

UNIVERSITY OF EDUCATION, WINNEBA

**E-hailing services- lessons for intra-urban transport needs and planning. A study
of Accra Metropolitan Area.**



ANTHONY FIANGOR

MASTER OF PHILOSOPHY

2024

UNIVERSITY OF EDUCATION, WINNEBA

**E-HAILING SERVICES: LESSONS FOR INTRA URBAN TRANSPORT
NEEDS AND PLANNING. A STUDY OF ACCRA METROPOLITAN AREA.**



**A thesis in the Department of Geography Education,
Faculty of Social Science Education, submitted to the school of
Graduate Studies in partial fulfilment
of the requirements for the award of the degree of
Master of Philosophy
(Geography with Education)
in the University of Education, Winneba**

MAY, 2024

DECLARATION

STUDENT'S DECLARATION

I, **Anthony Fiangor**, declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

Signature.....

Date.....

SUPERVISORS' DECLARATION

We hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis/dissertation/project as laid down by the University of Education, Winneba.

Prof. Enoch F. Sam (Principal Supervisor)

Signature.....

Date.....

Dr. Prince Kwame Odame (Co-Supervisor)

Signature.....

Date.....

DEDICATION

This study is dedicated to Mr. & Mrs. Fiangor, who are of blessed memory; Mr. Samuel Tei, who is of blessed memory; and my siblings Gladys, Vivian, Patience, Magaret, and Peter.



ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere gratitude to my supervisor, Prof. Enoch F. Sam, for his invaluable guidance, unwavering support, and profound insights throughout this research journey. His mentorship and constructive feedback have been instrumental in shaping this work. I am deeply grateful to my co-supervisor, Dr. Prince Kwame Odame, for his valuable contributions, insightful suggestions, and constant encouragement, which significantly enriched this study. I also extend my heartfelt appreciation to Dr. Osman Adams for his advice and mentoring, which have been instrumental in navigating the challenges encountered during this research. My sincere thanks go to Dr. Victor Owusu, the exams officer of the Geography Department, for his mentorship and support throughout my academic journey. I am forever indebted to the late Mr. Samuel Tei, whose financial assistance played a crucial role in enabling me to pursue this research. I am profoundly grateful to my late parents, Mr. and Mrs. Fiangor, whose unwavering love, sacrifices, and support drive my academic pursuits. I want to thank my siblings for their constant encouragement and belief in me, which strengthened me throughout this journey. I am deeply grateful to my friend Emmanuel Niagiah, who is in the USA, whose friendship and moral support have constantly motivated me. I want to acknowledge the contributions of all those who have directly or indirectly supported me in this endeavour but whose names are not mentioned here. Your kindness and support have been invaluable. Finally, I would like to acknowledge all sources cited, paraphrased, or quoted in this study, including books, journal articles, web pages, handouts, etc.

TABLE OF CONTENTS

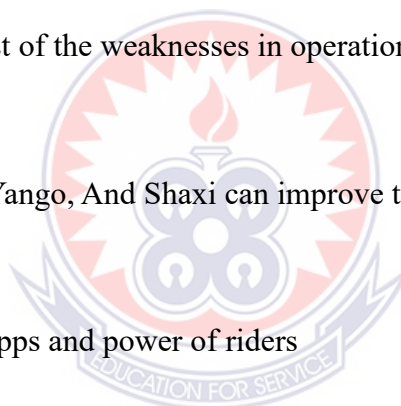
Content	Page
DECLARATION	iii
DEDICATION	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	x
ABSTRACT	xii
CHAPTER ONE: INTRODUCTION	1
1.0 Background to the study	1
1.1 Statement of the problem	4
1.2 Purpose of the study	6
1.3 Research objectives	6
1.4 Significance of the study	7
1.5 Study delimitations	7
1.6 Study organization	8
CHAPTER TWO: LITERATURE REVIEW	9
2.0 Introduction	9
2.1 Definition of concepts	9
2.2 Theoretical framework	11
2.3 Conceptual framework	14
2.4 Evolution of E-hailing Services	16
2.5 Business models of e-hailing services	19

2.6 Factors contributing to the growth of e-hailing services and rider preferences.	21
2.7 Innovations in e-hailing services	26
2.8 Regulatory challenges of e-hailing services	28
2.9 Impact of e-hailing services on urban transport planning	30
2.10 E-hailing mobile- ICT apps and power of drivers, riders, and e-hailing service companies	33
2.11 The state of traditional taxi services in Ghana	40
CHAPTER THREE: RESEARCH METHODOLOGY	43
3.0 Introduction	43
3.1 Profile of the study area	43
3.2 Research paradigm	46
3.3 Research approach and design	46
3.4 Target population	47
3.5 Sample size	51
3.6 Sampling technique	52
3.7 Data sources and data collection instruments	53
3.8 Data collection procedure	55
3.9 Validity and reliability of research instrument	55
3.10 Data processing and analysis	57
3.11 Ethical considerations	60
CHAPTER FOUR: RESULTS AND DISCUSSIONS	62
4.0 Introduction	62
4.1 Socio-demographic characteristics of a rider in Accra Metropolitan Area	62
4.2 Frequency of using e-hailing and traditional taxi services	65
4.3 E-hailing service provider and frequency of usage	67

4.4 Purpose for using e-hailing services	69
4.5 Usage patterns of e-hailing services throughout the day	70
4.6 Destination of e-hailing service riders	71
4.7 Factors contributing to the growth of e-hailing services (Uber, Bolt, Yango, and Shaxi)	72
4.8 Strengths in operational modules between e-hailing and taxi services	77
4.9 Weaknesses in operational modules of e-hailing and taxi services	81
4.10 Ways Uber, Bolt, Yango, And Shaxi can improve to compete with traditional taxi services	86
4.11 E-hailing mobile apps and power of riders	90
4.12 Lessons for intra-urban transport needs and planning	94
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS	
5.0 Introduction	97
5.1 Study summary	97
5.2 Key findings	98
5.3 Conclusion	100
5.4 Recommendation	102
5.5 Areas for further studies	103
REFERENCES	104
APPENDIX I	117
APPENDIX II	125
APPENDIX III	127
APPENDIX IV	129

LIST OF TABLES

Table	Page
3.1: Residents' above 15 years within the (AMA)	48
3.2: Target Population	51
4.1: Socio-demographic characteristics of respondents	62
4.2 period of using e-hailing in the day.	70
4.3 Logistic regression analysis of predictive variables influencing rider's frequency of e-hailing service usage	73
4.4: Paired sample t-test of the strengths in operational modules between e-hailing and taxi services	77
4.5: Paired sample t-test of the weaknesses in operational modules of e-hailing and taxi services	82
4.6: Ways Uber, Bolt, Yango, And Shaxi can improve to compete with traditional taxi services	87
4.7: E-hailing mobile apps and power of riders	91



LIST OF FIGURES

Figure	Page
2.1: Disruptive innovation theory	13
2.2: Conceptual framework	15
3.1: Map of Accra Metropolitan Area	45
4.1. frequency of using e-hailing and traditional taxi services	66
4.2: E-Hailing Service and Frequency of Usage	68
4.3: Purpose for using e-hailing services in Accra Metropolitan Area	69
4.4: Destinations e-hailing riders	71



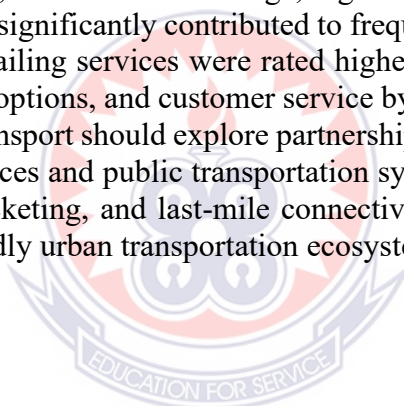
LIST OF ABBREVIATIONS

PCA	-	Principal Component Analysis
-----	---	------------------------------

KMO	-	Kaiser-Meyer-Olkin
AMA	-	Accra Metropolitan Area
GPS	-	Geographic Positioning System
AI	-	Artificial Intelligence
APA	-	American Psychological Association
NRSA	-	National Road Safety Authority
DVLA	-	Driver and Vehicle Licensing Authority
FRSC	-	Nigeria Federal Road Safety Corps
FHV	-	For Hire Services
USA	-	United States of America
TLC	-	Taxi and Limousine Commission
ETA	-	Estimated Time of Arrival
LGMS	-	Local Government Management Solutions
SoU	-	Standard of Understanding
PSV	-	Public Service Vehicle
GSS	-	Ghana Statistical Service

ABSTRACT

E-hailing services in Ghana has transformed the transport landscape by allowing passengers to use mobile applications to request a ride, track the driver's location, and pay for rides electronically. This innovation has improved safety, convenience, and affordability for passengers and drivers alike. The study aimed at determining the factors contributing to the growth of e-hailing service operations in Ghana, comparing taxi and e-hailing operations, and power play among drivers, riders, and e-hailing companies, specifically focusing on the Accra Metropolitan Area. The study adopted a mixed-method approach and an explanatory sequential design. The study utilized a mixed-methods approach, collecting quantitative data via questionnaires from 400 e-hailing riders and qualitative data through semi-structured interviews with 12 drivers and 3 e-hailing company representatives. Statistical Package for Social Sciences (SPSS), Jamovi, and Excel 365 were used to perform descriptive and inferential (t-test and multinomial regression) analysis and presented using frequency, cross-tabulation, and charts while thematic analysis was employed using key constructs that emanated from the transcripts. Key findings revealed that the e-hailing rider profile is young male adults aged 24-34 with higher education and middle-income earners. Bolt emerged as the most used platform, while factors like age, higher income, tertiary education, and perceptions of security significantly contributed to frequent e-hailing usage. Compared to traditional taxis, e-hailing services were rated higher for convenience, safety, price transparency, payment options, and customer service by riders. The study recommends that the Ministry of Transport should explore partnerships and integration opportunities between e-hailing services and public transportation systems through multi-modal trip planning, integrated ticketing, and last-mile connectivity solutions, to enable a more efficient and user-friendly urban transportation ecosystem.



CHAPTER ONE

INTRODUCTION

1.0 Background to the study

The growing technology in recent years has revolutionized various industries, including the transport sector (Malik et al., 2023; Xu et al., 2018; Morrar et al., 2017). Since the 2000s, shared mobility has seen growth in countries in the Global North and Global South, filling the gaps left by historic modes of transport traditionally categorized into private cars, public transit, and for-hire services through service diversification (Machado et al., 2018; Ruhrort, 2020; Boutueil et al., 2022). Between 2010 and 2020, cities with car-sharing services rose from 1,100 to 2,095 worldwide (Reyes et al., 2020; Boutueil et al., 2022).

“Shared mobility” is the shared use of cars, vans, scooters, bicycles, airplanes, or boats), for the same trip or not, over a short or a medium period, on an “as needed” basis (Mohamed, 2022; Boutueil et al., 2022). Shared mobility over the years has established itself as one of the new mobility trends supported by information and communication technology (Abouelesa et al., 2023). As technological innovations continue to break through the shared mobility market, so does the smartphone market. As of June 1, 2023, there were 6.8 billion smartphone users and 8.6 billion mobile phone subscriptions worldwide, meaning 80% of the world's population used a mobile phone (Lin, 2023; Taylor, 2023).

The proliferation of Mobile ICTs continues to play a significant role in shaping transport systems through the emergence of shared mobility services better designed to meet the varying needs of riders (Comi & Russo, 2022; Boutueil et al., 2022; Di Marino et al., 2023). Over the past decade in the field of transport and mobility, the rapid diffusion of mobile ICTs has led to the development of new service features such as

real-time location or navigation aid using GPS, new mobility services like free-floating car-sharing, and new business models like multi-sided market platforms for user-operator matchmaking (Javaid et al., 2022; Castellanos et al., 2022; Ghislain, 2022; Boutueil et al., 2022; Shibghatullah et al., 2022).

Shared mobility digital platforms are a subcategory of mobility applications that give individual customers direct and full access to one or more shared mobility services (Auer et al., 2022). Digital platforms in these contexts are market interfaces that "connect demand and supply" (Shibghatullah et al., 2022). The introduction of 'shared mobility' in the field of mobility has been one of the significant changes of the past decade in the Global North and Global South. One notable innovation from shared mobility is e-hailing services, which have gained immense popularity worldwide.

E-hailing services are on-demand vehicle acquisition that relies on network dependency and uses a specific digital application through the Internet (Sahir Jais & Marzuki, 2018). With the rapid development and popularization of mobile and wireless communication technologies, e-hailing companies have leveraged internet-based platforms to operate in many cities worldwide. E-hailing companies like Uber, Lyft, Didi, Grab, Careem, and Ola link drivers to passengers in real-time, which is changing the transportation industry, especially the traditional taxi industry (Wang & Yang, 2019).

These platforms offer a user-friendly, convenient, and cost-effective alternative to conventional/traditional taxi services through Geographic Positioning Systems (GPS) technology and mobile application software (Smith, 2019). Mobile applications and GPS technology ensure that e-hailing platforms offer convenience and cost-effective alternatives to conventional/traditional taxi services (Smith, 2019).

An e-hailing service operation involves three (3) main actors: passengers, the e-hailing platform, and drivers. This interconnectedness allows passengers to quickly request rides through mobile applications with their desired pick-up and drop-off locations (Pasquali et al., 2022). The request from riders is then matched with an available driver nearby by considering the estimated arrival time, driver ratings, and the distance to be travelled (Feng et al., 2022). These innovations allow passengers to track the driver's location and communicate in real time once the application accepts the ride (Huang et al., 2022).

At the end of the trip, passengers can rate the driver and provide feedback to ensure quality control within the platform once the ride is completed (Cameron & Rahman, 2022). E-hailing services provide comfort, security, convenience, accessibility, dynamic pricing, cashless payment, efficiency, transparency, and flexible employment opportunities in areas where public transportation may be unreliable (Shaheen et al., 2016; Smith, 2019; Tirachini, 2020).

The introduction of e-hailing services in Ghana began with the entry of global players like Uber and Taxify (Bolt), which entered the Ghanaian market in 2016 and 2018, respectively (Adu-Gyamfi, 2020). Uber signed a Standard of Understanding (SOU) with the Ministry of Transport in June 2016, making Accra the 467th city worldwide to offer Uber services (Aagyemang, 2019). These companies significantly changed the traditional taxi system, plagued by safety concerns and inconsistent pricing.

E-hailing services solved these issues by allowing riders to see the driver's profile, car model, and license plate number before getting into the car. The app-based payment system ensures riders are charged for their rides through the application software. Many young people in Ghana have signed up to become e-hailing drivers, as

the job's flexibility allows them to earn money while pursuing other interests. Furthermore, e-hailing services have also created job opportunities in different sectors, such as app development and customer service (Pasquali et al., 2022).

However, e-hailing services have been challenging. One significant issue is Ghana's lack of e-hailing regulations (Boateng et al., 2022). The government has slowly implemented laws addressing safety, pricing, and licensing requirements for e-hailing drivers.

1.1 Statement of the problem

Urban transportation systems globally encounter many challenges, including congestion, inadequate public transport, high road accident rates, and environmental degradation (Goetz, 2019). These issues are particularly acute in developing countries like Ghana, Nigeria, Kenya and Tanzania where rapid urbanization has outpaced the growth of transportation infrastructure (Agyapong & Ojo, 2018).

In Ghana, urban congestion is a problem, worsening travel times, fuel consumption, and pollution (Sultana et al. 2019). The inefficiency of public transport services compounds the situation as public transport in Ghana is dominated mainly by informal services such as "trotros" (shared minibuses) and taxis, which are characterized by long waiting times, unreliable services, and overcrowding, which drive preference for private car ownership, which in turn worsens congestion (Agyapong & Ojo, 2018).

According to Poku-Boansi et al. (2019), the informal nature of public transportation in Ghana has led to numerous safety concerns and inefficiencies due to the lack of a well-coordinated and regulated public transport system, which has resulted in high accident rates and substandard environmental conditions, especially in urban areas. Consequently, there is a pressing need for a more efficient and sustainable urban

transport system that can accommodate the growing demand for mobility while reducing congestion and pollution (Agyapong & Ojo, 2018).

The emergence of e-hailing services, such as Uber and Bolt, has introduced a new dimension to urban mobility, offering convenience, affordability, and reliability to urban commuters (Acheampong et al., 2020). These services have rapidly gained popularity in Ghana and other developing countries, propelled by the increasing penetration of smartphones and the Internet (Pasquali et al., 2022). Unlike traditional taxis, e-hailing services provide transparent pricing, real-time tracking, and driver rating systems, enhancing the overall user experience (Cartwright et al. (2018).

Urban transportation in Ghana faces several challenges, including congestion, inefficiencies in public transport, high accident rates, and growing environmental concerns. These issues are particularly severe in the Accra Metropolitan Area, where rapid urban growth has outpaced the development of formal transport infrastructure. Public transport is dominated by informal modes such as trotros and taxis, which are often unreliable, overcrowded, and poorly regulated, contributing to long travel times, increased pollution, and road safety issues (Agyapong & Ojo, 2018; Poku-Boansi et al., 2019).

In recent years, e-hailing services like Uber, Bolt, and Yango have emerged as a viable alternative for urban mobility in Accra. These services offer convenience, digital payment systems, and real-time tracking, filling critical service gaps left by informal operators (Acheampong et al., 2020). However, their rapid expansion raises new challenges, including regulatory uncertainty, competition with traditional operators, and concerns about their potential to worsen traffic congestion (Henao & Marshall, 2019; Pasquali et al., 2022).

There is a need for policymakers and urban planners in Ghana and other developing countries to develop a regulatory framework that supports the growth of e-hailing services while addressing the challenges they pose to traditional transport systems by setting standards for vehicle safety, emissions, and driver qualifications, as well as implementing measures to manage congestion and ensure fair competition with existing transport services (Acheampong et al., 2020).

Despite the growing body of literature on the impact of e-hailing services on urban transport, there is a lack of comprehensive studies focusing on Ghana and the lessons that can be drawn from this mode of transportation for intra-urban transport needs and planning. This gap in knowledge presents a critical problem for policymakers and urban planners who need to design and implement sustainable and efficient transportation systems that cater to the growing demand for intra-urban travel. Therefore, there is a need for a comprehensive study that investigates the modus operandi of e-hailing services and their impact on intra-urban transport and the lessons that can be learned to inform planning and policymaking for sustainable and efficient urban transportation systems.

1.2 Purpose of the study

- This research aims to assess how e-hailing services operate in the context of intra-urban transportation demands and planning in the Accra Metropolitan Area.

1.3 Research objectives

More specifically, the study seeks to.

- i. Examine the factors contributing to the growth of e-hailing services in the Accra Metropolitan Area.

- ii. Compare the operational modules of e-hailing to traditional taxi services as the basis for drawing lessons in the Accra Metropolitan Area.
- iii. Explore how e-hailing mobile- ICT apps affect the role and power of drivers, e-hailing companies, and riders in Accra Metropolitan Area.

1.4 Significance of the study

The significance of this research lies in its ability to inform policymakers, urban planners, and transportation service providers about the potential benefits and challenges associated with integrating e-hailing services into existing urban transport systems. This research study provides insights into the factors contributing to the growth of e-hailing services and how they can be integrated into existing transportation systems.

Also, by examining the operational modules of e-hailing services and comparing them to traditional taxi services, researchers can draw lessons on how to improve transportation services and address the needs of commuters. Finally, the study on the modus operandi of e-hailing services sheds light on how mobile-ICT apps affect the role and power of drivers, passengers, and regulators, helping policymakers and transportation planners develop policies and regulations responsive to the changing landscape of transportation services.

1.5 Study delimitations

This study investigates e-hailing services in the Accra Metropolitan Area (AMA). The AMA is an administrative district in Ghana within the Greater Accra Region. It is the most populous district in Ghana and home to the nation's capital, Accra. The study explores how AMA residents use e-hailing services and how it affects their daily lives. The study also examines the motivations and preferences of riders, the ease of access, the cost of the service, and the overall satisfaction with the service.

Furthermore, the study evaluates the service's safety, the drivers' reliability, and the company's customer service. Finally, the study investigates the potential of e-hailing services to improve the transportation system within AMA and the broader Ghanaian economy. With the increasing population of the AMA, e-hailing services have become an essential part of the transportation system.

1.6 Study organization

The study is organized into five chapters. The background, statement of the problem, purpose of the study, research objectives, significance of the study, study delimitations and study organization are in Chapter One. The second chapter focuses on the underlying theories and review relevant literature on the factors contributing to the growth of e-hailing services, the operational modules of e-hailing services and traditional taxi services, and the role of mobile ICT apps on the power of stakeholders. Chapter Three presents the adopted methodology for the study, including the research approach and design, target population, sample size, sampling technique, research instrument, validity and reliability, data collection procedure, data analysis, and ethical considerations. Chapter Four focuses on analyses, presentation, and discussion of the field data. Chapter Five presents the summary of findings, conclusion, and recommendations to address the objectives.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter focuses on the review of relevant literature. A systematic search was conducted across academic databases, including Google Scholar, JSTOR, ScienceDirect, Elsevier, ResearchGate, Semantic Scholar, Academia, and Taylor and Francis, to conduct this literature review. The selection criteria included articles published between 2015 and 2023 (because e-hailing services like Uber and Lyft gained popularity and widespread adoption around 2012. Hence, including articles from 2015 to 2023 ensured the literature review captured the relevant and up-to-date research on this rapidly evolving industry).

The search terms included an overview of e-hailing, growth factors of e-hailing, the evolution of e-hailing, business models of e-hailing, innovations in ride-hailing, ride-hailing regulations, and the impact of ride-hailing. The chapter is organised as follows, definition of concepts, theoretical framework, conceptual framework, evolution of e-hailing services, business models of e-hailing services, factors contributing to the growth of e-hailing services and rider preferences, innovations in e-hailing services, regulatory challenges of e-hailing services, impact of e-hailing services on urban transport planning, e-hailing mobile ICT and power of drivers, riders and e-hailing service companies and chapter summary.

