energy justice: Charting an emerging agenda, *Harvard Environ Law Rev.* 43 (2) 307-37
- Whittle, C., Whitmarsh, L., Hagger, P., Morgan, P., Parkhurst, G. (2019). User decision-making in transitions to electrified, autonomous, shared or reduced mobility, *Transportation Research Part D*: 71, 302–319.
- Williams, S. and Doyon, A. (2019). Justice in energy transitions, *Environmental Innovation and Societal Transitions*, 31(01), 144–153.
- Winters, M., Fischer, J., Nelson, T., Fuller, D., Whitehurst, D. (2018). Equity in spatial access to bicycling infrastructure in mid-sized Canadian cities, *Transportation Research Record*, 2672(36), 24–32.
- World Bank (2021). *Demographic Trends and Urbanization*.
- Yang, A., Liu, C., Yang, D., Lu, C. (2023). Electric vehicle adoption in a mature market: A case study of Norway, *Journal of Transport Geography*, 106, 1-10.

Appendix I: Wits Ethic Clearance Certificate



6 August 2024

Rapa, Calvin
2891967

TO WHOM IT MAY CONCERN

RESEARCH ETHICS APPROVAL

Sustainable Urban Mobility Systems that bridge Climate Change Mitigation and Just Transitions: A case study of Kampala City, Uganda.

This letter serves to confirm that the Ethics application for the above titled study has been approved. The researcher has been granted clearance to proceed with the research study or project.

Protocol/clearance number is: **SOAP054/05/2024**

Yours sincerely

Motsei Choabi
Senior Administrative Manager | School of Architecture and Planning
E: motsei.choabi@wits.ac.za
T: +27 11 717 7727
W: www.wits.ac.za/soap/

School of Architecture and Planning, Faculty of Engineering and Built Environment, John Moffat Building, Wits, 2050, South Africa

Appendix II: Plagiarism Declaration Form

Faculty of Engineering and the Built Environment

Private Bag 3, Wits 2050, South Africa * Telephone (011) 717 – 7007 * Fax: (011) 717 7009 * Email: febe.pg@wits.ac.za



PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Calvin Rapa, student number 2891967 am a student registered for the degree of Master of Urban Studies in the field of urban management in the academic year 2024.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

Signature:  Date: 13th December 2024

Appendix III: Participant Information Forms



Date: 16th May 2024

Participant's information sheet- Civil Servants (Kampala Capital City Authority Officials)

Dear Sir / Madam

My name is Rapa Calvin, I am a master's student in Urban Studies (Urban Management) at the University of the Witwatersrand, Johannesburg. My supervisor is Dr. Emmanuel T. Busayo. I am conducting a research study about Urban Mobility. The study title is: **Sustainable Urban Mobility Systems that bridge Climate Change Mitigation and Just Transitions: A Case Study of Kampala City.**

I am inviting you to take part in an interview. If you decide to take part, your participation in this research study will last not more than 40 minutes. The interview activity either be in person or online through Microsoft teams during working hours of your choice.

With your permission, I would like to audio record the interview using a digital device. This data will be stored in a password protected folder in my personal laptop for one year and deleted after 5 years. I will be the only person with access to the data.

All the information provided during the interview will be confidential. While the anonymity is not guaranteed during interview process, unless you give me permission, in the resulting report, this is guaranteed.

If you decide to take part in the research study, it should be because you want to volunteer. You do not have to take part. You can stop being in the study at any time. You do not have to answer any questions if you do not want to. You will not get any direct benefits if you choose to join the research study. You will not lose any services, benefits or rights you would normally have if you decided not to join. No payment for being part of this research will not be made.

The risks for this research study are no more than what happens in everyday life.

This research study will be written as a research report, and part of its objectives may be published in the academic journal. The report will be available on the university library website. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecon-medical@wits.ac.za.

Yours sincerely,

A handwritten signature in blue ink, appearing to be 'J. M. M.', with a stylized flourish at the end.

Researcher:

Wits email: 2891967@students.wits.ac.za

Supervisor:

Dr. Emmanuel T. Busayo, Wits email: emmanuel.busayo@wits.ac.za

Date: 16th May 2024

Participant's information sheet-Academics (Makerere University)

Dear Sir / Madam

My name is Rapa Calvin, I am a master's student in Urban Studies (Urban Management) at the University of the Witwatersrand, Johannesburg. My supervisor is Dr. Emmanuel T. Busayo. I am conducting a research study about Urban Mobility. The study title is: **Sustainable Urban Mobility Systems that bridge Climate Change Mitigation and Just Transitions: A Case Study of Kampala City, Uganda**

I am inviting you to take part in an interview. If you decide to take part, your participation in this research study will last not more than 40 minutes. The interview activity will take place online through Microsoft teams during working hours of your choice.

With your permission, I would like to audio record the interview using a digital device. This data will be stored in a password protected folder in my personal laptop for one year and deleted after 5 years. I will be the only person with access to the data.

All the information provided during the interview will be confidential. While the anonymity is not guaranteed during interview process, unless you give me permission, in the resulting report, this is guaranteed.

If you decide to take part in the research study, it should be because you want to volunteer. You do not have to take part. You can stop being in the study at any time. You do not have to answer any questions if you do not want to. You will not get any direct benefits if you choose to join the research study. You will not lose any services, benefits or rights you would normally have if you decided not to join. No payment for being part of this research will not be made.

The risks for this research study are no more than what happens in everyday life.

This research study will be written up as a research report, and part of its objectives will be published in the academic journal. The report will be available on the university library website. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Yours sincerely,

A handwritten signature in blue ink, appearing to be 'J. Busayo', with a stylized flourish at the end.

Researcher:

Wits email: 2891967@students.wits.ac.za

Supervisor:

Dr. Emmanuel T. Busayo, Wits email: emmanuel.busayo@wits.ac.za

MAKERERE

P.O. Box 7062 Kampala UGANDA
E-mail: arch@tech.mak.ac.ug



UNIVERSITY

Tel: +256 - 41 - 531860
Fax: +256 - 41 - 530686

DEPARTMENT OF ARCHITECTURE AND PHYSICAL PLANNING

Your Ref: Date: 27th May 2024

**The Academic Research Ethics Committee
School of Architecture & Planning
University of Witwatersrand**

AUTHORISATION TO CONDUCT RESEARCH

This serves to confirm that Mr. Calvin Rapa of University of the Witwatersrand Johannesburg has been granted permission to conduct research at Makerere University on Topic: Sustainable Urban Mobility Systems that bridge climate change mitigation and just transitions: A case study of Kampala city, Uganda.

He is free to get in touch with any of the academic staff of the University that he feels to share the same interests on the stated research topic.

This authorization is valid until 15th May 2025.

Sincerely

**Dr. Kiggundu Tamale
HOD**

Architecture & Physical Planning Department
Makerere University
E-mail address: tamaleamin@gmail.com

Date: 16th May 2024

Participant's information sheet-Private Sector employees (Cfao Mobility Uganda-Ltd)

Dear Sir / Madam

My name is Rapa Calvin, I am a master's student in Urban Studies (Urban Management) at the University of the Witwatersrand, Johannesburg. My supervisor is Dr. Emmanuel T. Busayo. I am conducting a research study about Urban Mobility. The study title is: **Sustainable Urban Mobility Systems that bridge Climate Change Mitigation and Just Transitions: A Case Study of Kampala City, Uganda**

I am inviting you to take part in an interview. If you decide to take part, your participation in this research study will last not more than 40 minutes. The interview activity will take place online through Microsoft teams during working hours of your choice.

With your permission, I would like to audio record the interview using a digital device. This data will be stored in a password protected folder in my personal laptop for one year and deleted after 5 years. I will be the only person with access to the data.

All the information provided during the interview will be confidential. While the anonymity is not guaranteed during the interview process, unless you give me permission, in the resulting report, this is guaranteed.

If you decide to take part in the research study, it should be because you want to volunteer. You do not have to take part. You can stop being in the study at any time. You do not have to answer any questions if you do not want to. You will not get any direct benefits if you choose to join the research study. You will not lose any services, benefits or rights you would normally have if you decided not to join. No payment for being part of this research will not be made.

The risks for this research study are no more than what happens in everyday life.

This research study will be written up as a research report, and part of its objectives will be published in the academic journal. The report will be available on the university library website. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Yours sincerely,

A handwritten signature in blue ink, appearing to be 'J. Busayo', with a stylized flourish at the end.