2.1 Definition of concepts

E-hailing: E-hailing refers to using a digital platform or mobile application to book and request transportation services, typically for rides in taxis, private cars, or rideshare vehicles (Vega-Gonzalo et al. 2023). The service allows riders to connect with available drivers in real time and arrange transportation conveniently through their smartphones.

Rider: A rider refers to someone who uses a mobile application or digital platform to request and hire a ride from a private vehicle, typically a car or taxi, for transportation purposes (Wang & Yang, 2019)

Platform: In the context of e-hailing services, a platform refers to the digital infrastructure that facilitates the connection between passengers and drivers (Pollio, 2021). It typically consists of a mobile application or website where riders can register, book rides, track their drivers, make payments, and provide feedback. The platform acts as an intermediary, matching passengers with available drivers based on their location and preferences.

Booking: Booking in the context of e-hailing services refers to requesting a ride through the platform (Tan et al, 2017). Passengers can enter their pick-up and drop-off locations, select the type of vehicle they prefer, and submit their request. The platform then matches the passenger with an available driver who accepts the booking.

Conventional/traditional Taxi: A conventional/traditional taxi is a traditional service where passengers can hail a taxi on the street or find one at designated taxi stands (Wyman, 2017). These taxis are typically owned and operated by individual drivers or taxi companies. These taxis can be hailed on the street or found at designated taxi ranks/stands with a five (5) sitting capacity. In contrast to e-hailing services, conventional/traditional taxis do not rely on digital platforms for booking and dispatching.

Adoption: Adoption refers to passengers' and drivers' acceptance and utilization of e-hailing services (Soares et al. 2020). It measures how individuals and communities embrace and incorporate these services into their transportation habits. Factors influencing adoption include convenience, affordability, safety, and the availability of e-hailing platforms in a particular area.

Domain: In e-hailing services, domain refers to the geographical area or market where the services are available (Arora et al, 2022). E-hailing platforms typically operate within specific cities or regions, and their services may vary depending on local regulations, licensing requirements, and market demand.

Application Software: Application software, commonly known as an app, is a computer program or mobile application designed to perform specific tasks or functions. In the case of e-hailing services, the application software refers to the mobile app that passengers and drivers use to access the platform, book rides, track their location, communicate with each other, and complete transactions (Tan et al, 2017).

2.2 Theoretical framework

Disruptive Innovation Theory

Clayton Christensen proposed the disruptive innovation theory in his book "*The Innovator's Dilemma*" (1997). The theory argues that disruptive innovations enable new entrants to challenge established firms by offering products or services that are simpler, cheaper, and more accessible to a previously underserved market segment.

Disruptive innovations originate from the lower end of the market, where established firms initially see them as inferior products (Christensen, 1997). However, as technology improves, these products gain market acceptance and begin to replace the existing products. Unfortunately, established firms fail to respond to these disruptive innovations because they focus on their current customers and are unwilling to undermine their existing products.

Hazlett (2016) applied the theory to the computer industry and argued that the rise of personal computers and the decline of mainframe computers are disruptive innovations. Similarly, Benzidia et al. (2021) applied the theory in the automobile

industry and found that disruptive innovations, such as electric and autonomous vehicles, are challenging established firms' business models.

2.2.1 Components of the theory of disruptive innovation theory

The theory of disruptive innovation builds on three key components: innovative business models, enabling technologies, and a coherent value network.

- **Innovative business model:** Incumbent companies don't typically adopt an innovative business model because it offers low profit margins at first. New companies that use an innovative business model to target neglected customers can create economical, easy-to-use solutions to problems of the customer base.
- **Enabling technology:** Enabling technology in business are the innovations and technologies that create a substantial improvement or change to how people do things. When talking about disruptive innovation, enabling technologies are the innovations or technologies that make it possible for a broader market to have access to a more affordable product.
- **Coherent value network:** To successfully create a disruptive innovation in a market, a business needs to have business partners both upstream and downstream that will benefit from a new, disruptive innovation. These suppliers, vendors, and distributors change their organization or process to adopt a new business model that suits disruptive innovation. Without buy-in

from a company's network, it is difficult, if not impossible, to succeed in creating a disruptive innovation (Christensen, 1997).

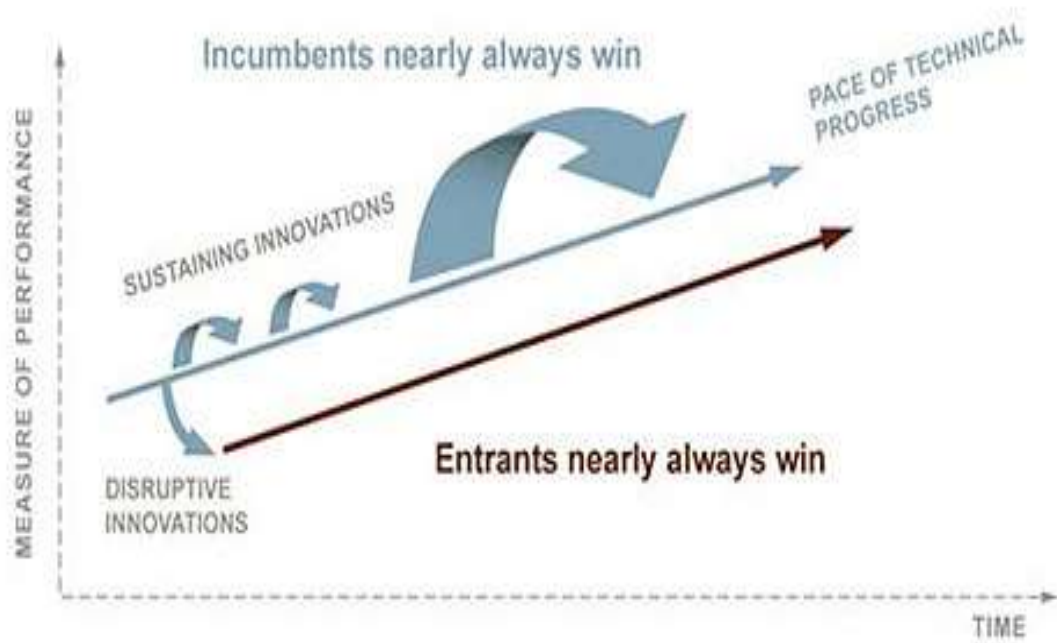


Figure 2.1: Disruptive innovation theory

Source: Christensen, 1997

2.2.2 Limitations of disruptive innovation theory

Several critiques have been made about Clayton Christensen's theory of disruptive innovation. One such critique of the theory is that it is too simple. Critics claim that the theory does not appreciate the interplay between the various actors in the innovation cycles. Secondly, the theory is often misapplied. Critics argue that the theory is often applied to innovation generally or whenever well-backed new entrants win. Thirdly, Christensen's theory ignores the element of luck or timing. Another critique is that the theory is more on business interests than the broader picture of society.

2.2.3 Relevance of disruptive innovation theory to the research study

The theory of disruptive innovation is highly relevant to the study "Modus Operandi of E-hailing Services: Lessons for Intra-Urban Transport Needs and

Planning." Disruptive innovation theory provides a valuable framework for understanding how e-hailing services, as a new entrant in the intra-urban transportation market, have disrupted traditional taxi services and created new market opportunities. The theory helps to explain how e-hailing services have initially served a niche market or lower-end customer base with lower prices and more convenient and accessible services. In contrast, traditional taxi services have continued to focus on their high-end, established customers. Over time, e-hailing services have improved their services, pricing, and technology, ultimately capturing a significant market share and displacing taxi services.

The study uses the theory of disruptive innovation to examine the operational strategies of e-hailing services, including their technology, price, customer service, and other elements, using the theory of disruptive innovation. The theory explains how e-hailing firms have provided riders with a handier and more approachable service while keeping affordable pricing and excellent quality. The theory also aids in identifying potential opportunities and difficulties for e-hailing services in developing and planning intra-urban mobility.

The theory of disruptive innovation provides a valuable lens for analysing the operational strategies of e-hailing services and identifying lessons for addressing intra-urban transportation needs and planning.

2.3 Conceptual framework

The framework in Figure 2.1 illustrates how e-hailing service, as a new technology disrupts traditional taxi services by introducing various features and advantages. The framework begins with e-hailing service as a new technology which is driven by factors such as innovation, technology, efficiency, cost-effectiveness, regulation, and safety. These factors enable e-hailing service to provide features like convenience,

dependability, customer satisfaction, comfort, flexibility, and price transparency. The combination of these features creates competition for traditional taxi services, ultimately leading to the disruption of their business model. The e-hailing service offers a more convenient, transparent, and cost-effective alternative, challenging the established practices of traditional taxi operators. The framework effectively depicts how a new technology-driven service like e-hailing leverages various advantages to gain a competitive edge and disrupt an existing industry by providing a better experience for riders.

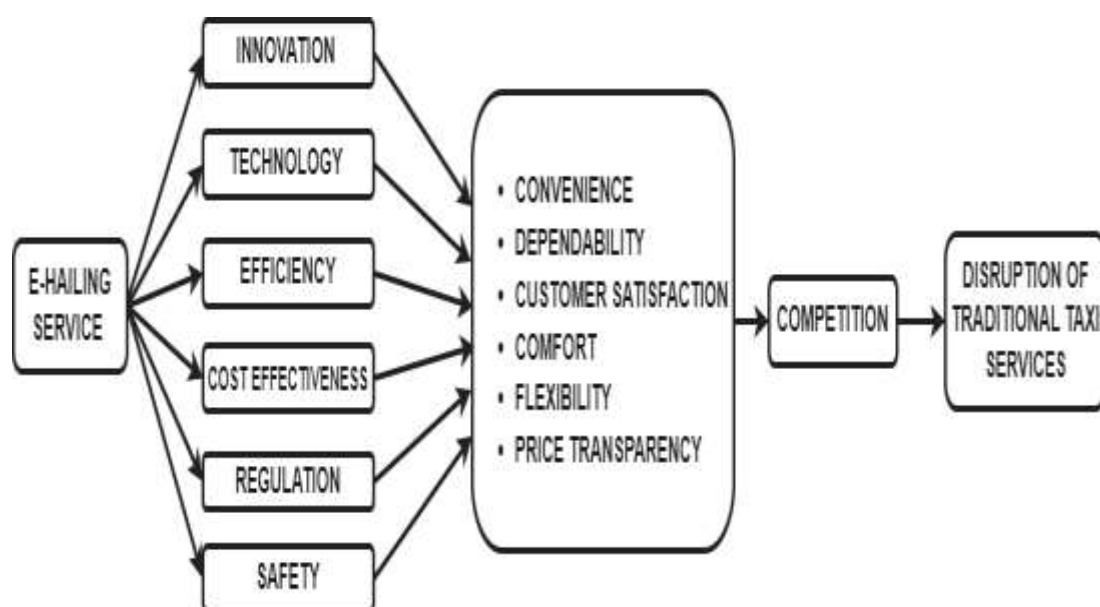


Figure 2.2: Conceptual framework of disruptive innovations

Source: Adapted construct from Christensen, 1997

2.3.1 Key constructs

Innovation refers to developing a new technology or business model that disrupts the existing market. In e-hailing services, innovation is a crucial driver of disruptive change. Introducing new technologies and business models has disrupted the traditional taxi industry and created new opportunities for growth and innovation.

Technology refers to the specific technologies and tools used to enable disruptive innovation such as real-time ride tracking and payment processing.

Efficiency and Cost-effectiveness refer to the ability of e-hailing services to provide more efficient and cost-effective transportation solutions compared to traditional taxi services. With technology and innovative business models, e-hailing services can offer customers lower prices, faster service, and greater convenience.

Regulation and safety refer to the role of regulatory frameworks and safety considerations in shaping the competitive landscape of the e-hailing services industry. As disruptive innovation evolves, regulations and safety considerations become critical factors in determining the success of e-hailing services and the impact on the traditional taxi industry.

Competition refers to the competitive dynamics of the e-hailing services industry and the impact on traditional taxi services. As e-hailing services continue to gain market share, competition in the intra-urban transportation increases, putting pressure on traditional taxi services to adapt and compete.

Customer satisfaction refers to the degree to which e-hailing services meet customers' needs and expectations such as convenience and satisfaction to customers, contributing to their success and disruptive impact on the traditional taxi industry.

Disruption of the taxi industry refers to the impact of e-hailing services on the traditional taxi industry, including changes in market share, pricing, and overall industry structure.

2.4 Evolution of E-hailing Services

E-hailing services' historical progression and evolutionary trajectory are rooted in the early 2000s, characterized by the experimental endeavours of pioneering companies such as Uber and Lyft in the technological linkage between passengers and

drivers (Machado et al., 2018). The advent of Uber in 2009 marked a watershed moment in the inception of the E-hailing market, ushering in a swift rise in popularity. Referred to interchangeably as "ride-sourcing" or "ride-hailing," E-hailing services encompass the process of electronically pairing passengers and drivers via applications hosted on computer or mobile devices (Smith, 2020).

This emergent shared mobility paradigm has recently attained prominence, characterized by the expansive global operations of industry giants like Uber, Lyft, and Grab (Miller, 2022). As veritable titans within the transportation sector, E-hailing entities have attained a transcontinental footprint, reconfiguring conventional norms in the domain. Central to their transformative influence is providing a more expedient and economically judicious alternative for consumers, creating an agitation within the traditional taxi ecosystem. Furthermore, they have engendered fresh avenues of income for drivers, fostering a flexible work schedule and supplementary earnings.

Since their nascent emergence, E-hailing services have undergone a rapid surge in growth and expansion. Research by Hall et al. (2018) underscores the growth of E-hail trips worldwide, leaping from 100 million in 2013 to an astounding 4 billion in 2017. This increase is attributed to a combination of factors, encompassing augmented smartphone penetration, heightened convenience, decreased cost parameters, and real-time ride-tracking capabilities. The force driving this growth emanates from the smart utilization of technology to engineer a more efficient and dependable service model. Eminent platforms, such as Uber and Lyft, have accurately harnessed algorithms to ensure the correspondence of passengers and the nearest available drivers, curtailing wait times and ameliorating the overall customer experience (Clewlow & Mishra, 2017). It is noteworthy that E-hailing services have left an imprint on the conventional/traditional taxi sector, as explained by Hall and Krueger's (2015) research

revealing a reduction in taxi utilization consequent to Uber's introduction within a city. This reduction is attributed to E-hailing services' streamlined convenience, cost-efficiency, and user-friendliness. Additionally, these platforms have developed into an alternative revenue stream for many individuals, taking the opportunity to become a driver-partner for anyone possessing a car and a valid driver's license.

Establishing a scope of convenience and seamlessness, e-hailing services offer passengers unparalleled ease of navigation. Through the simple interface of a smartphone application, riders can promptly requisition rides while concurrently tracking the real-time trajectory of their assigned driver. Furthermore, these services create a space of security superior to traditional taxis, courtesy of the pre-ride accessibility of driver information and ratings to passengers. The heightened transparency engenders a foundation of trust bridging passengers and drivers. Notably, potentially mitigating traffic congestion and environmental strain surfaces is a crucial advantage of E-hailing services. Cheng et al. (2017) investigation postulates the potential of these services to engender a decline in vehicle ownership, facilitating the proliferation of car-sharing initiatives and thus resulting in a reduced vehicular populace. By extension, this alleviates traffic congestion, with a conducive contribution to establishing a sustainable transportation infrastructure.

However, despite their laudable merits, e-hailing services face challenges. Predominant among these is the situation of regulatory alignment. E-hailing platforms, navigating relatively unknown regulatory spheres, engender tensions with conventional/traditional taxi operators and local authorities. Frictions materialize on the bedrock of licensing, insurance, and passenger well-being. Notwithstanding E-hailing platforms' assertion of drivers as independent contractors, an ongoing discourse envelops their classification as employees, bearing on ensuing rights and safeguards.

Shibayama & Emberger (2020) exploration highlights the imperative of addressing this problem to warrant equitable treatment and commensurate compensation for drivers.

Prospects for the E-hailing realm appear promising, given ongoing technological strides and mutable consumer expectations. A noteworthy realm of evolution revolves around assimilating autonomous vehicles within E-hailing frameworks. Investments by Uber and “Waymo” in self-driving technologies augur a forthcoming landscape dominated by fully autonomous ride-hailing experiences. Moreover, integrating E-hailing services with public transportation matrices could potentially transform urban mobility paradigms. Shaheen et al.'s (2016) research postulates that the amalgamation of E-hailing services with public transit systems ensures enhancements in transportation accessibility, concurrent with a limitation in private vehicle ownership and an overall enhancement of mobility infrastructure.

2.5 Business models of e-hailing services

Ridesharing platforms, exemplified by industry leaders like Uber and Lyft, are intermediaries linking drivers with passengers needing transportation services. These contemporary services have emerged as a flexible and appropriate alternative to traditional taxi operations. Scholars assert that the surge in popularity of ridesharing platforms can be attributed to their cost-efficiency, reduced waiting times, and enhanced accessibility, all of which collectively contribute to heightened customer satisfaction (Smith et al., 2017). Additionally, integrating smartphone applications and Global Positioning System (GPS) technology has facilitated matching drivers and passengers, optimizing the operational flow (Chen et al., 2019).

In revenue models, commission-based frameworks predominate within the realm of e-hailing services. Under this structure, the service provider levies a commission on each trip conducted through the platform, effectively aligning the

interests of both service providers and platforms. This symbiotic relationship hinges upon mutual benefit derived from heightened platform utilization. Scholars posit that this model incentivizes drivers to uphold service excellence, as their earnings are intrinsically linked to the quality of their services, concurrently driving platform growth (Wang et al., 2019). Nonetheless, it merits acknowledgment that commission rates exhibit variability across diverse platforms and geographical regions, thereby influencing driver profitability (Chen et al., 2018). The regularized commission rate at 20% of the trip's revenue (Sumakha, 2022).

Concurrently, subscription-based models have emerged as an alternative approach within the scope of e-hailing services. This paradigm involves imposing a recurring monthly or yearly fee upon riders in exchange for various privileges, including fare discounts, preferential access, or enhanced functionalities. Wang et al. (2019) highlight potential benefits intrinsic to this model, encompassing augmented customer loyalty and the establishment of consistent revenue streams. Nonetheless, this model poses challenges such as sustaining a critical mass of subscribers and ensuring the perpetuity of the value proposition, prerequisites for long-term viability (Sánchez-García et al., 2022). The distinguishing facet of the subscription-based model lies in its imposition of a fixed subscription fee on the driver, replacing the customary trip-by-trip commission. This subscription assumes either a temporal or quantifiable validity, affording the driver more significant revenue than the commission-based counterpart (Jain, 2022).

In recent times, the e-hailing sector has witnessed the emergence of hybrid models amalgamating commission-based and subscription-based frameworks. These models strive to strike a harmonious equilibrium between driver and passenger incentives while concurrently safeguarding platform sustainability. A paradigmatic

illustration of this approach involves specific platforms imposing commissions on standard fares while extending subscription-based packages offering supplementary benefits, such as augmented earnings during peak demand periods (Chen et al., 2021). Albeit nascent, research on these hybrid models suggests their potential to augment driver retention and bolster platform profitability (Huang et al., 2020).

2.6 Factors contributing to the growth of e-hailing services and rider preferences.

The advent of smartphone-based ride-hailing platforms like Uber, Grab, Lyft, and Bolt in the last decade has revolutionized urban transportation across the globe. By enabling passengers to digitally hail and pay for trips via mobile apps instead of physically waving down traditional taxis on the streets, e-hailing services have gained tremendous adoption (Fielbaum, & Tirachini 2021). The factors contributing to e-hailing expansion worldwide include.

Safety and Trust

Enhancing consumer safety is repeatedly emphasized across the literature as the foremost priority for e-hailing firms aspiring to dominate mobility markets. With adequate safety assurances, ride-hailing platforms can gain initial user trust and loyalty in the long term (Yasmin et al., 2017). Trust cultivation hinges on executing stringent driver and vehicle vetting protocols and implementing in-app security features to increase customer protection during trips compared to unregulated traditional taxi services (Fielbaum, & Tirachini 2021). Based on trust transfer theory (Stewart, 2003), several studies demonstrate that platform onboarding policies critically reassure initial customers. Analyses of Uber's early expansion found that mandated background checks, vehicle inspection requirements, insurance policies, and minimum experience thresholds for driver sign-ups were pivotal to building consumer confidence regarding personal security (Rosenblat et al., 2017).

Equally vital are in-app features that enable traceability and emergency assistance throughout rides. A Local Government Management Solutions (LGMS) survey across five countries showed that nearly 90% of ride-hailing riders highlighted driver details display, GPS trip tracking, and police reporting functions as primary preferences against 35% for regular cab passengers (Fielbaum, & Tirachini 2021). Such smart mobility integrations significantly alleviate safety fears, especially for vulnerable demographic segments like women, according to scholars (Borker, 2021; Yasmin et al., 2017). Over 70% of female riders surveyed in Bangladesh and India ranked safety assurances as their foremost adoption driver for platforms like Uber and Ola (Yasmin et al., 2017). Researchers attributed women's firm reliance on app transparency and accountability to mitigate harassment risks based on cultural norms and past victimization trauma in public transport (Borker, 2021; Yasmin et al., 2017).

Consequently, operationalizing safety is an ethical imperative for ride-hailing firms entering developing markets aiming to empower underserved communities economically and socially (Borker, 2021). As urbanization escalates globally, e-hailing safety protocols can further expand access to affordable mobility options once constrained by infrastructure gaps or crime concerns. However, safety levels remain partially tied to governmental legal protections, enforcement, and infrastructure availability, affecting platform efficacies across markets (Rosenblat et al., 2017). More research comparing localized safety impacts using incident data analytics would provide constructive insights for operators and regulators alike.

Economic Factors

The appeal of potential cost savings and earnings also strongly motivates e-hailing adoption for both riders and drivers based on scholarly evidence. Leveraging technology acceptance models, researchers repeatedly associated perceived economic

utility as a predictor of consumer usage intent across services like Grab, Uber, and InDrive (Yasmin et al., 2017). Price sensitivity remains high, particularly in emerging cities with typical income constraints. Among riders, scholars identified trip fare clarity, cashless payments, and dynamic pricing algorithms as pivotal economic advantages attracting consumers from incumbent taxi alternatives frequently crippled by manipulative price-gouging and stagnant supply mismatches to spiking demand (Rosenblat et al., 2017). Uber's uptake across Latin America has been partially linked to public frustrations with overcharging by traditional cabs and the convenience of pre-set mobile payments (Wang & Yang, 2019).