Researcher:

Wits email: 2891967@students.wits.ac.za

Supervisor:

Dr. Emmanuel T. Busayo, Wits email: emmanuel.busayo@wits.ac.za



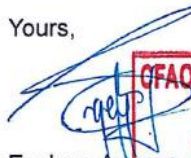
The Academic Research Ethics Committee,
School of Architecture and Planning
University of Witwatersrand, Johannesburg

REF: AUTHORIZATION TO CONDUCT RESEARCH

This is to confirm that Mr. Calvin Rapa of University of the Witwatersrand, Johannesburg has been granted permission to conduct research in CFAO Mobility, Kampala on the topic: Sustainable Urban Mobility Systems that bridge Climate Change Mitigation and Just Transitions: A Case Study of Kampala City, Uganda. During the interview periods, he will be given all the necessary support in regard to his research objectives.

This authorization is valid until 30th July 2025.

Yours,


CFAO MOBILITY UGANDA LIMITED
P. O. BOX 31732,
KAMPALA, UGANDA

Evelynn Angye

Head of Human Resources

Date: 10th July 2024

Date: 16th May 2024

Participant's information sheet- Civil Servants (Taxi Operators Associations)

Dear Sir / Madam

My name is Rapa Calvin, I am a master's student in Urban Studies (Urban Management) at the University of the Witwatersrand, Johannesburg. My supervisor is Dr. Emmanuel T. Busayo. I am conducting a research study about Urban Mobility. The study title is: **Sustainable Urban Mobility Systems that bridge Climate Change Mitigation and Just Transitions: A Case Study of Kampala City, Uganda**

I am inviting you to take part in an interview. If you decide to take part, your participation in this research study will last not more than 40 minutes. The interview activity either be in person or online through Microsoft teams during working hours of your choice.

With your permission, I would like to audio record the interview using a digital device. This data will be stored in a password protected folder in my personal laptop for one year and deleted after 5 years. I will be the only person with access to the data.

All the information provided during the interview will be confidential. While the anonymity is not guaranteed during interview process, unless you give me permission, in the resulting report, this is guaranteed.

If you decide to take part in the research study, it should be because you want to volunteer. You do not have to take part. You can stop being in the study at any time. You do not have to answer any questions if you do not want to. You will not get any direct benefits if you choose to join the research study. You will not lose any services, benefits or rights you would normally have if you decided not to join. No payment for being part of this research will not be made.

The risks for this research study are no more than what happens in everyday life.

This research study will be written up as a research report, and part of its objectives may be published in the academic journal. The report will be available on the university library website. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Yours sincerely,

A handwritten signature in blue ink, appearing to be 'J. Busayo', with a stylized flourish at the end.

Researcher:

Wits email: 2891967@students.wits.ac.za

Supervisor:

Dr. Emmanuel T. Busayo, Wits email: emmanuel.busayo@wits.ac.za

Appendix IV: Participants Consent Forms



16th May 2024

Participants Consent Form

Title of project: Sustainable Urban Mobility Systems that bridge Climate Change Mitigation and Just Transitions: A Case Study of Kampala City, Uganda

Name of researcher: Rapa Calvin

I, ..., agree to participate in this research project.

I agree to the following: (Please circle the relevant options below)

The research study was explained to me. I understand what this study is about.	YES	NO
I understand that I can volunteer to take part in the study	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that direct quotations from my interview activity may be used by the researcher in their research report and manuscript	YES	NO
I agree that my participation will remain anonymous (my name or other identifying data will not be used by the researcher in their research report and manuscript, unless I give the researcher permission.	YES	NO
I agree that other researchers may use the information I provide in my interview/ depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on	YES	NO

..... (signature)

..... (name of participant)

..... (date)

A handwritten signature in blue ink, appearing to read 'Rapa Calvin', is written over a light blue grid background.

Rapa Calvin

16.05.2024



Name of the Researcher: Calvin Rapa

Greetings, and once again thank you very much for sparing your time to participate in this interview. As I mentioned earlier, my research focuses on finding the best model that Kampala City Authorities can adopt to reduce the current amount of greenhouse gas emissions from transport sector, but in ways that does not have much impact on different categories of urban residents and existing transport providers like taxis (just transitions)