Meanwhile, for drivers, amplified income opportunities and scheduling flexibility expedited supply acquisition across Asia and Africa, according to researchers (Surie & Koduganti, 2016). Analyses revealed that average monthly revenues doubled for platform chauffeurs over conventional/traditional taxi earnings in markets like India and Kenya, encouraging migration despite the emergence of cutthroat competition (Rosenblat et al., 2017). Such partner retention strategies will remain essential to sustaining service quality and response times, fulfilling rising consumer demand. However, recent litigation around driver benefits classification highlights complex labour dynamics that can undermine platform viability if unaddressed (Smith, 2016).

Security

With cashless e-payments ubiquitous across mobility platforms, data privacy is another crucial factor influencing trust and adoption. Researchers argue that encryption, access controls, and blockchain technologies can help reassure customers while combating potential fraud (Gupta et al., 2022; Bhuiyan et al., 2019). Equally important are prompt incident response and recovery protocols, given that data breaches remain inevitable despite cybersecurity investments highlighting the lingering risks of

digitization (Gupta et al., 2022). Interestingly, however, perceptions of platform security vary demographically. Survey analyses in developing countries like Bangladesh showed that female passengers were over 20% more apprehensive about payment data safety than male counterparts despite equal usage levels, highlighting the necessity for targeted protections in platform design (Bhuiyan et al., 2019).

Riders between 24 and 35 years display lower security anxieties, possibly owing to greater digital literacy (Shamim et al., 2021). Such human-centric insights should shape policy priorities. Regrettably, quantitative metrics validating actual security incident rates across platforms remain scarce (Jiang et al., 2022). With ride-hailing ecosystems now spanning complex supply chains, researchers urge more transparent threat reporting and accountability from operators rather than evasive public-relations tactics when things go wrong, which ultimately erode consumer trust (Rosenblat et al., 2017). Commitments to safety and security should be grounded in robust ethics, not just digital features.

Social Influence and Impacts

Beyond functional appeals, social elements equally drive e-hailing adoption, as highlighted extensively in the literature. Scholars frequently applied technology diffusion models to unpack how influencer marketing ignited viral peer sharing about Uber on social media and within communal circles, spearheading rapid penetration even before launching aggressive pricing tactics in specific markets (Smith, 2016). Such organic community buzz will remain vital in overcoming negative perceptions, especially where taxi lobbies politically block new entrants. Research in African and South Asian cities also reveal profound socio-economic ripple effects expanding digital mobility access to previously underserved segments (Surie & Koduganti, 2016).

Studies found that e-hailing supply opportunities as drivers empowered migrant populations and improved women's financial conditions despite the risks of overwork (Borker, 2021). Even irregular driving gigs on apps augmented household incomes by 30-50% in struggling communities in Kenya and Pakistan, generating gratitude and loyalty among these expanded customer segments that are now relieved from transport struggles (Jiang et al., 2022).

However, e-hailing disruption also threatens certain vulnerable groups, notably traditional cab operators now displaced by tech-savvy competitors (Fielbaum, & Tirachini 2021). Research urges policymakers to balance platform innovations against societal outcomes so digitization advances also uplift rather than oppress sections of society (Smith, 2016).

Ease-of-use

The attraction of convenience propelling mobile commerce uptake also permeates academic explanations of e-hailing's advancement. Scholars identified the simplicity of the digitized hailing and payment process requiring just smartphone taps without physical cash or street-side wanderings as tremendously appealing to time-pressed urbanites over legacy taxi hurdles (Jiang et al., 2022).

Uber's exponential expansion has been partially credited to intuitively designed mobile interfaces preloaded with user payment profiles, location trackers, and one-click functionalities, drastically reducing coordination overheads associated with conventional/traditional transport options (Jiang et al., 2022). Researchers further linked such frictionless user flow to greater customer satisfaction and retention likelihoods across multiple apps studied (Yasmin et al., 2017).

Advancements in algorithms and predictive analytics further bolster platform efficiencies through rapid matching and allocation mechanisms. Studies analysing

Uber's routing technologies found that Estimated Time of Arrival (ETAs) minimized wait times by 50% compared to ordinary taxi services on congested Bangkok streets (Fielbaum, & Tirachini 2021). Scholars predict that artificial intelligence and autonomous vehicles could drive future innovations, transforming mobility from ownership to access-based consumption models centered on flexibility and reliability (Shaheen & Cohen, 2019). Realizing such ambitions, however, relies on sustaining public trust as complexity increases.

2.7 Innovations in e-hailing services

E-hailing services have catalysed a paradigm shift within the transportation industry by introducing innovative technologies that have ushered in heightened operational efficiency and effectiveness. Anchoring this transformation are technologies such as mobile applications, GPS tracking, and other cutting-edge tools that have revolutionized user experiences and redefined operational dynamics (Ramanan, 2022).

Foremost among these technologies are mobile applications, serving as the primary conduit between riders and e-hailing platforms. Positioned at the emergence of technological evolution within e-hailing, mobile applications have been lauded for their pivotal role in elevating customer engagement, driver productivity, and overall service quality.

Scholarly works highlights the transformative impact of mobile applications on passengers' ride requests, real-time tracking of drivers' whereabouts, and seamless transactional procedures. Integrating mobile applications has facilitated streamlined ride bookings and more efficient driver-passenger interactions, engendering heightened operational efficiency (Smith & Johnson, 2017; Hansen, 2022). Furthermore, these applications have provided e-hailing platforms with a reservoir of data, pivotal for

enhancing service personalization and facilitating tailored recommendations (Smith & Johnson, 2017; Hansen, 2022).

GPS tracking, a cornerstone technology, has emerged as a linchpin in augmenting the capabilities of e-hailing services, enabling real-time driver monitoring and optimal route selection. Empirical research conducted by Li and Wang (2016) underscores the pivotal role of GPS tracking in curtailing passenger waiting times through the judicious allocation of drivers and route optimization.

In parallel, GPS tracking has assumed a pivotal role in bolstering driver safety and security, enabling e-hailing platforms to oversee driver conduct and respond expeditiously to exigent situations. Chen and Liu's (2018) investigation highlight the transformative impact of GPS tracking in intensifying operational efficiency by minimizing idle intervals and amplifying the frequency of completed trips per unit of time.

By affording e-hailing services the capability to ascertain vehicle locations in real-time, GPS tracking has facilitated seamless driver-passenger rendezvous and enabled passengers to monitor drivers' progress (Ramanan, 2022).

Concurrent with these innovations, a constellation of auxiliary technologies, including data analytics, artificial intelligence (AI), and machine learning, have converged to augment the operational efficiency of e-hailing services further. Notably, data analytics has furnished e-hailing platforms with invaluable insights into user predilections, traffic patterns, and oscillations in demand. Wang and Zhang (2019) advocate for data analytics as a catalyst for optimizing driver deployment, forecasting demand patterns, and enhancing the overall service milieu. Zhang et al. (2020) emphasize deploying AI algorithms to predict passenger demand, refine pricing strategies, and refine driver-passenger matching mechanisms. Incorporating AI and

machine learning has concretized efficiencies in optimizing routes, prognosticating demand dynamics, and enhancing user experiences (Lau et al., 2023).

In synthesis, the advent of e-hailing services has been inherently entangled with technological innovation, yielding transformative outcomes in operational efficacy and user experience. Through the interactive integration of mobile applications, GPS tracking, data analytics, AI, and machine learning, e-hailing platforms have navigated a trajectory of evolution that holds the promise of continually redefining the transportation landscape.

2.8 Regulatory challenges of e-hailing services

The regulatory frameworks governing e-hailing services encompass a spectrum of provisions, including licensing and insurance requisites. These frameworks traverse a landscape rife with legal challenges, prominently involving conflicts with conventional/traditional taxi enterprises (Wood, 2021).

In the United States, the oversight of e-hailing services exhibits diversity across states and localities. While certain jurisdictions have embraced these services with lenient regulations, others have imposed stringent conditions. A case in point is New York City, where the Taxi and Limousine Commission (TLC) instituted regulations mandating e-hailing drivers to obtain For-Hire Vehicle (FHV) licenses, harmonizing the competitive balance with traditional taxis (Smith, 2016). Cities such as Chicago and San Francisco have embraced regulatory measures to safeguard the integrity and accountability of e-hailing services (Johnson, 2019). China, host to the globe's largest e-hailing market, has devised regulatory frameworks to oversee the industry.

In 2016, the Chinese government issued guidelines compelling e-hailing platforms to authenticate drivers' identities, procure requisite licenses, and adhere to data management protocols to mitigate safety apprehensions and protect passenger

rights (Fu, 2018). Beyond this, China's Ministry of Transport has advocated for harmonious collaboration between e-hailing platforms and traditional taxi entities, fostering an environment of cooperation rather than direct competition (Luo et al., 2018).

The regulatory landscape in India has undergone substantial transformation. The Motor Vehicles (Amendment) Act 2019 introduced guidelines to streamline licensing, insurance, and safety stipulations for e-hailing platforms (Rao & Ramesh, 2020). Furthermore, the Indian government established the digital platform Vahan, streamlining registration and verification of drivers' documents, a mechanism that aligns with regulatory standards (Malik, 2019).

Beyond these, nations such as Malaysia, Nigeria, South Africa, and Kenya have all instituted regulatory blueprints to supervise e-hailing services. In Malaysia, the Land Public Transport Agency (APAD) introduced guidelines in 2017 mandating e-hailing drivers to procure a Public Service Vehicle (PSV) license and undergo medical assessments (Azam et al., 2020). Similarly, Nigeria's Federal Road Safety Corps (FRSC) has devised a framework to ensure the safety of e-hailing services, encompassing obligatory vehicle inspections and background checks on drivers (Adeola et al., 2021).

South Africa's governance of e-hailing services falls under the National Land Transport Act, describing licensing requirements and safety benchmarks (Makore et al., 2017). Kenya has similarly stated regulations, covering licensing and vehicle inspection protocols (Ouma & Ngugi, 2021). However, in Ghana there needs to be a clear policy governing e-hailing service operations in terms of licensing drivers, vehicle inspections, background checks on drivers and safety of riders (Acheampong, 2021; Okyere-Manu, 2023).

Globally, e-hailing services have encountered a collection of legal predicaments, frequently precipitated by confrontations with traditional taxi enterprises. In the United States, taxi companies have initiated litigation against e-hailing platforms, alleging unfair competition and breaches of regulatory protocols. In 2016, the California Public Utilities Commission imposed a \$7.6 million fine on Uber for non-compliance with data reporting obligations (Smith, 2016). Concomitantly, traditional taxi associations have argued that e-hailing services must be subject to the same regulatory frameworks and licensing conditions as traditional taxis, triggering lengthy legal battles (Kitchin & Lauriault, 2019).

In China, similar legal challenges have materialized, centring on the employment classification of drivers. Numerous drivers have litigated against e-hailing platforms, asserting entitlement to employee benefits, encompassing social security and labour rights (Wang et al., 2016). The Chinese judicial system has struggled with demarcating the employment relationship between drivers and e-hailing platforms, resulting in divergent verdicts across jurisdictions (Luo et al., 2018). India has witnessed legal complications between e-hailing platforms and conventional/traditional taxi associations, resulting in strikes and protests. Conventional/traditional taxi associations contend that e-hailing services operate outside the bounds of legality and expose their livelihoods (Rao & Ramesh, 2020). These contentions have prompted governmental intervention, prompting the establishment of regulatory frameworks to address the concerns of all stakeholders.

2.9 Impact of e-hailing services on urban transport planning

Urbanization has engendered transformative shifts in global transportation demands and planning strategies. Technological advancements and innovations have

announced the emergence of e-hailing services as a prospective resolution to the multifaceted challenges pervading urban mobility (Shibayama & Emberger, 2020).

Predominant among these challenges is the spectre of traffic congestion, casting prolonged travel times, air pollution, and productivity reductions across urban landscapes. E-hailing services wield the potential to assuage this congestion by proffering an efficient alternative to private vehicle ownership. Li et al. (2019) inquiry in China delineate the decline in vehicular density on roads consequent to e-hailing services, prompted by the intensity of ridesharing and carpooling.

Furthermore, the adept algorithms underpinning e-hailing services optimize routes, limiting travel distances and, by extension, congestion (Thakur et al., 2020). Nevertheless, the impact of e-hailing services on traffic congestion is unique across studies. Chen et al. (2017) in the United States posit that although these services may restrain personal vehicle numbers on the road, they can concurrently intensify vehicle miles travelled, potentially opposing substantial congestion reduction. Thus, a demand for comprehensive investigations prevails to resolve the diverse implications of e-hailing services on traffic congestion patterns across regions (Ansar et al 2021).

Public transportation is pivotal in furnishing avenues for affordable and sustainable mobility within urban spheres. However, the advent of e-hailing services generates warnings regarding its impact on public transportation ridership. Wang et al. (2018) study in India underscores the depletion of public transportation patronage attributed to e-hailing services, particularly within middle and higher-income demographics. This transition towards e-hailing could apparently impede revenue streams for public transportation entities, thereby encroaching upon their operational efficiency and the discharge of their mandate to serve marginalized communities.

Even so, e-hailing services, offer the potential to complement public transportation networks by providing first and last-mile connectivity. Jais and Marzuki, (2020). research in Malaysia perceives enhancing public transportation accessibility, especially within regions enhanced by limited connectivity. By bridging gaps between passengers' points of origin and destinations, e-hailing services heighten public transportation systems' overall efficiency and attraction.

The ripples of e-hailing services extend into the realm of urban planning, modelling land use configurations, infrastructure evolution, and transportation network architectures. Adedeji et al.'s (2020) exploration in Nigeria casts light on the transformation of land use dynamics, generating intensified demands for parking facilities such as airports and shopping complexes. This paradigm shifts in land utilization mandates thorough urban planning to harness the judicious deployment of finite urban expanse.

Moreover, transportation networks are also subject to transformation. Mhlanga et al. (2021) analysis in South Africa highlights the influence of e-hailing services on the siting and design of bus stops and taxi ranks to accommodate pick-up and drop-off conditions. Urban planners are tasked with assimilating these changing mobility patterns into transportation infrastructure to ascertain the assimilation of e-hailing services.

E-hailing services offer a complementary facet to traditional transportation modes by offering quick and on-demand mobility alternatives. Nyamweya et al. (2019) scrutiny in Kenya champions the role of e-hailing services with public transportation systems to counterbalance the constraints imposed by constrained schedules and routes. The interaction between e-hailing and traditional transportation modes highlights urban mobility's accessibility and convenience. Shaheen et al. (2017) investigation in the

United States asserts that while e-hailing services offer convenience, they could potentially heighten vehicle ownership and solo commutes, consequently undermining the utilization of public transportation and non-motorized transportations. Thus, judicious planning and targeted policy interventions emerge as imperatives to form a harmonized and sustainable transportation ecosystem that optimizes the potential of both e-hailing services and traditional paradigms.

2.10 E-hailing mobile- ICT apps and power of drivers, riders, and e-hailing service companies

The advent of ride-hailing platforms enabled by mobile apps and GPS technologies has profoundly disrupted urban transportation over the past decade. By enabling passengers to digitally hail and pay for rides from non-professional driver-partners using personal vehicles, companies like Uber, Grab, Ola, and Didi Chuxing have achieved exponential growth and multi-billion-dollar valuations (Ward et al., 2019). However, this significant transformation catalysed by smartphones has also instituted novel power asymmetries between riders, drivers, and platform owners that challenge conventions within traditional taxi economies (Rosenblat, 2018).

The onset of internet-enabled smartphones with built-in GPS transmitters enabled real-time ride coordination between passengers and non-professional drivers at an unprecedented scale (Rathnayaka et al., 2021). Leveraging these advantages, e-hailing companies develop algorithms exchange that efficiently matches transport supply and demand to fulfil rider needs better than traditional taxis or public transit (Smith, 2016). This asset-light model allowed rapid growth across cities by utilizing GPS and digital payments to book rides without owning vehicle fleets or employing drivers.

Research credit such technical integrations with enhancing access and convenience for urban commuters who previously struggled to secure traditional street-hailed cabs during hours of peak need (Fielbaum, & Tirachini 2021). Passengers could instantly book rides using a few smartphones taps instead of endless physical searches.

However, the technological capacities granting e-hailing services massive scale facilitates deep surveillance, tracking, and directives over its dispersed workforce of non-employee driver-partners outside corporate decision circles (Rosenblat, 2018). Ride coordination, dynamic pricing, and performance evaluations were controlled by proprietary algorithms optimized for expansion and profitability, often overlooking driver constraints. These misleading technological controls created multifaceted labour tensions.

To interpret the unequal influence between ride-hailing firms and other ecosystem participants, academics apply the lens of “platform capitalism” characterized by value and control centralization within the digital intermediary extracting rents from all transactions (Srnicek, 2016; Surie & Koduganti, 2016). Unlike conventional pipelines, platforms follow circular accumulation logic where owner profits flow from all user participation.

E-hailing companies exemplifies this tactic with corporate revenues generated by commissions sliced from driver payments on every ride. Geo-tracking, computation, and data monopolies permit remote oversight of global fleet logistics without significant asset investments in human resources or vehicles typical for legacy transport companies (Surie & Koduganti, 2016).

Such data-driven consolidation of decision powers with limited oversight revives Marxist critiques regarding inequitable divides within industrial ecosystems, allowing owner profits to override worker rights and welfare (Rosenblat, 2018). The

uneven access to operational data and collective negotiating across e-hailing network entrenches uncertainty and hazards for drivers without systemic support while optimizing returns for executives through directed controls.

The pervasive surveillance capacities engendered by digital platforms represent another salient dimension of rising workplace power divides flagged by academics. Rosenblat (2018) applies the lens of "datafication" to capture how Uber's and Bolts continuous tracking of metrics like real-time GPS coordinates, trips logged, driving speeds, and customer ratings fed into automated management systems governing routing, payments, and employment for drivers without transparency. Such extensive monitoring intensifies behaviour controls that encroach on individual autonomy.

Uber and Bolt data tracking penetrates deep into decisions like ride acceptance and vehicle maintenance, penalizing deviations from the prescribed "optimum" conduct deemed most profitable by headquarters. However, the same systems readily disappear when ride incidents require significant support due to the non-employment disclaimers benefitting e-hailing service providers (Rosenblat, 2018). The invasive tracking tools aimed at maximizing corporate efficiencies also problematically disempower and endanger workers despite flexible work promises used in platform advertising.

Moreover, Smith, (2016) argue that persistent metric surveillance fuels psychological anxieties and pressures to overperform among labourers. E-hailing service providers automatically suspends low-rated drivers based on passenger feedback, although exact score calculations and weights remain unclear, instilling rating fears. Such unclear scorecards promote uncertainty and coercion. Stein, (2021) and Boer et al. (2022) argued for strict governance regarding data handling and exposure to restore balance within e-hailing ecosystems.

Gamification represents another technological-psychological technique platforms leverage to tap human motivations for desired behaviours. E-hailing service providers intentionally designed driver interfaces with video-game elements like points, ranks, and cash incentives for frequent usage ("Power Driver Rewards") to maximize participation through addictive loopholes (Smith, 2016). Researchers reveal how such gamified, social incentive schemes promoted excessive driving hours, chasing higher targets prioritized by e-hailing companies, often at the expense of driver health (Smith, 2016). Over 50% of Uber contractors admitted to working while exhausted (Fielbaum & Tirachini, 2021).

Owing to such gamification, escalating accidents, and insurance issues, the firm dodges using employment disclaimers. Such gamified motivations increase platform leverage over drivers, diminishing their judgments despite the promised self-directed flexible scheduling. Consequently, legal scholars argue that tighter labour regulations on enforced rest periods can correct such psycho-technical regulatory gaps being exploited by e-hailing platforms to neutrally moderate performance (Rogers, 2015).

Uber and Bolt operate not as a taxi enterprise but as a software intermediary managing ride exchanges powered by mobile technology, data, and non-employee drivers lacking employment rights (Surie & Koduganti, 2016). E-hailing service primary interest lies in advancing its algorithms, market share, and influence over rider habits using automated nudges (Smith, 2016). E-hailing service providers deploy engagement features like surge pricing and loyalty promotions to entice customers, although research shows such tactics distorted actual trip costs for riders (Cats et al., 2020).

On the driver side, complex incentive schemes focused on supply acquisition rather than welfare persist. Studies consistently reveal Uber's minimal considerations

for fair driver compensation with algorithmically set, inconsistent pay rates failing to reflect driver inputs, frequently triggering labour protests (Ward et al., 2019).

Through funding dominance over fragmented drivers, Uber's executives wield unchecked authority in directing networks absent reforms (Surie & Koduganti, 2016). Scholars warn that such consolidation risks labour needs being disregarded within digital platforms entirely captured by profit-driven managers seeking transaction growth (Srnicsek, 2016).

However, due to low switching costs to alternative platforms, Uber riders represent the most empowered constituency in e-hailing networks. Unlike drivers facing onboarding barriers, app-savvy urban commuters can effortlessly migrate services based on cost and experience factors using quick smartphone clicks. Their main interest lies in accessing rides swiftly at affordable pricing with strong service quality across safety, reliability, and hospitality dimensions (Ward et al., 2019).

Uber pioneered bilateral rating systems to address such expectations, allowing riders to evaluate driver services and trip factors. Negative feedback can trigger instant driver suspensions, forcing them to align behaviours with passenger preferences, although what constitutes firing thresholds remains ambiguous to partners (Rosenblat, 2018). Such scorecards grant considerable oversight influence on riders potentially abused to discriminate against vulnerable driver demographics (Rosenblat et al., 2017).

E-hailing driver-partners constitute the most disadvantaged constituency owing to the substantial logistical investments and oversupply risks, making it easier to voice needs with replacement threats. Research reveals that many who joined were poor migrants enticed by deceptive Uber promotions who face sudden algorithmic firings due to brief service gaps or biases rather than genuine flaws (Rosenblat et al., 2017).

Their interests focus on income stability, safety support, and flexibility in managing personal obligations, all directly shaped by restrictions.

Nevertheless, corporations make unilateral decisions on fares and work conditions without consulting drivers (Ward et al., 2019). Such voicelessness leaves drivers constantly overwhelmed when navigating opaque scoring systems and ever-changing features delegated down by managers.

While economic motivations primarily drive participation on ride-hailing platforms, several studies reveal longer-term frustrations among drivers regarding their lack of collective negotiation powers against dominant platforms like Uber to enact policy changes addressing poor welfare protections, arbitrary evaluations, and surveillance over-reach (Rosenblat, 2018; Surie & Koduganti, 2016). Vast asymmetries in access to crucial trip data limit drivers from contesting management dictates or researching alternative platform options.

A significant debate among scholars scrutinizes whether drivers should be classified as employees of ride-hailing platforms (Mäntymäki et al, 2019). This would mandate corporations like Uber and Bolt to provide employment rights and benefits enjoyed by internal staff for external drivers or retain independent contractor status with minimal protections (Rogers, 2015).

E-hailing companies have insisted its driver-partners desire contractor flexibility, but scholars argue this overlooks hidden expectations of reliable income and supports unable as non-employees (Smith, 2016). Critics also highlight e-hailing companies like Uber and Bolt extensive controls over driver operations from forcing acceptance rates to dictating fares as contradicting claims of independent work (Brugière, 2021).

Some jurisdictions, such as California, have passed progressive laws to expand collective bargaining and wage guarantees for platform contractors, such as Uber drivers (Brugière, 2021). However, complications persist in determining appropriate classifications. Nonetheless, most researchers concur that stronger regulations are imperative to ensure welfare, given the consistent evidence of precariousness amplified by algorithmic management and skewed oversight powers (Rosenblat et al., 2017).

Significantly, over 80% of existing e-hailing research examines ridesharing dynamics in Asia, mainly focusing on Uber's Indian and Chinese operations (Wang & Yang, 2019). The Asian emphasis is due to rapid smartphone penetration and e-commerce adoption rates catalysing app-based platforms coupled with lagging public transit infrastructure in developing cities. This creates immense transport deficiencies prime for disruption (Fielbaum, & Tirachini 2021). Western contexts like the USA received early Uber in-roads, but complex local taxi regulations stalled advances, allowing competitors to gain, and highlighting the policy impacts on platform success.

Surprisingly, direct African evidence remains scarce despite strong ride-hailing presence, signalling gaps for researchers given the continent's young demographics portending immense future adoption. The predominance of male drivers across nearly all studies also warrants highlight, averaging over 70% of contractor samples surveyed. Experts partially attribute high male ratios to sociocultural norms in Asia and Africa that discourage female mobility or late-night work, posing barriers to participation (Yasmin et al., 2017).

Research shows ridesharing supply participation as supplementary incomes for males rather than primary work; scholars call for targeted recruiting efforts by platforms to address exclusionary forces hindering equitable access to digitized work for women entrepreneurs (Borker, 2021).

While existing research has significantly advanced understandings of ride-hailing power dynamics, essential gaps persist. Firstly, long-term ethnographic immersions capturing the lived experiences of drivers and riders still need to be explored, with most studies relying on one-off surveys unable to unpack complex psychological tensions amplified by platform algorithms and scoring systems.

Secondly, comparative policy analyses evaluating regulatory models across jurisdictions for impacts on participant welfare are critical given conflicts between hyper-growth investor interests and livelihood sustainability emerging in scholarship narratives and courtrooms.

2.11 The state of traditional taxi services in Ghana

Urban transportation in Ghana, particularly in Accra, is characterized by a mix of public and semi-formal systems that serve different user groups and trip purposes. Among these systems, traditional taxi services a commercial vehicle typically a four-door car, licensed to transport passengers for a fare. It usually accommodates four passengers plus the driver, totalling five occupants. Taxis are often painted in distinct colours (such as yellow with a stripe) to signify their legal registration as public transport. They can be hailed on the street and hired from taxi ranks (Agyeman & Ojo, 2020; Amoako-Sakyi et al., 2021).

Traditional taxi services in Accra are largely dominated by fuel-powered saloon vehicles that operate on either a shared-route or exclusive-hire model. These taxis typically serve short-distance but frequent trips within urban neighbourhoods (Obiri-Yeboah et al., 2022). Compared to minibuses (trotros) which handle higher passenger volumes over longer distances, taxis provide flexible point-to-point mobility, especially during peak periods and in less accessible neighbourhoods.

Fleet surveys in Accra reveal that over 30 distinct vehicle models are in operation, many of which are over a decade old and prone to fuel inefficiency and mechanical failure (Obiri-Yeboah et al., 2022). Yet, their ubiquity and adaptability continue to make them integral to urban transport especially for commuters seeking quicker alternatives to overcrowded public buses.

The expansion of digital ride-hailing platforms such as Uber, Bolt, and Yango has significantly disrupted the traditional taxi sector in Accra. These platforms offer app-based, fare-transparent, and often cleaner vehicle services, thereby attracting middle-income users and tourists (Addo et al., 2023). Traditional taxis, by contrast, rely on street-hailing and price negotiation, often leading to inconsistent fares and disputes.

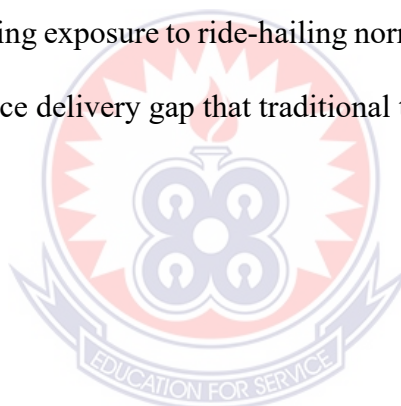
Nevertheless, traditional taxis remain relevant in areas underserved by digital platforms or where network connectivity is weak. (Addo et al., 2023) found that during the COVID-19 lockdown, many residents in Accra still preferred chartered taxis for long-distance intra-urban trips due to perceived health safety compared to overcrowded trotros.

Traditional taxi services in Accra operate under a formal regulatory regime that includes licensing by the Driver and Vehicle Licensing Authority (DVLA) and municipal permits (Alimo et al., 2022). However, compliance remains partial, with some operators avoiding inspections or operating beyond designated routes. This partly stems from laidback enforcement and the inability of regulatory bodies to adapt quickly to the informal innovations reshaping urban mobility (Boateng et al., 2022).

Interestingly, although traditional taxis are more regulated than informal modes like motorcycle, their service quality does not always reflect this status. Addo et al. (2023) report that ride-hailing drivers outperform traditional taxi drivers on punctuality, courtesy, and vehicle cleanliness.

The environmental footprint of Accra's traditional taxis is a growing concern. Most of the fleet consists of older, inefficient vehicles with high emissions, contributing to the city's air quality challenges (Obiri-Yeboah et al., 2022). Furthermore, fleet distribution in Accra is uneven, with high concentrations in central business districts and fewer taxis servicing peri-urban and low-income areas. This spatial imbalance mirrors national findings that rural and peripheral communities have limited access to taxi services, resulting in higher transport costs (Afukaar et al., 2019).

Regarding passenger satisfaction with traditional taxi services in Accra, while some users appreciate the flexibility and availability of taxis, concerns persist about inconsistent pricing, rude driver behaviour, and poorly maintained vehicles (Addo et al., 2023). With increasing exposure to ride-hailing norms, passenger expectations have shifted, creating a service delivery gap that traditional taxis must address.



CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter focuses on the study area's profile, research paradigm, research approach, research design, target population, sample size, sampling procedure, data collection methods, research instruments, data analysis methods, and ethical considerations.

3.1 Profile of the study area

The study setting in Figure 3.1 is Accra Metropolitan Area, with a population of residents that relies heavily on public and private transportation services. As an urban metropolis, AMA faces intra-city mobility and transport planning challenges that e-hailing could impact (Agyemang, 2015). For almost a decade, AMA has seen a rapid uptake of e-hailing services like Uber, Bolt, Yango, Shaxi etc as smartphone and internet penetration continues to increase (Yeakey et al., 2022).

The growth of e-hailing alongside traditional taxi services in AMA provides an interesting case to examine the modus operandi and effects of these tech-enabled entrants (Jain et al., 2020). AMA has high congestion levels, and many residents consider public transit inadequate, leaving room for innovations like e-hailing to fill mobility gaps (Agyemang, 2015).

Understanding these new services is vital for transport planning as the population grows. Ghana has an emerging framework for e-hailing, with proposed ride-hailing guidelines introduced, but regulations are still developing (Yeakey et al., 2022). Examining the AMA context can illuminate lessons for policymakers seeking to regulate e-hailing in developing country cities.

As a metropolis, AMA attracts investment from major e-hailing firms like Uber and Bolt and a vibrant, tech-savvy local population (Jain et al., 2020). This provides a scope to explore the dynamics between drivers, residents, municipalities, and e-hailing companies. Road, rail, and air transportation are all part of AMA's developed transportation network.

The city's transportation system is relatively developed, with numerous highway links to other regions of the nation (Ofori et al., 2016). AMAs' rapid e-hailing growth, transport challenges, evolving regulatory environment, and population size make it an information-rich location well-suited to advance understandings of these emerging mobility services in developing world contexts.



3.1.1 Study area map

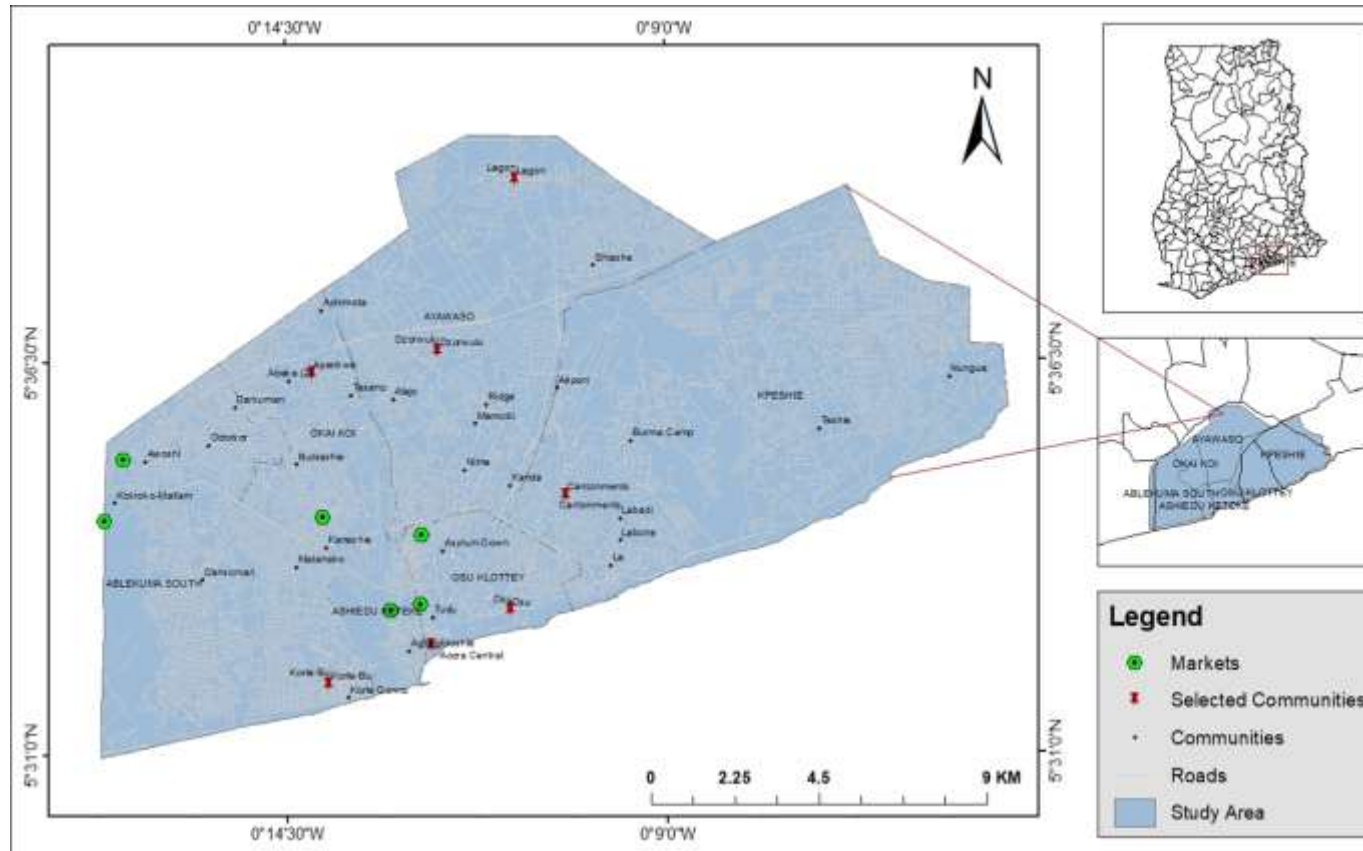


Figure 3.1: Map of Accra Metropolitan Area

Source: Author, 2023

3.2 Research paradigm

The study utilizes a pragmatic research paradigm, a mixed-method approach emphasizing the practical application of research findings to solve real-world problems. According to Creswell and Plano (2018), the pragmatic paradigm is characterized by "the use of quantitative and qualitative methods to address research questions and the use of research to inform practice".

This paradigm bridges the gap between theory and practice by generating relevant and valuable research for practitioners. Morgan (2014) notes that the pragmatic paradigm "emphasizes the practical usefulness of research and the importance of bridging the gap between research and practice." Similarly, Creswell and Creswell (2017) argue that the pragmatic paradigm "provides a useful framework for addressing practical problems in diverse contexts".

3.3 Research approach and design

The research was based on the mixed methods research approach, involving qualitative and quantitative methods to provide a more comprehensive understanding of the research questions. The mixed methods approach is handy for triangulating data from multiple sources, which can enhance the validity and reliability of the findings (Fetters et al., 2013). The mixed methods approach helped explore complex research questions that required a deep understanding of human experiences or behaviour and statistical analyses of large datasets. The mixed method approach involved collecting and analysing quantitative and qualitative data, with the two types integrated in the analysis phase (Creswell & Creswell, 2018).

The study builds its tenants on explanatory sequential design. An explanatory sequential mixed methods design involves collecting quantitative data and then explaining the quantitative results with in-depth qualitative data. It is a popular

approach when a researcher wants to use qualitative results to explain and interpret the findings of a quantitative study (Creswell & Creswell, 2018).

For this study examining e-hailing services in Ghana, an explanatory sequential design allowed the researcher first to quantify growth trends, compare operations to taxis, and analyse the impact on stakeholders using quantitative analysis. The quantitative phase determined the growth rates of e-hailing, statistically tested differences between e-hailing and taxis, and correlated app usage with riders. However, the underlying reasons, contexts, and stories behind these quantitative trends remained unknown without a qualitative phase.

As Mohajan, (2020) noted, quantitative data determines relationships but not explain the reasons why. Hence, a qualitative follow-up enabled the researcher to probe the quantitative results further to understand why specific growth patterns occurred, how operations specifically differ, and the exact mechanisms by which the apps influence various stakeholders. The quantitative data provided a general measurement of what is happening, while the qualitative data explained the contextual factors and processes leading to these results. The two phases provide a more complete understanding than either approach alone (Creswell & Creswell, 2018).

3.4 Target population

The study included riders, drivers, and e-hailing company officials within the Accra Metropolitan Area (AMA); the accessible population was drawn from three (3) sub-metros (Ablekuma South, Ashiedu Keteke, and Okai Koi South) between 18 and 65 years of age, as well as key informants such as e-hailing drivers and e-hailing companies within the Accra Metropolitan Area. Table 3.1 presents data on the total population and population proportion of residents in Ablekuma South, Ashiedu Keteke, and Okai Koi South within the Accra Metropolitan Area (AMA). The data in Table 3.1

reveals Ablekuma South has total population of 110,158 (38.8%), Ashiedu Keteke has a total population of 88,633 (31.2%) residents, while Okai Koi South has a total population of 85,333 (30.0%) residents. The total population across all three sub-metros is 284,124.

Table 3.1: Residents' above 15 years within the (AMA)

Sub-metros	Total population	Population proportion (%)
Ablekuma South	110,158	38.8
Ashiedu Keteke	88,633	31.2
Okai Koi South	85,333	30.0
TOTAL	284,124	100

Source: GSS, 2021

The inclusion criteria consisted of urban residents living within the Ablekuma South, Ashiedu Keteke, and Okai Koi South sub-metros of the Accra Metropolitan Area, individuals between 18-65 years old, E-hailing service drivers operating within the Accra Metropolitan Area for more than two (2) years, and representatives from e-hailing companies (Bolt, Uber, Yango, and Shaxi) serving the Accra Metropolitan Area market.

The exclusion criteria included individuals living outside the specified sub-metros of the Accra Metropolitan Area, younger than 18 years old and older than 65 years old, drivers and representatives from traditional taxi companies or other transportation providers besides e-hailing services and e-hailing drivers and company representative's companies (Bolt, Uber, Yango, and Shaxi) operating exclusively outside the Accra metropolitan Area.

Apart from urban residence, other factors distinguish the selected sub-metros, Ablekuma South, Ashiedu Keteke, and Okai Koi South from other urbanised sub-

metros within the Accra Metropolitan Area. A key consideration is their role as commercial and transportation hubs. These areas represent some of the busiest centres of economic and mobility activities in Accra. Ashiedu Keteke, for example, houses the Central Business District (CBD), including Makola Market, Rawlings Park, and the Arts Centre, which are all major destinations for business and trade (Oosterbaan et al., 2012).

Okai Koi South includes the Kaneshie Market and transport terminal, a key node for intra-urban mobility. Similarly, Ablekuma South contains areas like Chorkor and Mamprobi, known for a high concentration of residential and commercial interactions (Oosterbaan et al., 2012). These locations are strategic because they experience high foot traffic and transport demand, making them ideal for capturing the dynamics of e-hailing services.

Another distinguishing factor is the level of e-hailing activity and penetration in these sub-metros. Due to their proximity to economic centres, high population densities, and relatively greater access to smartphones and mobile money services, these areas have seen higher adoption rates of e-hailing platforms such as Uber, Bolt, Yango, and Shaxi (Pasquali et al., 2022). This makes them optimal for examining e-hailing usage patterns, driver operations, and customer experiences, which are central to the study's objectives.

The selected sub-metros also present a diverse socioeconomic profile. These areas house a mix of low- to middle-income populations, creating opportunities to examine how different socioeconomic groups engage with e-hailing services (Owusu & Oteng-Ababio, 2015). For instance, lower-income users may depend on affordability and safety, while middle-income users may prioritize convenience and service

reliability. This diversity enhances the analytical richness of the study by allowing insights into varying user expectations, needs, and perceptions.

Additionally, the historical and administrative significance of these sub-metros sets them apart. They form part of the historical core of Accra and have long-established transport systems that may interact or compete with modern e-hailing services (Osei-Asamoah et al., 2012). The presence of government offices, schools, and other institutions within these sub-metros also contributes to regular commuting patterns, which are critical for understanding mobility needs and behaviours (Musah et al., 2020).

Lastly, these areas benefit from relatively better-developed infrastructure and road networks, which support higher mobility demand and facilitate the operation of e-hailing services. Unlike some peripheral urban sub-metros that may suffer from poor road conditions or limited digital connectivity, the selected sub-metros offer an environment where e-hailing platforms can function efficiently, and data on service usage can be more reliably captured (Andreasen et al., 2022).

Table 3.2 presents data distribution of sample size across Ablekuma South, Ashiedu Keteke, and Okai Koi South. The total sample size for all three sub-metro areas is 399. From Table 3.2 the study engaged Ablekuma South (155), Ashiedu Keteke (124) and Okai Koi South (120). The sample sizes and the proportions of the total sample offer a quick view of the representation of each sub-metro area in the total population.

Table 3.2: Target Population

Sub-metro	Sample size per sub-metro	Sample proportion (%)
Ablekuma South	155	38.8
Ashiedu Keteke	124	31.2
Okai Koi South	120	30.0
TOTAL	399	100.0

Source: Author 2023

3.5 Sample size

The sample size is "the number of observations or participants included in a study or experiment" (APA, 2020). It is an essential aspect of research design as it influences the validity and reliability of study findings. According to Yamane's (1967) statistical formula, the sample size is calculated by dividing the population size by one plus the product of the population size and the square of the margin of error. Yamane's statistical formula considers the population size, margin of error, and confidence level to determine the appropriate sample size.

The formula is as follows:

$$S_n = \frac{N}{1 + N(e)^2}$$

Where:

S_n = sample size

N = population size

e = margin of error

$$S_n = \frac{284,124}{1 + 284,124(0.05)^2}$$

$$= \frac{284,124}{1 + 710.31}$$

$$= \frac{284,124}{711.31}$$

$$= 399.437$$

=399 approximately

3.6 Sampling technique

A meticulous sampling methodology was devised to ensure the robustness and credibility of the study's findings, combining probability and non-probability sampling techniques.

Stratified sampling was employed to select the sub-metros (Ablekuma South, Ashiedu Keteke, and Okai Koi South). This approach involves segmenting the population into distinct clusters and then employing a random selection process to choose clusters for inclusion in the study (Dillman et al., 2014).

By utilizing stratified sampling, the study effectively captured a representative cross-section of the population, enhancing the generalizability of its findings. The research areas were demarcated into three clusters: Ablekuma South, Ashiedu Keteke, and Okai Koi South.

The study minimized the risk of unconsciously favouring specific population subsets by giving everyone within the selected clusters an equal opportunity for inclusion. Within each chosen cluster (Ablekuma South, Ashiedu Keteke, and Okai Koi South), a subset of individuals was randomly selected to participate in the study. Through its impartial and unbiased selection process, the technique enhanced the accuracy of the collected data and ensured the study's conclusions were generalizable to the broader population.

Convenience sampling offered insights in cases where direct access to the target population proves challenging or strict representativeness is not a primary concern. Riders from the pre-identified clusters were conveniently sampled, acknowledging the potential for inherent bias due to the nature of this method (Bryman, 2016).