1. How would you describe the current mobility situation of Kampala city?
2. How do you envision the future of urban mobility in Kampala, considering the increasing focus on sustainability and the need to reduce carbon emissions?
3. How do you see the role of Cfao in supporting Kampala's transition towards sustainable urban mobility?
4. Can you describe your company's current involvement in sustainable urban mobility initiatives within Kampala city?
5. What are some of the factors contributing to low adoption of electric vehicles in Uganda?
6. In your opinion, what policies or regulations could the government implement to support
7. How do you see the role of innovation and technological advancements in driving the transition towards sustainable urban mobility in Kampala, and how is your company contributing to this?
8. Do you think government is doing enough to promote sustainable urban mobility transition in Uganda?
9. Looking ahead, what innovations or advancements do you foresee in the field of low carbon vehicle manufacturing, and how do you plan to stay at the forefront of these developments?
10. Can you discuss any regulatory or policy influences that have shaped your approach to low carbon manufacturing?
11. How do you balance the environmental benefits of low carbon vehicles with factors such as cost-effectiveness and consumer demand?



Name of the Researcher: Calvin Rapa

Greetings, and once again thank you very much for sparing your time to participate in this interview. As I mentioned earlier, my research focuses on finding the best model that Kampala City Authorities can adopt to reduce the current amount of greenhouse gas emissions from transport sector, but in ways that does not have much impact on different categories of urban residents and existing transport providers like taxis (just transitions)

1. How would you describe the current mobility situation of Kampala city?
2. What, in your opinion are the key challenges currently facing urban mobility in Kampala city?
3. What have been some of the successful initiatives or projects that have been implemented or planned aimed at promoting sustainable urban mobility in Kampala.
4. From your experience, what are the main barriers hindering the implementation of sustainable urban mobility initiatives in Kampala, and how can they be overcome?
5. Looking ahead, what do you see as the most important steps or actions that need to be taken to achieve a sustainable urban mobility transition in Kampala city?
6. How would you assess the performance of some of the non-motorized zones created within the city centre?
7. Do you see the opportunities to transition to sustainable urban mobility in Kampala?
8. How would you describe the Kampala urban form and structure in relation to achieving sustainable urban mobility transition?



Name of the Researcher: Calvin Rapa

Greetings, and once again thank you very much for sparing your time to participate in this interview. As I mentioned earlier, my research focuses on finding the best model that Kampala City Authorities can adopt to reduce the current amount of greenhouse gas emissions from transport sector, but in ways that does not have much impact on different categories of urban residents and existing transport providers like taxis (just transitions)

1. How would you describe the urban mobility situation of Kampala?
2. What do you think went wrong in the transport service provision in Kampala city?
3. Why do you think most of the strategies being employed by KCCA failing to address especially traffic congestions in the city?
4. What specific policy frameworks or regulatory measures that you think could be crucial for supporting a sustainable urban mobility transition in Kampala?
5. What role do you believe stakeholders such as government agencies, private sector entities, civil society organizations, and local communities could play in driving forward sustainable mobility transitions in Kampala?
6. How can innovative technologies and digital solutions be leveraged to enhance urban mobility efficiency and sustainability in Kampala?
7. What are your thoughts on how the integration of different modes of transportation, such as public transit, cycling infrastructure, and pedestrian-friendly urban design, could be undertaken in promoting sustainable mobility in Kampala?
8. Looking ahead, what do you envision as the most promising strategies or approaches for advancing sustainable urban mobility in Kampala in the coming years, and what are the main obstacles that need to be addressed to realize this vision?



Name of the Researcher: Calvin Rapa

Greetings, and once again thank you very much for sparing your time to participate in this interview. As I mentioned earlier, my research focuses on finding the best model that Kampala City Authorities can adopt to reduce the current amount of greenhouse gas emissions from transport sector, but in ways that does not have much impact on different categories of urban residents and existing transport providers like taxis (just transitions)

1. Previously, there was Uganda Taxi operators and drivers' association, now Federation of Uganda Taxi Operators. Why the change of name?
2. How many taxi operators are registered with the National Association which you lead?
3. How would you describe the public transport sector of Uganda, specifically Kampala city?
4. There used to be Pioneer Buses operating in the city, it did not last for 1 year. Why do you think they failed, even when they were supported by the Kampala City Authorities?
5. Most of the Taxis on Kampala roads rare in poor conditions. Why is it quite hard for the owners to maintain their vehicles?
6. Most people complain about traffic jam in the city, and they say it is caused by many taxis on the road. Do you agree with this, and how best can this challenge be addressed?
7. If there is a plan to introduce Buses again on the city roads, how best do you think this should be done?
8. Could there be a better solution for the existing old, aged taxis and traffic congestions in the city?