Purposive sampling was employed to augment the study's depth and comprehensiveness. This approach involves selecting participants based on predefined criteria aligning with the research's objectives (Bryman, 2016). The research encompassed stakeholders in an interview session, including e-hailing drivers and e-hailing service platform representatives, ensuring a comprehensive and multifaceted perspective.

3.7 Data sources and data collection instruments

The study relied on primary data from riders, drivers, and e-hailing companies. The primary data was collected using the following instruments:

3.7.1 Questionnaire:

A questionnaire was an appropriate data collection instrument for this study because it allows gathering information directly from a large sample of e-hailing service riders in a standardized way (Adams & Lawrence, 2019).

The questionnaire data on demographics and usage patterns, user, and perspectives on e-hailing vs taxi services. Using an online questionnaire platform (Kobo toolbox) provided room for collecting data across the geographic area. Questionnaires were administered to 400 riders, including a cross-section of women, men, and youth while balancing factors such as age, marital status, socioeconomic status, and level of education. The questionnaire had four sections. The first section captured the socio-demographic data on e-hailing riders.

The second section captured questions on the factors that influence the growth of e-hailing. The third section had questions comparing e-hailing service operations and traditional taxi operations. The last section had questions about the power of e-hailing riders over drivers and e-hailing companies.

3.7.2 Interview guide:

In addition to the Questionnaire, this study utilized a semi-structured interview guide to conduct expert interviews with drivers and e-hailing company representatives in the Accra Metropolitan Area. The semi-structured expert interviews provide an opportunity to capture rich, descriptive data and narratives that the quantitative methods missed (Mason, 2018). Drawing insights from drivers and e-hailing company representatives provided a vital context to complement the usage data gathered through questionnaires.

The interview data revealed themes about opportunities, challenges, policies, and regulations influencing e-hailing operations and growth in Accra specifically. Twelve (12) e-hailing drivers from (Bolt, Yango, Uber, and Shaxi) and three (3) e-hailing managers participated in the interview session. For e-hailing drivers, the semi-structured interview guide captured questions on the processes of becoming an e-hailing driver, passenger safety, perception of the differences that exist between e-hailing operations and traditional taxis, app, and ride control in terms of ride acceptance and rejection, work schedules, job security, and system ratings.

On the part of e-hailing company representatives, the interview questions centred around operations and services, regulations, customer experience, e-hailing advantages, rider empowerment issues, and the future evolution of e-hailing. The questionnaire and semi-structured interviews provided comprehensive data to meet the study's research objectives.

3.8 Data collection procedure

The questionnaires were administered by the researcher with assistance from trained research assistants. The research instrument was electronically modelled with the Kobo toolbox and administered in two ways.

Firstly, the researcher and the research assistants on the field administered directly to e-hailing riders in person. With assistance from the research assistants, the researcher positioned at malls, churches, supermarkets, university campuses, and airport areas to intercept and engage riders at their convenience. Secondly, the link to the questionnaire was shared with e-hailing riders who could not make time to respond to questions but opted to answer at their convenience.

A face-to-face interview section was scheduled with the drivers and e-hailing representatives to collect qualitative data, which were further transcribed. With e-hailing drivers, the researcher booked rides and engaged drivers in the conversation which was recorded while on the trip to have first-hand information on the issues. On the other hand, the researcher booked appointment sessions with company representatives from Uber, Bolt, Yango, and Shaxi. The researcher used a semi-structured interview guide to ensure consistency in data collection. The interviews were audio-recorded with the consent of the participants and later transcribed verbatim. The data collection process lasted from 18th August 2023 to 22nd November 2023.

3.9 Validity and reliability of research instrument

3.9.1 Validity of research instruments

Validity is a crucial aspect of research that ensures the accuracy and meaningfulness of inferences based on the research results. According to Mugenda and Mugenda (1999), validity is typically assessed using a professional or expert in a particular field to review the research instrument. This process helps to identify any

content-related issues, correct wording, and sequencing problems and explore ways to improve the overall quality of the study. For this study, the researcher sort opinions of experts in the field of study, particularly the supervisor, who is an expert in the field of transportation, and other lecturers in the Department of Geography Education at the University of Education, Winneba.

This expert review established the content validity of the research instrument and facilitated the necessary revisions or modifications to enhance its validity. By incorporating expert feedback into the research instrument, the study instruments were better equipped to produce accurate and meaningful results. This process helped to ensure that the research instrument was appropriate and relevant to the study's objectives and research questions.

3.9.2 Reliability of research instruments

The reliability of data collection instruments is crucial in research as it ensures consistency of measurement. The test-retest technique is frequently used to assess reliability (Mugenda & Mugenda, 2003).

The test-retest technique in this study involved administering the questionnaire to the same group of participants on two different occasions within a month. The goal was to determine if the results obtained from the two sessions were consistent, which indicated that the measure produces reliable and stable scores. I initially selected a representative sample from the study population who were administered with the questionnaire. After the initial testing, a month was allowed to pass.

After the month period elapsed, the questionnaire was administered again to participants, under similar conditions as the initial testing. The responses from the two administrations (initial testing and retesting) were compared using correlation coefficients. The test-retest reliability coefficient was calculated to determine the

degree of consistency of the measure over time. A high test-retest reliability coefficient of 0.83 was observed which suggested the measure produced a consistent result when administered at different points in time, indicating good reliability.

3.10 Data processing and analysis

Quantitative Data Processing

The collected data was cleaned to identify and address any errors, inconsistencies, or missing values. This step involved checking for duplicate entries, validating data formats, and ensuring the integrity of the data. Depending on the analysis requirements, the data were transformed into appropriate formats. The numerical data from the questionnaires were coded to facilitate statistical analysis. Questions on the factors contributing to the growth of e-hailing services were recoded into three categories on a scale of (disagree, neutral, and agree) from the initial scale used in collecting the data (1- strongly disagree to 5- Strongly Agree).

After cleaning the data, a principal component factor analysis was performed to reduce observed variables (items) to fewer underlying factors or dimensions. The principal component factor analysis was performed to ensure a prudent representation of the data by identifying the most important variables that capture most of the variance. According to Tabachnick and Fidell (2007), Principal Component Analysis (PCA) is "used to identify the linear components within data such that a maximum amount of variance is extracted from the data."

The parameters set for the PCA were Promax Rotation, while the coefficient estimation was suppressed to 0.5, indicating that all items with factor loadings below 0.5 were excluded from the data. From the PCA, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were conducted to assess the suitability of the data for factor analysis.

The KMO measure of sampling adequacy was .848, above the recommended value of .6 (Kaiser, 1974), indicating that the sample size was adequate for factor analysis. Bartlett's Test of Sphericity was statistically significant ($\chi^2(253) = 7991.581$, $p < .001$), suggesting that the correlation matrix was not an identity matrix and that the variables were related (Engle et al., 2019). The PCA results supported the factorability of the correlation matrix and the appropriateness of performing factor analysis on the given dataset. See the Appendix IV for the Structure Matrix.

After the factor analysis, the items maintained were subjected to a reliability test to determine whether the items within the instrument consistently measured the same underlying construct or concept. Economic factors to e-hailing growth maintained six (6) items with a Cronbach Alpha = .903, Ease of use maintained five (5) items with Cronbach Alpha = 0.868, Safety maintained seven (7) items with Cronbach Alpha = .871, and finally, Security maintained five (5) items with Cronbach Alpha = .805.

All 23 items of the four dimensions recorded a Cronbach Alpha of .905. A Cronbach's alpha coefficient of .905 is considered excellent, as it exceeds the generally accepted threshold of .7 (Bujang et al., 2018) and is often cited as an indication of adequate internal consistency (Taber, 2018). This high level of reliability indicates that the items are measuring the same thing and that the scale provides consistent results. According to Tavakol and Dennick (2011), a high Cronbach's alpha suggests that the items in the scale are highly intercorrelated and consistently measure the same underlying concept.

After subjecting the data PCA, further statistical techniques were employed to analyse the data, depending on the research objectives. Quantitative data from the questionnaires were analysed using statistical software, such as Statistical Package for Social Sciences (SPSS) version 27, Jamovi version 2.4.8, and Microsoft Excel 365 (to

develop charts), to perform descriptive and inferential analyses. The socio-demographic characteristics were subjected to descriptive analysis, and the results were measured in frequency counts and percentages. These measures allowed for a clear understanding of the patterns and trends present in the dataset.

Multinomial logistic regression analysis was used to verify the relationship between the demographic variables, the factors promoting e-hailing operations' growth, and the dependent variables (satisfaction, ratings, and usage patterns). These analyses provided insights into the associations and helped conclude the relationship between factors predicting the growth of e-hailing service operations and overall riders' satisfaction.

The comparisons between e-hailing service operations and traditional taxi services were subjected to a paired sample t-test to identify the strengths and weaknesses of each service against the other. Subsequently, for the power of e-hailing riders, the data was subjected to crosstabulation analysis of the control riders have on the service platform, as opposed to the service platform rides being hailed.

Data visualization techniques were utilized to present the findings clearly and compellingly. Charts, graphs, and table visual representations were created to illustrate the relationships, trends, and patterns identified during the data analysis.

Qualitative Data Processing

Qualitative data from the interviews were analysed using MAXQDA version 2020 to perform thematic and content analyses to identify patterns, themes, and insights.

The coding strategy involved open coding, categorization, axial coding, and selective coding. The interview transcripts were carefully read, and codes were assigned to capture the data segments, utilizing descriptive, conceptual, and Nvivo codes. Similar

codes were grouped into broader themes by identifying relationships and organizing them in a hierarchical structure.

During axial coding, the relationships between categories and subcategories were examined to understand the central phenomena, causal conditions, intervening conditions, strategies, and consequences. This process helped to develop the emerging themes and their interconnections. Selective coding was then used to relate the core categories to other categories, validating relationships and refining the overall narrative or conceptual framework.

Throughout the coding process, the constant comparative method was employed, where codes, categories, and emerging themes were continuously compared with new data segments. Memo writing was utilized to capture thoughts, reflections, and interpretations.

3.11 Ethical considerations

Ethical considerations are crucial in ensuring the well-being of all individuals involved in the research activities. Ethics aims to prevent harm and mitigate any adverse consequences from the study. To achieve this, the researcher implemented reasonable safeguards and adhered to ethical requirements throughout the research process. One critical ethical consideration was the sensitive nature of the relationships between the researcher and the respondents.

Recognizing this, the researcher prioritized the confidentiality and privacy of the information shared during the study. The data collected was treated with utmost confidentiality and solely used for academic purposes. To maintain anonymity and protect the respondents' identities, the researcher refrained from using or mentioning their names in the study.

This approach ensured that the privacy and confidentiality of the participants were respected, reducing the risk of potential harm or negative consequences. By incorporating these ethical considerations and safeguards, this study upheld the principles of research ethics and prioritized the well-being of all individuals involved.



CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter highlights the analysis and discussion of the study's data. The data analysed presents the socio-demographic background of respondents, factors contributing to the growth of e-hailing operations, comparison between the operational modules of e-hailing and taxi services, and power play between riders, drivers, and e-hailing companies while using e-hailing mobile apps.

4.1 Socio-demographic characteristics of a rider in Accra Metropolitan Area

Table 4.1 presents socio-demographic information of e-hailing riders surveyed for the study. It breaks down the frequency and percentage of riders by gender, age, highest level of education, employment status, average monthly household income, and use of e-hailing platforms like Uber, Bolt, Yango, and Shaxi in the Accra Metropolitan Area.

Table 4.1: Socio-demographic characteristics of respondents

Variables	Freq.	Percent
Gender		
Male	237	59.3%
Female	163	40.8%
Age		
18-23 years	77	19.3%
24-34 years	246	61.5%
35-44 years	70	17.5%
45-54 years	2	0.5%
55+ years	5	1.3%
Total	400	100.0%

Source: Fieldwork, 2023

Table 4.1: Socio-demographic characteristics of respondents (cont'd)

Variables	Freq.	Percent
Highest Level of Education		
No formal Education	3	0.8%
Primary	22	5.5%
JSS/JHS	37	9.3%
SHS/ Voc	100	25.0%
Tertiary	238	59.5%
Employment		
Unemployed	28	7.0%
Private formal	30	7.5%
Private informal	125	31.3%
Public formal	120	30.0%
Public informal	25	6.3%
Student	72	18.0%
Average Household Income		
Below GHc 500	42	10.5%
GHc 500 – 1,000	56	14.0%
GHc 1,001 -1,500	71	17.8%
GHc 1,501 – 2,000	119	29.8%
GHc 2,001 – 2,500	78	19.5%
Above GHc 2,500	34	8.5%
E-hailing Platform Use		
Uber	113	28.2%
Bolt	160	40.0%
Yango	92	23.0%
Shaxi	35	8.8%
Total	400	100.0%

Source: Fieldwork, 2023

The sample of 400 e-hailing riders in Table 4.1 was predominantly male (59.3%) and young adults, with 61.5% aged 24-34. Nearly 60% have a tertiary education. Regarding employment, the most prominent groups (31.3%) were privately employed

in informal enterprises, with only about 6% in the public informal sector. Over half (56%) of riders had average monthly household incomes of GH¢1,000 to GH¢2,500. The most frequently used e-hailing platform was Bolt (40%), with only 8.8% of riders using Shaxi.

The gender distribution of the sample shows a clear male dominance, with nearly 60% of the riders being male. This trend is commonly observed in the ride-hailing industry, often perceived as male-dominated (Micha & Pereyra, 2022). However, it's noteworthy that a significant proportion (40.7%) of riders are female, indicating that the industry is gradually becoming more inclusive and provide opportunities for women (Aheto & Cronje, 2018). Regarding age, the data reveals that most e-hailing riders (61.5%) fall within the age group of 24-34 years. This age bracket is typically associated with higher mobility, adaptability to new technologies, and a greater willingness to engage in freelance opportunities (Asgari & Jin, 2020).

The educational background of the riders is noteworthy, with nearly 60% having a tertiary education. This suggests that e-hailing riders are educated individuals (Inan et al., 2022). Regarding employment, the data reveals that a significant proportion (31.3%) of riders are privately employed in informal enterprises (Dieppa, 2019). This highlights the prevalence of informal employment in the region and the potential role of e-hailing work in supplementing incomes or providing alternative sources of livelihood (Turkson et al., 2022; Alozie & Akpan-Obong, 2017).

Additionally, riders from the public informal sector (6%) underscores the diverse employment backgrounds of those engaged in e-hailing activities (Liang et al., 2020). The monthly household income distribution shows that over half (56%) of the riders have average monthly household incomes ranging from GH¢1,000 to GH¢2,500. This income range suggests that e-hailing work may be an attractive option for

individuals seeking to supplement their household income or as a primary source of income for those in lower-income brackets Gomez et al., (2021).

Regarding the e-hailing platforms used, Bolt emerges as the most popular choice, with 40% of riders utilizing its services. This dominance could be attributed to factors such as brand recognition, user experience, or incentives offered by the platform (Turkson et al., 2022). Conversely, Shaxi's relatively low usage (8.8%) among riders may indicate challenges in capturing market share or consumer preferences. Overall, the data provides insights into the demographics and characteristics of e-hailing riders in the sample. It highlights the diversity in terms of gender, age, educational backgrounds, and employment status, while revealing trends in income levels and platform preferences.

4.2 Frequency of using e-hailing and traditional taxi services

Four hundred (400) e-hailing riders were asked to indicate their frequency of use of the service platform as compared to the usage of taxi services on a scale of (1-never, 2-once a week, 3-one to two times a week, 4-four to six times a week and 7-everyday of the week). The results are presented in Figure 4.1

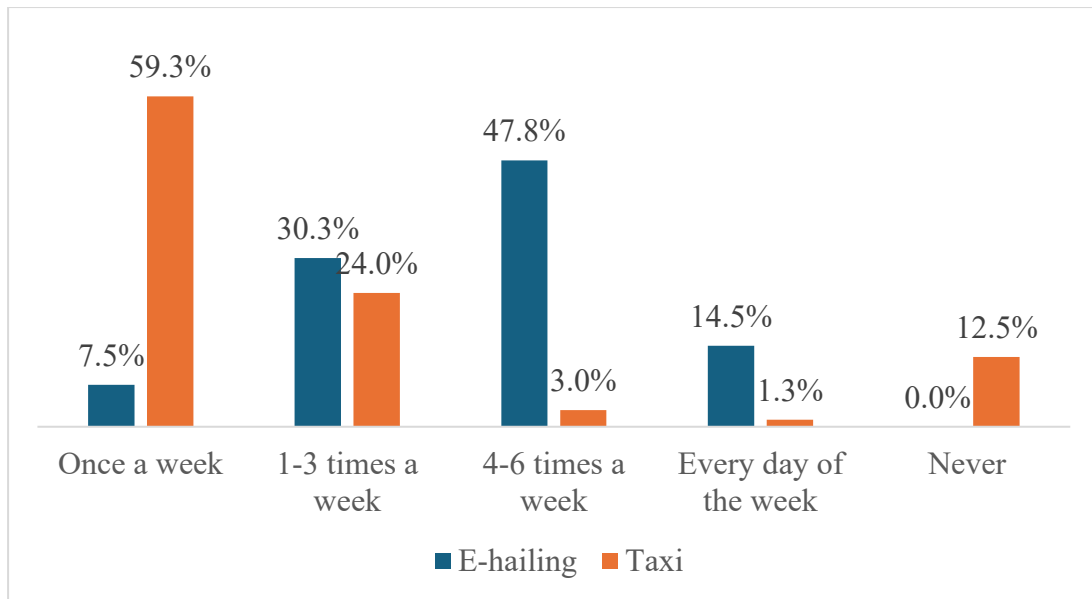


Figure 4.1. Frequency of using e-hailing and traditional taxi services

Source: Fieldwork, 2023

The results presented in Figure 4.1 reveal insights into the usage patterns of traditional taxi services versus e-hailing platforms among survey respondents. Specifically, the data shows that most (59.3%) of e-hailing platform riders utilize taxis once a week. In contrast, nearly half (47.8%) of e-hailing riders use e-hailing platforms 4-6 times per week. Contradictory results were found in a study by Sahir Jais and Marzuki (2018), which found that most e-hailing riders used e-hailing services only once a week, primarily for leisure and entertainment purposes. Several factors may explain the discrepancy in usage frequency between traditional taxis and e-hailing services: E-hailing services have a higher frequency than traditional taxis due to their convenience and ease of use.

In contrast, traditional taxis often have predatory pricing practices that make single rides relatively expensive (Raychaudhuri, 2020). Furthermore, E-hailing platforms offer discounts, coupons, and subscription packages, increasing affordability for frequent trips (Pasquali et al., 2022). Moreover, the digital nature of e-hailing

networks allows them to scale up fleets quickly, resulting in faster pick-ups and rides. Finally, as smartphones become ubiquitous, e-hailing riders become habitual, making them less likely to consider alternatives like taxis (Arumugam et al., 2020).

The higher frequency of e-hailing riders than taxi usage suggests habit formation and dependability reinforcement despite taxis' cost, availability, and convenience (Smith, 2021). The advantages and popularity of e-hailing platforms drive consumer preference over taxis, evolving into transportation habits (Arumugam et al., 2020). This preference gap may expand without availability, pricing, and convenience changes.

4.3 E-hailing service provider and frequency of usage

A crosstabulation was conducted to assess the relationship between the frequency of using e-hailing services and the type of e-hailing service provider often used among respondents in the Accra Metropolitan Area. The e-hailing service providers included Uber, Bolt, Yango, and Shaxi. The frequency of usage options was once a week, 1-3 times a week, 4-6 times a week, and every day of the week.

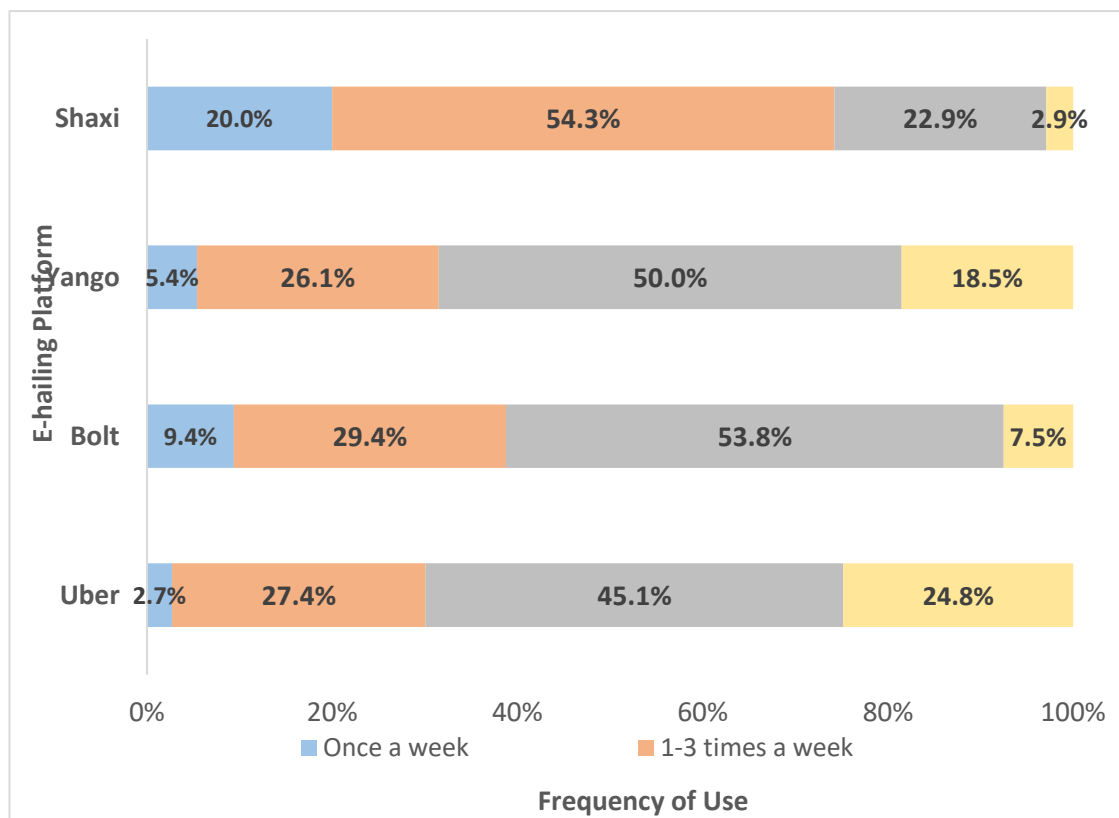


Figure 4.2: E-Hailing Service and Frequency of Usage

Source: Fieldwork, 2023

Figure 4.2 shows some differential preferences for e-hailing services providers based on usage frequency. It was revealed that among all platforms, Shaxi recorded the highest proportion of users (54.3%) who used the service 1–3 times a week, followed by 22.9% using it 4–6 times a week, 20.0% using it once a week, and only 2.9% using it daily. For Yango, half of the users (50.0%) used it 4–6 times a week, while 26.1% used it 1–3 times a week, 18.5% used it daily, and 5.4% used it once a week.

Bolt had 53.8% of its users using it 4–6 times a week, 29.4% 1–3 times a week, 9.4% once a week, and 7.5% every day. Uber had the highest percentage of daily users (24.8%) compared to other platforms, while 45.1% used it 4–6 times a week, 27.4% 1–3 times a week, and only 2.7% used it once a week. These findings reveal preferences for specific e-hailing services may vary based on one's frequency of e-hailing use within the Accra area (Ofori et al., 2022). More frequent usage (4-6 times or daily) appears to

be related to Bolt and Yango because of the discounts packages they offer to riders, while Uber maintained more appeal for customers with occasional or moderate frequency (Pasquali et al., 2022; Odame et al., 2023).

4.4 Purpose for using e-hailing services

Figure 4.3 displays the results in a bar graph representing the purposes for which individuals utilize Uber, Bolt, Yango, and Shaxi. The graph categorizes the usage into three distinct purposes: work-related trips, non-work-related trips, and a combination of work and non-work-related trips among riders in Accra.

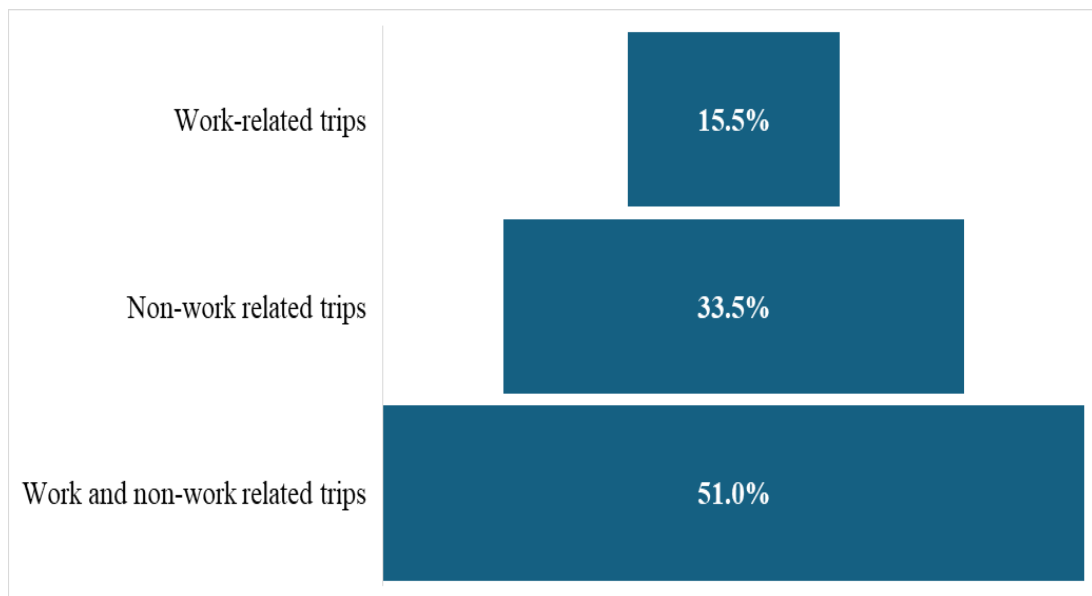


Figure 4.3: Purpose for using e-hailing services in Accra Metropolitan Area

Source: Fieldwork, 2023

Figure 4.3 indicates that 51% of e-hailing riders leverage e-hailing services for work and non-work-related trips, with a further 33.5% requiring the platforms to fulfil non-work-related transportation needs, while only 15.5% utilized the services strictly for work-related trips. This result confirms earlier studies by Rafiq and McNally (2023) that revealed that most riders reported using ride-hailing services for both work and non-work trips.

The findings imply that most app-based taxi patrons are not niche subsets who engage providers exclusively for commercial or private functions (Melia, 2020). Instead, application flexibility is prioritized, with consumers appreciating the ability to book rides seamlessly for diverse trips, including client meetings, errands, social occasions, and festivities (Shiftan et al., 2021).

4.5 Usage patterns of e-hailing services throughout the day

Table 4.2 displays data on the usage patterns of e-hailing services by time of day among the survey respondents. Participants could select multiple periods when they typically use e-hailing platforms either morning (6:00 am -11:59 am), afternoon (12:00 pm-4:59 pm), evening (5:00 pm -10:00 pm) and throughout the day (6:00 am-10:00 pm). Therefore, the percentage of cases is over 100%. Table 4.2 shows the frequency and percentage of total responses for each period and the percentage of cases (respondents) selecting each option.

Table 4.2 Daily usage pattern of e-hailing services

Period of Day	Responses		Percent of Cases
	Freq.	Percent	
Morning	255	39.9%	63.7%
Afternoon	52	8.1%	13.0%
Evening	191	29.9%	47.8%
Throughout the day	141	22.1%	35.3%
Total	639	100.0%	159.8%

a Dichotomy group tabulated at value 1.

Source: Fieldwork, 2023

Table 4.2 shows that morning (6 am-11:59 am) was the most popular time for e-hailing, with 255 responses (39.9% of total responses) and 63.7% of respondents choosing that period. The evening was the second most preferred timeframe, with 191 responses (29.9%) and 47.8% selecting it. One hundred forty-one responses (22.1%)

indicated e-hailing use throughout the entire day, encompassing 35.3% of respondents. Finally, the afternoon (12:00 pm-4:59 pm) had the least period, with only 8.1% of total responses and 13.0% of participants picking that option.

The morning commute period appears when e-hailing demand peaks within the Accra region. Evenings also see high utilization potentially coinciding with post-work transportation needs. Multi-period, all-day use still comprises over one-third of riders. Afternoon ridership notably lags compared to other significant timeframes. The findings from the study confirm Wang et al. (2021) study on the influencing factor analysis and demand forecasting of intercity online car-hailing in China, which found that the peak hours for car-hailing trips are between 9:00 and 10:00 and between 16:00 and 18:00.

4.6 Destination of e-hailing service riders

Figure 4.4 presents the distribution of destinations for riders using e-hailing services. Rider's destinations were categorized into seven types (office/work, shopping malls, markets, churches, schools, hospitals, and "other") category.

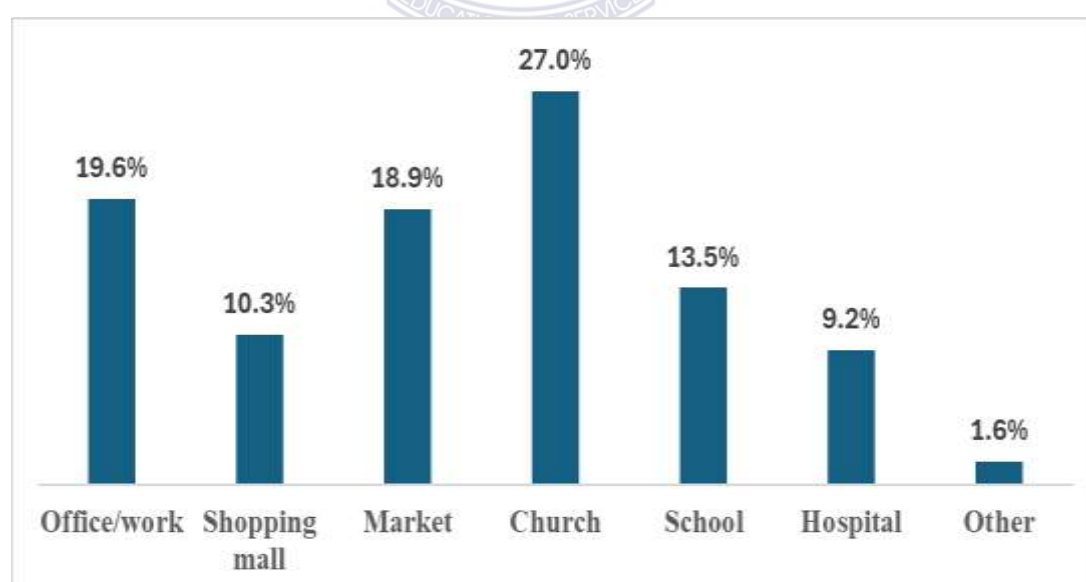


Figure 4.4: Destinations e-hailing riders

Source: Fieldwork, 2023

The results from Figure 4.4 indicate e-hailing riders, approximately 27.0%, frequently utilize these services for visiting churches. Additionally, 19.6% of riders use e-hailing for commuting to their offices or workplaces while the least represented activity for e-hailing usage was "other activities," comprising only 1.6% of riders. This data suggests that religious and work-related purposes are the primary motivations for e-hailing riders, while other activities, are less commonly served by these services.

Objective 1: *Examine the Factors Contributing to the Growth of E-Hailing Services in Ghana*

4.7 Factors contributing to the growth of e-hailing services (Uber, Bolt, Yango, and Shaxi)

4.7.1 Predictive factors influencing the frequency of e-hailing service usage

A multinomial logistic regression analysis was conducted to predict riders' frequency of using e-hailing services based on level of education, gender, service platform, age, monthly income, and growth factors. A composite scale of growth factors was constructed using the measure items for ease of use, safety, security and economic factors. The regression model was statistically significant, $\chi^2(42) = 213.654$, $p < .001$, Cox and Snell $R^2 = .414$, Nagelkerke $R^2 = .506$. The chi-square goodness-of-fit test showed significance $\chi^2(314) = 515.546$, $p < .001$, indicating the overall model significantly differed from the expected ones. However, the deviance chi-square test was insignificant, $\chi^2(314) = 312.987$, $p = .506$, suggesting an adequate model fit according to the test statistic.

Table 4.3 Logistic regression analysis of predictive variables influencing rider's frequency of e-hailing service usage

Predictive variables	Frequency of using e-hailing services			
	Rarely (1-3 times a week)		Seldom (4-6 times a week)	
	<i>p</i>	Odds Ratio	<i>p</i>	Odds Ratio
Level of Education				
No formal education	1.00	2.64	1.00	3.37
Primary education	1.00	4.16	0.33	1.85
JSS/JHS	0.26	5.49	0.00	5.54
SHS/Voc	0.00	66.61	0.14	1.86
Tertiary (REF)				
Gender				
Male	0.98	1.016	0.00	0.27
Female (REF)				
Service Platform				
Uber	0.00	0.01	0.00	0.17
Bolt	0.00	0.02	0.00	0.19
Yango	0.00	0.00	0.15	0.43
Shaxi (REF)				
Age				
18-23 years	0.00	4.70	1.00	1.51
24-34 years	0.00	6.66	1.00	9.56
35-44 years	.	1.12	1.00	9.70
45-54 years	.	8.68	1.00	10.65
55+ years (REF)				

The reference category is Always (everyday). REF=Reference category. $p < 0.05^*$, $p < 0.01^{**}$

Source: Fieldwork, 2023

Table 4.3 Logistic regression analysis of predictive variables influencing rider's frequency of e-hailing service usage (cont'd)

Predictive variables	Frequency of using e-hailing services			
	Rarely (1-3 times a week)		Seldom (4-6 times a week)	
	<i>p</i>	Odds Ratio	<i>p</i>	Odds Ratio
Monthly Income				
Below GH¢ 500	0.99	1.86	0.00**	28.19
GH¢ 500 – 1,000	1.00	1.88	0.00**	29.36
GH¢ 1,001 -1,500	0.99	5.75	0.02**	14.11
GH¢ 1,501 – 2,000	1.00	3.09	0.00**	23.88
GH¢ 2,001 – 2,500	1.00	7.72	0.26	3.56
Above GH¢ 2,500 (REF)				
Growth Factors				
Ease of Use	0.69	0.78	0.47	0.80
Safety factors	0.12	0.45	0.38	0.78
Security factors	0.92	0.94	0.00**	0.28
Economic factors	0.15	0.45	0.98	1.01
Cox and Snell	.414			
Nagelkerke	.506			

The reference category is Always (everyday). REF=Reference category. $p < 0.05^*$, $p < 0.01^{**}$

Source: Fieldwork, 2023

As shown in Table 4.3, the seven independent variables (level of education, gender, age, service platform, monthly income, and growth factors) significantly contributed to the model. Riders earning between GH¢ 500 and GH¢ 1000 were 29 times more likely to use e-hailing services seldomly (4-6 times) compared to those who always use e-hailing services throughout the day (OR=29.36, $p < 0.001$) which suggests that riders with moderate incomes may rely on e-hailing services for specific trips or occasions rather than as a primary mode of transportation (Sawyer, 2019).

Conversely, riders earning between GH¢ 1,001 and GH¢ 1,500 exhibited a lower likelihood of seldom usage ($OR=14.11, p<0.001$), indicating that higher-income individuals may be more inclined to use e-hailing services more frequently (Blakely & Kawachi, 2014).

Educational level also emerged as a significant predictor, with riders holding secondary/vocational education being 7 times more likely to rarely use e-hailing services ($OR=6.61, p<0.001$) and those with seldom usage being 6 times more likely to use the service ($OR=5.54, p<0.001$) compared to those who always use e-hailing service which suggests individuals with lower educational attainment may have different transportation needs or preferences that influence their e-hailing service usage patterns (Cheng & Fouda, 2018).

Age was another notable factor, with riders between 24-34 years being 7 times more likely to rarely (1-3 times) use e-hailing services ($OR=6.66, p<0.001$) compared to the 18-23 age group, who were 5 times more likely to use e-hailing services rarely (1-3 times) ($OR=4.70, p<0.001$). This age-related difference could be attributed to various factors, such as employment status, lifestyle, or familiarity with technology (Cohn & Taylor, 2010). Regarding service platform usage, riders who used Uber, Bolt, and Yango platforms were associated with lower odds of using e-hailing services rarely (1-3 times) and seldomly (4-6 times) compared to the Shaxi platform, which reflect differences in service quality, accessibility, or user experience among the various platforms (Dillahun et al., 2017).

Finally, among the growth factors, security factors were a significant predictor of seldom usage ($OR=0.28, p<0.001$) compared to safety, ease of use, and economic factors. This highlights the importance of addressing security concerns to encourage

more frequent usage of e-hailing services (Ghafghazi & Wilkie, 2014). In reference to Table 4.3 a Bolt representative during the interview asserts that:

“... safety and security are of utmost importance to us. We have implemented several measures to ensure the safety and security of our passengers, including thorough background checks and vetting of all driver-partners, In-app safety features like Share My Trip and Emergency Assistance, 24/7 customer support for any safety and security-related incidents, Strict policies against impaired driving and inappropriate behaviour...” **(Bolt representative, Male participant, 48years)**

Differences along demographic lines hint at complex underlying forces shaping uneven adoption patterns, highlighting priorities for policy reforms, public awareness campaigns, and corporate social responsibility initiatives aiming to spread the benefits of e-hailing advances broadly.

The findings from the study on factors influencing e-hailing service usage in Ghana strongly align with the disruptive innovation theory proposed by Clayton Christensen (1997). E-hailing services like Uber, Bolt, and Yango represent an innovative business model that leverages enabling technologies like mobile apps and digital platforms to disrupt the traditional taxi industry. These services initially target underserved segments with moderate incomes and lower educational levels, aligning with the theory's premise of disruptive innovations initially catering to overlooked markets. The varying adoption patterns across different service platforms suggest the presence of coherent value networks involving drivers, customers, and supporting infrastructure.

Despite potential resistance from incumbent firms, e-hailing services have gained market acceptance, reflecting the theory's prediction of disruptive innovations eventually replacing established products. The study also highlights areas for improvement, such as addressing security concerns and service quality differences, which aligns with the theory's notion of disruptive innovations continuously improving over time.

Objective 2: Compare the Operational Modules of E-Hailing To Taxi Services as the Basis for Drawing Lessons

4.8 Strengths in operational modules between e-hailing and taxi services

A paired-sample t-test was conducted to compare rider evaluations of the operational strength of e-hailing against traditional taxi services across five aspects (Convenience, safety, price transparency, payment options, and customer service). The item means and standard deviations indicate the strength of e-hailing and traditional taxi services based on riders' evaluation of service strengths in the operational model. Cohen's d is interpreted as small (0.1-0.29), medium (0.3-0.49), large (0.5-0.79), and very large (0.8- ≥ 1.0). The results are presented in Table 4.4.

Table 4.4: Paired sample t-test of the strengths in operational modules between e-hailing and taxi services

Variables	E-hailing	Taxi	Paired diff.		p	Cohen's d
	M (SD)	M (SD)	M (SD)	t		
Convenience (e.g., easy to book a ride)	4.76 (0.50)	3.39(1.49)	1.37(1.62)	16.99	.00	0.85
Safety (e.g., ability to track the ride and driver)	4.68(0.54)	3.07(1.49)	1.61(1.69)	18.96	.00	0.95
Price transparency (e.g., upfront pricing)	4.71(0.54)	3.15(1.57)	1.56(1.64)	19.05	.00	0.95
Payment options (e.g., ability to pay by credit card)	4.49(0.77)	3.17(1.61)	1.33(1.57)	16.91	.00	0.85
Customer service (e.g., ability to rate the driver)	4.71(0.56)	3.15(1.60)	1.56(1.69)	18.48	.00	0.92

Source: Fieldwork, 2023

The results from Table 4.4 reveal that riders rated e-hailing ($M = 4.76$, $SD = .50$) significantly higher on convenience than taxis ($M = 3.39$, $SD = 1.49$), $t(399) = 16.99$, $p < .001$, $d = .85$. This reflects a very large sized effect (Cohen's $d=.85$), indicates e-

hailing was rated as substantially more convenient. In terms of safety, E-hailing ($M = 4.68$, $SD = .54$) was rated as significantly safer than taxis ($M = 3.07$, $SD = 1.49$), $t(399) = 18.96$, $p < .001$, $d = .95$. This very large effect size shows that e-hailing was seen as superior in safety assurances.

With price transparency, there were significantly higher price transparency ratings for e-hailing ($M = 4.71$, $SD = .54$) compared to taxis ($M = 3.15$, $SD = 1.57$), $t(399) = 19.05$, $p < .001$, $d = .95$. This very large effect indicates that e-hailing prices were perceived as more transparent. Further, it was revealed that E-hailing payment options were rated significantly better ($M = 4.49$, $SD = .77$) than taxi payment options ($M = 3.17$, $SD = 1.61$), $t(399) = 16.91$, $p < .001$, $d = .85$. With this very large effect size, the result shows that e-hailing had notably superior payment flexibility. There was significantly higher satisfaction with e-hailing customer service ($M = 4.71$, $SD = .56$) than taxi customer service ($M = 3.15$, $SD = 1.60$), $t(399) = 18.48$, $p < .001$, $d = .92$.

The result reflects a substantial advantage for e-hailing regarding customer service quality. Riders rated e-hailing significantly higher across all aspects of operations, including convenience, safety, price transparency, payments, and customer service. The very large effect sizes confirm that e-hailing was considered superior on all metrics. The results reveal that e-hailing services have clear advantages over taxis across several key dimensions beyond dependability and comfort. Taking inferences from Table 4.4, during an interview session with drivers, a driver was of the view that:

“...Yango offers convenience and ease of use; with just a few taps on their smartphones, passengers can request a ride and track the driver's location, eliminating the need to wait on the street for a taxi. Yango often provides shorter wait times than traditional taxis. The large network of drivers ensures that a driver is usually available nearby, ready to pick up a passenger, reducing the frustration of waiting for a taxi to arrive. Yango can see the estimated fare before they book a ride, eliminating the possibility of unexpected charges. In contrast, traditional taxis may use meters that can be manipulated, leading to disputes over fares...” (Yango Driver, Male participant, 31 years)

These findings on rating align with a study on price, service quality, customer trust, and safety influence towards customer satisfaction on online transportation (Fong et al., 2023), which found that the impact of pricing, service quality, customer trust, and safety are the influencing factors of consumer satisfaction in e-hailing services in Malaysia. These technology-enabled strengths of the e-hailing model underline rider experience limitations faced by the traditional taxi industry. Taking inferences from Table 4.4, during an interview session with drivers, a driver was of the view that:

“...I provide higher quality service than regular taxis - my vehicle is newer and cleaner. The app allows riders to select preferred drivers based on ratings, car type, and fare rates. My acceptance and cancellation rates are monitored by Bolt as well, which discourages arbitrarily rejecting ride requests, which regular cab drivers frequently do. I cannot cancel too often without temporary account deactivation...” (Bolt driver, Male, 39 years)

The study results show that e-hailing services are rated significantly more convenient than taxis based on rider perceptions. E-hailing convenience averaged 4.76 out of 5, compared to just 3.39 for taxis, which is a huge difference with an effect size of 0.85. This significant convenience differential highlights how the e-hailing model has elevated on-demand access to rides via seamless mobile apps. GPS pairing of passengers and nearest drivers enhances convenience.

Relatedly, e-hailing's flexibility and payment process strengths speak to the greater accessibility the platforms provide over taxis. According to Smith (2020), e-hailing services have gained significant attention due to their dynamic nature and the availability of smartphone applications with GPS-based location technology. In comparing the operational modules of e-hailing to traditional taxi services, a driver asserted that:

“...Compared to traditional taxis, e-hailing services offer a more streamlined and efficient experience. The digital platform allows easy booking through a mobile app, GPS navigation for optimal routes, and cashless transactions. This benefits passengers and enhances the overall experience for drivers...” (Uber driver, Male, 32 years)

E-hailing payment options averaged 4.49 versus 3.17 for taxis, with a large effect size of 0.85. With integrated digital payments, cashless transactions, and payment profiles, e-hailing offers much smoother and more flexible payments. Additionally, e-hailing customer service satisfaction ratings were higher than taxis, 4.71 to 3.15, respectively (huge effect size of 0.92). E-hailing apps provide always-on support channels, self-help options, and user account management that expand accessible customer service. In an interview session with drivers, a driver shared his experiences, according to him:

“...Shaxi Ride offers a personalized experience, allowing riders to choose preferences such as preferred drivers, car models, and fare rates. I maintain a clean and well-equipped vehicle with amenities like phone chargers and water. While I have the flexibility to accept or reject rides, consistent rejections may lead to temporary restrictions. Shaxi Ride's service model goes beyond traditional taxis, providing passengers a more tailored and comfortable experience...” (Shaxi driver, Male, 29 years)

Additionally, riders viewed e-hailing as safer than taxis across several metrics. E-hailing safety ratings averaged 4.68 compared to just 3.07 for taxis – a huge effect size of 0.95. Safety features like GPS trip tracking, profile verification, and digital record keeping give e-hailing the edge. Relatedly, e-hailing prices were seen as more transparent than taxi pricing given technology-aided cost estimates and quotes (average ratings 4.71 vs 3.15 respectively; huge effect of 0.95). Upfront quoted prices and cashless payments promote this superior price transparency for riders.

These results make clear several technology-driven customer experience advantages held by e-hailing platforms over taxis (Tirachini, 2020). Large to very large effects on convenience, safety, pricing, payments, and customer service highlight e-hailing strengths rooted in their technical integration (Wang & Yang, 2019). Consequently, the taxi industry faces pressure to upgrade across digital and mobile accessibility, cashless infrastructure, and user support capabilities. Besides competing in service delivery and driver quality, taxis must adapt products, processes, and

technology to compete with the end-to-end customer experience provided by e-hailing leaders like Uber, Bolt, Yango, and Shaxi.

However, opportunities remain for taxis to leverage strengths around personalized services, driver vetting, and flexible routing/destinations. Hybrid approaches blending these taxi strengths with e-hailing-style technology could pose the most significant competition to e-hailing services (Vignon et al., 2023). For example, apps for hailing licensed taxi drivers, estimating fares, and paying digitally help bridge capabilities (Tirachini, 2020). Ride-share pioneer Lyft originated as Zimride essentially digitally "hailing" informal carpools before pivoting to a pure e-hailing model. Blending the service excellence of taxis with the technological excellence of e-hailing poses the greatest threat to market domination.

In conclusion, the findings presented in the image provide a compelling illustration of how e-hailing services, as a disruptive innovation, have been able to compete with and disrupt traditional taxi services by offering superior performance across various attributes such as convenience, safety measures, price transparency, payment options, and customer service which are valued by customers. This aligns with the theory's premise that disruptive innovations initially target underserved or overlooked market segments with simpler, more affordable, and often superior solutions, eventually displacing established incumbents. The success of e-hailing services serves as a prime example of the transformative power of disruptive innovation in reshaping industries and redefining customer expectations.

4.9 Weaknesses in operational modules of e-hailing and taxi services

A paired-sample *t*-test was conducted to determine whether rider perceptions of weaknesses differed across operational aspects such as dependability, driver experience, privacy, comfort, and flexibility of e-hailing against taxi services. The item

means and standard deviations indicate the weaknesses of e-hailing and traditional taxi services based on riders' evaluation of service weakness in the operational model. Cohen's *d* is interpreted as small (0.1-0.29), medium (0.3-0.49), large (0.5-0.79), and very large (0.8- ≥ 1.0). The results in Table 4.5 reflect a series of paired-sample *t*-tests to compare riders' perceptions of weaknesses.

Table 4.5: Paired sample *t*-test of the weaknesses in operational modules of e-hailing and taxi services

Variables	E-hailing	Taxi	Paired diff.	<i>t</i> (399)	<i>p</i>	Cohen's <i>d</i>
	M (SD)	M (SD)	M (SD)			
Dependability (e.g., availability of rides during peak hours)	3.65(1.46)	3.06(1.47)	0.59(2.54)	4.67	.00	0.23
Driver experience (e.g., knowledge of routes and navigation)	3.39(1.26)	4.31(1.05)	- 0.92(1.64)	-11.18	.00	-0.56
Privacy (e.g., sharing personal information with the app)	3.45(1.33)	4.16(1.22)	- 0.72(1.60)	-9	.00	-0.45
Comfort (e.g., quality of the vehicle)	4.45(0.85)	2.67(1.66)	1.78(2.21)	16.1	.00	0.81
Flexibility (e.g., ability to hail a ride on the street)	3.55(1.46)	4.22(1.24)	- 0.67(1.59)	-8.42	.00	-0.42

Source: Fieldwork, 2023

It was revealed in Table 4.5 that for dependability, there was a statistically significant increase in ratings for e-hailing ($M = 3.65$, $SD = 1.46$) compared to taxis ($M = 3.06$, $SD = 1.47$), $t(399) = 4.67$, $p < .001$, $d = 0.23$. Comfort ratings were significantly higher for e-hailing ($M = 4.45$, $SD = 0.85$) compared to taxis ($M = 2.67$, $SD = 1.66$), $t(399) = 16.10$, $p < .001$, $d = 0.81$. In contrast, driver experience, privacy, and flexibility

ratings were significantly lower for e-hailing compared to taxis, $t(399) = -8.42$, $p < .001$, indicating more perceived weaknesses of e-hailing on these dimensions.

Specifically, e-hailing driver experience ratings ($M = 3.39$, $SD = 1.26$) were lower than taxi ratings ($M = 4.31$, $SD = 1.05$), $d = -0.56$; e-hailing privacy ratings ($M = 3.45$, $SD = 1.33$) were lower than taxis ($M = 4.16$, $SD = 1.22$), $d = -0.45$; and e-hailing flexibility ratings ($M = 3.55$, $SD = 1.46$) were lower than taxi ratings ($M = 4.22$, $SD = 1.24$), $d = -0.42$). Riders tended to view e-hailing more positively regarding dependability and comfort but more negatively regarding other key operations like driver experience and privacy protections compared to taxi services.

The study results reveal intriguing differences in rider perceptions of e-hailing services compared to traditional taxi services. Broadly, e-hailing services like Uber, Bolt, Yango, and Shaxi rated higher in dependability and comfort. However, taxis scored better across service aspects like driver experience, privacy, and flexibility. Aguilera-García et al., (2022) confirms that ride sourcing offers convenient, on-demand door-to-door service, app-based real-time information about the trip, and flexible prices that vary according to supply and demand, while taxis are more regulated and have traditionally provided door-to-door trips (Nguyen-Phuoc et al. 2021).

The findings showed that e-hailing services were rated significantly more dependable than taxis based on rider experience. E-hailing had an average dependability rating of 3.65 out of 5, compared to 3.06 for taxis. The effect size for this difference was small ($d=0.23$) but notable. This result indicates that riders perceive e-hailing services as more reliable in providing a ride at the requested location and time. The technology-enabled nature of e-hailing, allowing riders to hail the nearest driver via GPS directly, underpins this advantage (Liyanage et al., 2019). Additionally, the

vast network of drivers on e-hailing platforms contributes to greater dependability (Smith, 2021).

Beyond dependability, e-hailing comfort ratings substantially outmatched taxis. E-hailing averaged 4.45 out of 5 compared to just 2.67 for taxis - a massive difference with a very large effect size ($d=0.81$). Riders find traveling in e-hailing vehicles like Uber, Bolt, Yango, and Shaxi more comfortable (Jamaluddin et al., 2021). The cars utilized by e-hailing operators explain the comfort differentials compared to traditional taxis. Maintaining higher cleanliness and vehicle wear standards also contributes to improved comfort ratings among e-hailing providers (Yee & Salleh, 2022). With reference to Table 4.5, an e-hailing driver during an interview session mentioned that:

“...e-hailing services are more attractive than traditional taxi services due to their convenience, ease of use, transparent pricing, and the ability for drivers to maximize their earnings through efficient use of time and resources...” (Bolt driver, Male, 29 years)

However, other service attributes beyond dependability and comfort reveal advantages taxi services retain. Taxis received significantly higher driver experience, privacy, and flexibility ratings in the study results. The result indicates they excel across dimensions related to service delivery and meeting individual trip needs.

Taxi driver experiences ratings averaged 4.31 compared to 3.39 among e-hailing drivers, a notable gap with a medium effect size ($d=-0.56$). The extensive training, licensing, and road experience required for taxi drivers give them an edge in user perceptions of skill (Timmermans et al., 2019). By comparison, critics have scrutinized the less stringent vetting and oversight of e-hailing drivers. Requiring more robust certification for e-hailing drivers could help close this experience differential with taxis.

Additionally, taxi services edged out e-hailing providers on privacy. Taxi privacy ratings registered 4.16 versus 3.45 for e-hailing, a small to medium-sized difference ($d=-0.45$). The one-on-one interaction of taxis likely promote a greater sense

of privacy over e-hailing trips (Ehidiamen, 2022). Riders believe sharing their personal information, like location, name, and contact information, with a third party hinders their privacy (Cheng et al., 2021). Limiting non-essential conversation and finding ways to personalize better and privatize e-hailing rides could address this weakness (Ryseck, 2022).

Lastly, flexibility perceptions favoured taxis by a medium margin (4.22 versus 3.55; $d=-0.42$). Such flexibility accommodates last-minute changes, special requests, and varied destinations. Taxis hold some advantages as an established industry with experience meeting individual needs (Pakusch et al., 2020). However, e-hailing platforms also present opportunities to build flexibility whether via driver specialization, premium classes of service, or integration with other transport modes (Ramseier, 2022).

These results generally reveal that riders' views of e-hailing and traditional taxis differ across service dimensions. E-hailing better satisfies demands for dependability and comfort compared to taxis (Adenigbo et al., 2023). However, taxis retain strengths in consumer perceptions of driver experience, privacy, and flexibility that are weaker for e-hailing (Acheampong, 2021).

There are opportunities for both models to learn from each other. However, the distinctions revealed in these results defy any simplistic verdict of e-hailing domination. While the technology-centric approach pioneered by Uber and Lyft carries some clear advantages, traditional taxis remain highly competitive across important service aspects.

4.10 Ways Uber, Bolt, Yango, And Shaxi can improve to compete with traditional taxi services

The results in Table 4.6 show riders' responses on features of e-hailing services that need improvement. The questions were asked on a five-point Likert scale from strongly disagree to strongly agree. Before analysis, the five-point scale was recoded into three (Disagree to Agree) for multiple regression analysis. For each feature-adoption aspect (e.g., increased dependability, increased convenience, etc.), riders selected Disagree, Neutral, or Agree regarding whether the feature of the service needs improvement.

The results from Table 4.6 revealed that most Uber riders agreed that improvements were needed across all service aspects for Uber to better compete with traditional taxis. The top aspects needing improvement were increased dependability (40%), increased convenience (41%), improved privacy (37%), and improved customer service (41%). It was further noticed that most Bolt riders agreed improvements were needed to better compete with traditional taxis in the areas of improved driver experience (40%), increased convenience (39%), improved safety (39%), and improved customer service (48%). Over half disagreed that increased dependability was an area needing improvement.

For Yango, the top areas riders felt needed improvement to compete with traditional taxis were improved driver experience (24%), increased convenience (20%), and improved customer service (11%).

Regarding the other e-hailing services, Yango had fewer riders, indicating improvements were necessary (Anaman & Ahmed, 2021). The results reveal that among Shaxi riders, the top areas for improvement identified were increased dependability (8%), improved driver experience (54%), and improved safety (35%).

Table 4.6: Ways Uber, Bolt, Yango, and Shaxi can improve to compete with traditional taxi services

Aspects for improvement	Uber			Bolt			Yango			Shaxi		
	D	N	A	D	N	A	D	N	A	D	N	A
Increase dependability	**	2(4%)	111(32%)	2(50%)	24((49%))	134(39%)	2(50%)	15(31%)	75(22%)	**	8(16%)	27(8%)
Improved driver experience	**	**	113(36%)	29(56%)	7(20%)	124(40%)	7(14%)	9(26%)	76(24%)	16(31%)	19(54%)	**
Improve privacy	**	**	113(37%)	13(39%)	24(38%)	123(41%)	9(27%)	15(24%)	68(22%)	11(33%)	24(38%)	**
Increased comfort	**	**	113(40%)	22(31%)	31(65%)	107(38%)	21(30%)	9(19%)	62(22%)	27(39%)	8(17%)	**
Increase flexibility	**	**	113(37%)	13(43%)	31(50%)	116(38%)	9(30%)	23(37%)	60(20%)	8(27%)	8(13%)	19(6%)
Increase convenience	**	**	113(41%)	37(57%)	15(26%)	108(39%)	9(14%)	27(47%)	56(20%)	19(29%)	16(28%)	**
Improve safety	**	**	113(39%)	22(73%)	23(30%)	115(39%)	**	27(35%)	65(22%)	8(27%)	27(35%)	**
Increase transparency	**	**	113(41%)	18(51%)	35(40%)	107(39%)	9(26%)	26(30%)	57(21%)	8(23%)	27(31%)	**
Improve payment options	**	**	113(39%)	11(28%)	31(42%)	118(41%)	9(23%)	27(37%)	56(20%)	19((49%))	16(22%)	**
Improve customer service	**	**	113(41%)	11(39%)	16(17%)	133(48%)	9(32%)	54(56%)	29(11%)	8(29%)	27(28%)	**

D= Disagree, N= Neutral, A= Agree.

Source: Fieldwork, 2023

Shaxi had the highest percentage of riders selecting "Neutral" across the service aspects, suggesting a lower perceived need for improvement comparatively.

This study explored riders' perspectives on key areas for improvement across major e-hailing platforms, such as Uber, Bolt, Yango, and Shaxi, to better compete with traditional taxi services in Ghana in Table 4.6. The findings reveal the gaps in customer experience from the lens of those actively using these services. Several notable trends emerged.

The study results show that Uber has the most widespread areas of improvement in achieving competitiveness with traditional taxis (Agyemang, 2020). The top aspects where deficiencies are perceived by a sizable minority of over one-third of riders include dependability, convenience, privacy, and customer service (Anaman & Ahmed, 2021). The results imply that from an Uber rider's viewpoint, Uber falls short of providing reliable and seamless end-to-end journeys, protecting personal information, and resolving account or ride concerns promptly and satisfactorily (Agyemang, 2020).

In contrast, the other operators face more isolated improvement by rider accounts. For Bolt, deficiencies centre around driver experience, convenience, safety, and flexibility, which indicates inconsistent service interactions, potentially unsafe driving, and unsatisfactory recovery when issues emerge (Boateng et al., 2022). For Yango, driver experience, dependability, and flexibility are primary weaknesses.

Finally, Shaxi must improve dependability, driver experience, and safety. Across the e-hailing market, recurring pain points exist around unreliable service, concerns over safety and professionalism among drivers, and access to support (Arubayi, 2022). Making inferences from Table 4.6, in an interview with e-hailing company representatives, it was revealed that:

“... We believe in fostering collaboration with our driver-partners and riders. We regularly engage with our driver-partners through in-person meetups,

online forums, and surveys to understand their concerns and gather feedback. We also have driver advisory councils that provide valuable insights and recommendations. Similarly, we collect and incorporate rider feedback into product development and decision-making processes...” (Uber representative, Female, 38 years)

Notably, Shaxi has the highest neutral response proportions across nearly all categories. The result reflects that riders are still evaluating the quality of this newer market entrant relative to the more established brands (Acheampong et al., 2020). Smaller sample sizes may also be a factor. Collectively, the patterns imply that outside of Uber, the other players like Bolt, Yango, and Shaxi have narrower domains needing improvement to achieve competitiveness. They may be able to equal or surpass traditional taxi options by targeting these shortfalls revealed from rider perspectives.

From Table 4.6 traditional taxi services likely outperform e-hailing competitors in dependability and driver professionalism gained from experience and regulation, personalized relationships for regular customers, cash payment options, and perceived safety assurances (Agyeman et al., 2019). Many riders use these app-based platforms for greater convenience, ease of hailing, route optimization, lack of bartering over fares, and modern branding. However, the incumbent taxi ecosystem accrues advantages from decades of local operation (Acheampong et al., 2020). E-hailing firms must bridge critical gaps around reliability, safety, payment, and human interactions to shift more customer wallet share within this evolving mobility landscape (Boateng et al., 2022).

Overall, the findings supplied directly by Ghanaian e-hailing riders provide market intelligence into where these services fail to satisfy consumer expectations as viable taxi alternatives. The major operators now have identified priorities for improving dependability, driver quality, safety, convenience, support, and other dimensions to strengthen their value proposition and increase adoption (Kumar et al., 2022). Ghana provides a space of similar dynamics across Sub-Saharan Africa and other emerging markets where universal smartphones and mobile internet enable app-

based urban mobility despite limited transit infrastructure. By benchmarking against long-established traditional taxi services through the lens of tech-savvy early adopters in these high-growth regions, e-hailing platforms can improve superior models that may ultimately disrupt incumbent operators globally.

Objective 3: Explore How E-Hailing Mobile- -ICT Apps Affect the Role and Power of Riders, Drivers, and Service Providers.

4.11 E-hailing mobile apps and power of riders

Table 4.7 presents riders' level of agreement with having control over aspects of e-hailing rides across four platforms: Uber, Bolt, Yango, and Shaxi. Each control item's responses are broken down by level of agreement (Disagree, Neutral, and Agree) and by service used.

The study on riders' control of aspects of the e-hailing service revealed that Uber riders feel the most empowered across all aspects of the e-hailing experience compared to Bolt, Yango, and Shaxi riders. Most Uber riders agreed they have control of ride booking (98%), rejecting assigned drivers (98%), reviewing ratings (100%), providing feedback (98%), controlling costs (97%), managing driver job security (100%), setting drivers' work schedules (98%), and choosing vehicle types (100%).

In contrast, agreement was lower among Bolt riders, ranging from control over driver schedules (42%) to providing feedback (99%), and even lower among Yango riders (ranging from 28% to 100%) and deficient among Shaxi riders (from 0% to 69%). Perceived control across platforms was related to factors affecting drivers, including job security, work schedules, and choice of vehicles (Acheampong et al., 2020). A complete agreement was expressed by 100% of Uber riders, but only 49% of Bolt, 37% of Yango, and 0% of Shaxi riders for control over driver job security. Similarly, 98% of

Table 4.7: E-hailing mobile apps and power of riders

Power of Riders	E-hailing Mobile Apps											
	Uber			Bolt			Yango			Shaxi		
	D	N	A	D	N	A	D	N	A	D	N	A
Control overbooking	**	2(2%)	111(98%)	18(11%)	**	142(89%)	**	**	92(100%)	**	**	35(100%)
Control override	2(2%)	**	111(98%)	10(6%)	8(5%)	142(89%)	**	**	92(100%)	**	**	35(100%)
rejection												
Review driver rating	**	**	113(100%)	10(6%)	**	150(94%)	**	**	92(100%)	**	**	35(100%)
Provide feedback	**	2(2%)	111(98%)	2(1%)	**	158(99%)	**	**	92(100%)	**	**	35(100%)
Control over the cost of the trip	2(2%)	2(2%)	109(97%)	50(31%)	32(20%)	78(49%)	42(46%)	**	50(54%)	11(31%)	**	24(69%)
Control over driver's job security	**	**	113(100%)	46(29%)	36(23%)	78(49%)	39(42%)	19(21%)	34(37%)	16(46%)	19(54%)	**
Control over drivers' work schedule	2(2%)	**	111(98%)	69(43%)	24(15%)	67(42%)	46(50%)	20(22%)	26(28%)	24(69%)	11(31%)	**
Control over vehicle type	**	**	113(100%)	76(48%)	**	84(53%)	38(41%)	28(30%)	26(28%)	19(54%)	8(23%)	8(23%)

D= Disagree, N= Neutral, A= Agree

Source: Fieldwork, 2023

Uber riders agreed they control driver work schedules compared to 42% of Bolt, 28% of Yango, and 0% of Shaxi riders. Ride rejection and cost control showed smaller but still considerable differences in agreement between Uber and Shaxi.

Beginning with Ubers exceptionally high rider control agreement verifies their consumer-first positioning, granting riders substantial influence across the service model. Control dimensions like booking, rejection, costs, and feedback are fundamental to accessing the core offering of rides (Agyemang, 2020). Uber relies on rider needs for business viability by yielding decision authority over these areas.

Their 100% agreement on controlling driver management through ratings, job security, and schedules reveals that riders assume a management hierarchy absent in traditional transportation (Pakusch et al., 2020). With clients directly managing the worker pool by rewarding/penalizing drivers and dictating availability, Uber reorients top-down business conventions to make riders central overseers (Agyemang, 2020). In an interview session with drivers and e-hailing company representatives it was revealed that:

“...As a driver, I can accept or reject ride requests based on my availability and preferences. However, it is crucial to strike a balance, as excessive rejections may impact my overall ratings and, in turn, affect the number of rides request I receive...” (Bolt driver, Male, 36 years)

“...The introduction of e-hailing apps has impacted the power dynamics between companies, drivers, and riders. E-hailing apps have given riders more choices and control over their transportation experiences by providing a transparent platform and real-time data. At the same time, drivers have gained more flexibility and income opportunities, although some may argue that they have less control over pricing and working conditions...” (Uber representative, Female, 38 years)

In contrast, trailing competitors Bolt, Yango, and Shaxi exhibit progressively lower control granting through higher disagreement. By overriding rider decisions over trip assignments, pricing inputs, and appropriate driver feedback, these platforms regulate

service patterns for internal optimization over external fulfilment (Yee & Salleh, 2022).

According to e-hailing representatives:

“...Regarding the type of vehicles used by our drivers, we prioritize safety, comfort, and fuel efficiency. Drivers can choose from a range of approved vehicle models, but we encourage using newer, well-maintained vehicles that meet our passenger safety and comfort standards. We also consider factors such as seating capacity and luggage space to cater to different ride types (e.g., solo rides, group rides) ...” (Yango representative, Male, 43 years)

Maintaining control over variables like vehicle supply, identity, schedules, and job stability enables companies to make more centralized decisions. However, in wresting autonomy back from riders, platforms face risks of dissatisfaction that market leader Uber sidelines through empowerment. The complete lack of agreement from any Shaxi rider on fundamental dimensions like job security signals an imbalance where companies overwhelmingly dominate exchanges—in contrast, maximizing platform efficiencies and failing to cede control risks rider alienation when alternative services allow more voice. During an interview session with e-hailing drivers, it was revealed by a driver that:

“...Job security is dependent on maintaining a good record. Consistently low ratings, violations of platform policies, or safety concerns can lead to termination. Following guidelines, ensuring passenger satisfaction, and maintaining a positive reputation is key to job longevity...” (Uber driver, Male, 29 years)

Essentially, high rider control concentration at Uber versus lower, more selective control distribution for trailing competitors indicates fundamentally different power dynamics. Uber's high agreement across all dimension's cements rider authority over drivers, platform operations, costs, and access. Their pervasive ability to set parameters creates a reciprocal dependency where Uber relies on rider oversight for vital functions. Contrastingly, by selectively limiting control to dimensions like booking while restricting it to pricing, ratings, and matching, Bolt, Yango, and Shaxi concentrate decision powers on the companies themselves. Riders depend on platforms granting

access and flexibility versus platforms depending on riders to direct functionality.

During an interview session with e-hailing drivers, it was revealed by a driver that:

“...Drivers can get suspended from Yango if we consistently receive low customer ratings or violate certain policies related to safety, payments, etc. Fortunately, I have maintained a high rating through good service. Yango provides training resources to help drivers improve deficient areas reported through customer feedback...” (Yango driver, Male, 38years)

The hierarchy of rider control between services highlights how empowerment has become a competitive edge for Uber (Smith, 2022). Uber as the pioneer of e-hailing, their initial platform designs centred on rider convenience, which competitor tweaks later granting clients exceptional power benefits Uber through higher perceived service value and massive rider-generated data streams for optimization (Slee, 2017). However, accompanying risks around driver churn and survival of less popular routes require mitigation. Followers like Shaxi show that control restrictions can maximize company profits but likely sacrifice growth.

4.12 Lessons for intra-urban transport needs and planning

The advent of e-hailing services has revolutionized urban transportation, offering a convenient and accessible mode of travel for millions of commuters worldwide. While these services have primarily focused on providing on-demand ride-hailing solutions, their operational models and data-driven approaches hold lessons for addressing intra-urban transport needs and informing urban transportation planning within Accra Metropolitan Area.

One significant lesson that can be drawn from the *modus operandi* of e-hailing services within Accra Metro Area is the importance of integrating diverse transportation modes into a seamless ecosystem. By creating designated pick-up and drop-off zones near public transit hubs and incorporating e-hailing options into transit apps or trip planners, transportation authorities to facilitate a smoother transition between different modes of transportation. This integration not only enhances convenience for commuters

but also encourages the use of public transportation for longer portions of their journeys, thereby reducing traffic congestion and environmental impact.

Moreover, e-hailing services have demonstrated the power of leveraging data and technology to optimize transportation systems. The real-time data collected by these services, encompassing travel patterns, demand hotspots, and transportation needs, provides insights for urban transportation planning. By harnessing this data, city planners and transportation authorities can make informed decisions regarding infrastructure development, traffic management, and public transportation route optimization. This data-driven approach can lead to more efficient resource allocation, improved accessibility, and a better transportation experience for residents and visitors alike.

Another crucial lesson lies in the importance of fostering partnerships and exploring integration opportunities between e-hailing services and public transportation systems. By collaborating on multi-modal trip planning, integrated ticketing, and last-mile connectivity solutions, transportation authorities can create a user-friendly and efficient urban transportation ecosystem. This integration will encourage commuters to combine different modes of transportation, reducing reliance on private vehicles and alleviating traffic congestion in urban areas.

Furthermore, the adaptability and responsiveness of e-hailing services in meeting customer demands can serve as a lesson for public transportation providers. By embracing innovative technologies, leveraging user feedback, and continuously refining their services, transportation authorities can enhance user experience and ensure that intra-urban transport solutions remain relevant and responsive to the evolving needs of the urban population.

In conclusion, the modus operandi of e-hailing services offers insights for addressing intra-urban transport needs and informing urban transportation planning. By embracing integration, data-driven decision-making, partnerships, and a customer-centric approach, transportation authorities to create an efficient, sustainable, and user-friendly transportation ecosystem that meets the diverse needs of urban commuters.



CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter highlights the study summary, key findings, conclusions, recommendations, and areas for further studies.

5.1 Study summary

This study on e-hailing services: lessons for intra urban transport needs and planning in Accra Metropolitan Area, aimed to determine how they operate in the context of intra-urban transportation demands and planning in Accra, Ghana. It examined the growth factors, compared operations to taxis, and explored rider, driver, and company power dynamics. The study was within the pragmatic research paradigm. An explanatory sequential mixed methods design combined questionnaires for 400 riders and semi-structured interviews with twelve (12) drivers and three (3) company representatives. Theoretical framing drew upon disruptive innovation theory

Using cluster sampling, the target population encompassed Accra Metropolitan Area residents aged 18-65 within Ablekuma South, Ashiedu Keteke, and Okai Koi South. A structured questionnaire gathered rider usage patterns, demographics, and perspectives. Open-ended, in-depth expert interviews with drivers and company representatives elicited rich qualitative data.

Further, rigor arose from probability techniques like cluster sampling, simple random sampling, and non-proportional quota sampling alongside non-probability convenience and purposive approaches. Questionnaire distribution occurred online via Kobo Toolbox and in-person, intercepting riders and ensuring sufficient responses. Audio-recorded interviews enabled verbatim transcription. Rider questionnaire sections encompassed demographics, growth factors, operational comparisons, and rider power.

Interview questions covered driver and company representative experiences with regulations, advantages, challenges, and future outlooks. Quantitative data underwent descriptive and inferential SPSS analyses to identify usage trends and test relationships. Qualitative data was thematically analysed via MAXQDA version 2020 for quotations and contextual insights.

Data accuracy was promoted through expert content validity assessments on the instruments and data cleaning, coding, and consistency checks during analysis. Strict ethics protocols prioritized participant confidentiality, anonymity, and privacy. Informed consent ensured voluntary engagement.

5.2 Key findings

Socio-demographics of riders in AMA.

- The study found that the typical e-hailing rider profile emerges were riders aged 24-34, predominantly male (59.3%), with relatively high education levels (60% tertiary education) and an average monthly household income of GH¢1,000 to GH¢2,500.
- The most prominent e-hailing platform used is Bolt (40%), while Shaxi has lower usage (8.8%).
- Nearly half (47.8%) of e-hailing riders use e-hailing platforms 4-6 times per week, indicating a relatively high usage frequency among a substantial portion of riders.
- E-hailing platforms are primarily used for work and personal trips, with many riders using them solely for personal trips. A relatively smaller segment of riders relies on these services exclusively for occupational or work-related trips.

Objective 1: Factors Contributing to the Growth of E-Hailing Services (Uber, Bolt, Yango, and Shaxi)

The study found that:

- Riders earning GHC 500–1000 per month were 29 times more likely to use e-hailing services seldomly (4-6 times) for daily trips, compared to those who use them always.
- Riders with secondary/vocational education were about 7 times more likely to rarely (1-3 times) use e-hailing services and 6 times more likely to use them seldomly, compared to always usage.
- Riders aged 24-34 years were 7 times more likely to rarely (1-3 times) use e-hailing services, while those aged 18-23 years were 5 times more likely to rarely (1-3 times) use them, compared to always using them.
- Riders using Uber, Bolt, and Yango platforms were associated with lower odds of using e-hailing services rarely (1-3 times) and seldomly (4-6 times), compared to the Shaxi platform.
- The security dimension was the only significant growth predictor among the four dimensions (safety, ease of use, security, and economics) of the growth of e-hailing services.

Objective 2: Compare the operational modules of e-hailing to taxi services as the basis for drawing lessons.

In comparing the operational modules of e-hailing to taxi services, it was found that:

- E-hailing was rated significantly higher than taxis in several metrics, including convenience, safety, price transparency, payments, and customer service. The very large effect sizes confirm that e-hailing has substantial advantages over taxis across these metrics.

- In terms of convenience, e-hailing outperforms taxis through mobile app access since GPS pairing of passengers and drivers streamlines on-demand bookings.
- Advantages in safety, price transparency, payments, and support showcase e-hailing's technology strengths. These include seamless digital payments, GPS trip tracking, profile verification, quoted prices, cashless transactions, and always-on self-help options that traditional taxis lack.
- E-hailing was rated as more dependable and comfortable than traditional taxis.
- E-hailing was viewed significantly more negatively than taxis because of driver experience, privacy, and flexibility.

Objective 3: Explore how e-hailing mobile ICT apps affect the roles and powers of riders, drivers, and service providers.

- Uber riders feel the most empowered and in control across all aspects of the e-hailing experience by wide margins compared to Bolt, Yango, and especially Shaxi riders. The result includes perceived control override booking, rejecting drivers, ratings, feedback, costs, driver job security, schedules, and vehicle types.
- Significant platform differences emerge regarding rider influence on factors directly impacting drivers themselves. Complete agreement on control over driver job security, work schedules, and vehicle choices was 2 to 10 times higher among Uber riders than Shaxi riders and the other service providers.

5.3 Conclusion

This study analysed the emergence of e-hailing platforms in Accra as potentially disruptive innovations in urban transport through growth factors, operational comparisons to taxis, and impacts on stakeholder power dynamics.

- The findings align with disruptive innovation theory as e-hailing leverages digital technology to create new mobility solutions targeting underserved demands for convenience, payments, safety, and transparency - primarily from educated, young, and middle-income early adopter groups.
- E-hailing shows substantive advantages over taxis across rider-centric dimensions while still lagging in driver welfare, flexibility, and privacy. The result upholds the disruptive pattern of overserving key consumer needs while initially underperforming incumbents on peripheral aspects before improving.
- Examining effects on transportation stakeholders reveals further hallmarks of disruption, shifting power and control dynamics through app-mediated interactions. Riders significantly influence trip parameters while exacerbating divisions between digitally empowered groups and vulnerable cohorts. Harnessing the benefits of e-hailing as a positively disruptive force relies on proactive policies guiding platforms to serve a breadth of urban interests equitably. Sustainable integration of app-based mobility innovation with transitional regulatory support is essential for responsive, next-generation transportation planning.

The study demonstrates e-hailing epitomizing disruption theory in transit - a technology-driven new entrant targeting unmet demands in initial segments but displaying potential for wider accessibility given thoughtful governance around stakeholder welfare, digital divides, and progressive regulation. The findings have important implications for leveraging platforms as opportunities, not threats, for just mobility transformations in Accra and similar urban contexts.

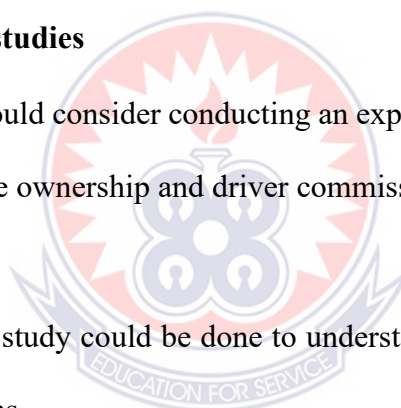
5.4 Recommendation

- E-hailing service providers like Bolt, Yango, Uber, and Shaxi should consider tailoring their marketing strategies through targeted advertising campaigns, specialized service packages, or app features tailored to meet rider's preferences and needs based on their demographic characteristics.
- With Bolt emerging as the dominant platform and Shaxi having lower usage, the Ministry of Transport should establish a regulatory framework and policy that promotes fair competition among e-hailing service providers to help prevent the monopolistic practices of multinational players like Uber, Bolt, and Yango and protect local players like Shaxi by ensuring pricing regulations.
- The Ministry of Transport should develop support programs like grants and partnership with tech startups to help traditional taxi operators adopt similar technological solutions (e.g., mobile apps, digital payments, GPS tracking) to improve their competitiveness.
- The Ministry of Transport should leverage on data and technology capabilities of e-hailing services to improve urban transportation planning and decision-making. The real-time data collected by e-hailing services can provide insights into travel patterns, demand hotspots, and transportation needs, which can inform infrastructure development, traffic management, and public transportation planning.
- The Ministry of Transport should explore partnerships and integration opportunities between e-hailing services and public transportation systems through multi-modal trip planning, integrated ticketing, and last-mile connectivity solutions, to enable a more efficient and user-friendly urban transportation ecosystem.

- To ensure a balanced and collaborative approach to regulating e-hailing apps. The Ministry of Transport, driver and vehicle licensing authority (DVLA), National Road Safety Authority (NRSA), and the Motor Transport and Traffic Directorate (MTTD) should work closely with companies, drivers, and user groups to establish clear guidelines and standards that prioritize safety, consumer protection, and fair competition. This could include measures such as background checks for drivers, vehicle inspections, fare transparency, and grievance redressal mechanisms. At the same time, regulations should not stifle innovation or create unnecessary barriers that could limit the growth and benefits of e-hailing services.

5.5 Areas for further studies

- Researchers should consider conducting an exploratory study to understand the issues of vehicle ownership and driver commission within the e-hailing service landscape.
- An exploratory study could be done to understand drivers' loyalty to e-hailing service platforms.



REFERENCES

- Jais, A. S., & Marzuki, A. (2020). E-hailing services in Malaysia: current practices and outlook. *Planning Malaysia*, 18(13). <https://doi.org/10.21837/pm.v18i13.780>
- Aboulela, M., Lyu, C., & Antoniou, C. (2023). Exploring the potentials of open-source big data and machine learning in shared mobility fleet utilization prediction. *Data Science for Transportation*, 5(2), 5.
- Acheampong, R. A. (2021). Societal impacts of smart, digital platform mobility services: An empirical study and policy implications of passenger safety and security in ride-hailing. *Case Studies on Transport Policy*, 9(1), 302-314.
- Acheampong, R. A., Siiba, A., Okyere, D. K., & Tuffour, J. P. (2020). Mobility-on-demand: An empirical study of internet-based ride-hailing adoption factors, travel characteristics and mode substitution effects. *Transportation Research Part C: Emerging Technologies*, 115, 102638.
- Adams, R. J., & Lawrence, E. K. (2019). Research methods, statistics, and applications (2nd ed.). *SAGE Publications, Inc.*
- Addo, E., Twumasi, P., & Boateng, D. (2023). Service quality and passenger satisfaction in ride-hailing transport: A case study in Accra. *African Journal of Applied Research*, 9(2), 55–68. <https://www.ajaronline.com/index.php/AJAR/article/view/852>
- Adediji, O. O., Salami, A. O., & Aderemi, A. S. (2020). Exploring the impact of e-hailing services on urban planning in Nigeria. *Journal of Transport Geography*, 82, 102594.
- Adenigbo, A. J., Mageto, J., Makan, H., & Luke, R. (2023). Service quality of e-hailing taxi services in Johannesburg. *Acta Logistica*, 10(4), 537-548.
- Adeola, A., Adesokan, I., & Adeyemi, A. (2021). Regulatory frameworks for ride-hailing services in Nigeria. *Transportation Research Interdisciplinary Perspectives*, 10, 100439.
- Afukaar, F., Damsere-Derry, J., Peters, K., & Starkey, P. (2019). Rural Transport Services Indicators: Using a new mixed-methods methodology to inform policy in Ghana. *Transportation Research Interdisciplinary Perspectives*, 3, 100074–100074. <https://doi.org/10.1016/j.trip.2019.100074>
- Aguilera-García, Á., Gomez, J., Velázquez, G., & Vassallo, J. M. (2022). Ride sourcing vs. traditional taxi services: Understanding riders' choices and preferences in Spain. *Transportation Research Part A: Policy and Practice*, 155, 161–178. <https://doi.org/10.1016/j.tra.2021.11.002>
- Agyapong, F., & Ojo, T. K. (2018). Managing traffic congestion in the Accra central market, Ghana. *Journal of Urban Management*, 7(2), 85-96.
- Agyeman, S., & Ojo, T. K. (2020). *Urban transportation systems in Ghana: Trends and challenges*. Accra: Ghana University Press.
- Agyeman, S., Kwarteng, R. A., & Zurkalnaine, S. (2019). Principal component analysis of driver challenges in the shared taxi market in Ghana. *Case Studies on Transport Policy*, 7(1), 73-86.

- Agyemang, E. (2015). Transport challenges in Accra, Ghana. Accra Metropolitan Area. https://www.ucl.ac.uk/bartlett/development/sites/bartlett/files/transport_challenges_in_accra_ghana.pdf
- Agyemang, E. (2020). “Uber is here to stay”: Exploring the policy implications of the Uber-Local Taxis turf war in Accra, Ghana. *Case Studies on Transport Policy*, 8(1), 59-66.
- Aheto, S. P. K., & Cronje, J. (2018). Digital device ownership and learning environment preferences of students in South Africa and Ghana. *Turkish Online Journal of Distance Education*, 19(3), 93-111.
- Alimo, R. A., Anin, E. K., & Koomson, L. (2022). Investigating the increasing demand and formal regulation of motorcycle taxis in Ghana. *Journal of Transport Geography*, 103, 103–121. <https://doi.org/10.1016/j.jtrangeo.2022.103121>
- Alozie, N. O., & Akpan-Obong, P. (2017). The digital gender divide: Confronting obstacles to women's development in Africa. *Development Policy Review*, 35(2), 137-160.
- Amoako-Sakyi, R. O., Agyemang, K. K., Mensah, C. A., Odame, P. K., Seidu, A.-A., Adjakloe, Y. A., & Owusu, S. A. (2021). Drivers’ cycling experiences and acceptability of micromobility use among children in Ghana. *Built Environment*, 47(4), 443–460. <https://doi.org/10.2148/benv.47.4.443>
- Anaman, P. D., & Ahmed, I. A. (2021). Taxation within the transport sector: A ride-hailer and sharing economy perspective. *Account and Financial Management Journal*, 6(10), 2470-2480.
- Andreasen, M. H., Agergaard, J., Møller-Jensen, L., Oteng-Ababio, M., & Yiran, G. A. B. (2022). Mobility disruptions in Accra: Recurrent flooding, fragile infrastructure and climate change. *Sustainability*, 14(21), 13790. <https://doi.org/10.3390/su142113790>
- Ansar, M. S., Ma, Y., Chen, S., Tang, K., & Zhang, Z. (2021). Investigating the trip configured causal effect of distracted driving on aggressive driving behaviour for e-hailing taxi drivers. *Journal of Traffic and Transportation Engineering (English edition)*, 8(5), 725-734.
- Arora, M., Singh, H., & Gupta, S. (2022). What drives e-hailing apps adoption? An analysis of behavioural factors through fuzzy AHP. *Journal of Science and Technology Policy Management*, 13(2), 382-404.
- Arubayi, D. E. (2022). Ride-hailing platforms, algorithmic management, and everyday resistances: a case study of drivers in Lagos, Nigeria.
- Arumugam, V., Ismail, M. R., & Joeharee, M. (2020). A review and conceptual development of the factors influencing consumer intention towards E-hailing service in Malaysia. *International Journal of Innovation, Creativity and Change*, 11(11), 224-242.
- Asgari, H., & Jin, X. (2020). Propensity toward ride-sourcing: Desired savings in travel time and mobility cost to switch from private mobility. *Transportation Research Part C: Emerging Technologies*, 121, 102883. <https://doi.org/10.1016/j.trc.2020.102883>

- Auer, S., Nagler, S., Mazumdar, S., & Mukkamala, R. R. (2022). Towards blockchain-IoT based shared mobility: Car-sharing and leasing as a case study. *Journal of Network and Computer Applications*, 200, 103316.
- Azam, A., Ahmad, M., & Javed, Z. (2020). Ride-hailing services in Malaysia: Regulatory challenges, market dynamics, and user perspectives. *Journal of Transport Geography*, 86, 102789.
- Benzidia, S., Luca, R. M., & Boiko, S. (2021). Disruptive innovation, business models, and encroachment strategies: Buyer's perspective on electric and hybrid vehicle technology. *Technological Forecasting and Social Change*, 165, 120520.
- Bhuiyan, A., Wang, W. M., Wang, B., & Islam, A. N. (2019). E-hailing driver and passenger safety perspectives: Does gender really matter in sharing economy services? A study to assess safety perceptions of e-hailing drivers and passengers. *Safety Science*, 120, 381-392. <https://doi.org/10.1016/j.ssci.2019.07.041>
- Boateng, A., Asiedu, M., & Mensah, F. (2022). Socio-environmental costs and employment shifts in Ghana's urban transport sector. *Humanities and Social Sciences Communications*, 9, 111. <https://www.mdpi.com/2673-7590/4/3/44>
- Boer, M., Türetken, O., & Adali, O. E. (2022). A review of business models for shared mobility and mobility-as-a-service (MaaS). *A Research Report*. Eindhoven University of Technology. <https://research.tue.nl/en/publications/a-review-of-business-models-for-shared-mobility-and-mobility-as-a>
- Borker, V. R. (2021). Safety first: Perceptions of risk and the adoption of ride-hailing services in urban India. *Feminist Economics*, 1-21. <https://doi.org/10.1080/13545701.2019.1686078>
- Boutueil, V., Nemett, L., & Quillerier, T. (2022). Trends in competition among digital platforms for shared mobility: Insights from a worldwide census and prospects for research. *Transportation Research Record*, 2676(2), 69-82.
- Brugière, F. (2021). Connecting the levers of platform control: Outsourced labour and algorithmic management: A Transurban study of the ride-hailing sector in Paris and Brussels. *South Atlantic Quarterly*, 120(4), 809-822.
- Bujang, M. A., Omar, E. D., & Baharum, N. A. (2018). A review on sample size determination for Cronbach's alpha test: A simple guide for researchers. *The Malaysian Journal of Medical Sciences: MJMS*, 25(6), 85.
- Cameron, L. D., & Rahman, H. (2022). Expanding the locus of resistance: Understanding the co-constitution of control and resistance in the gig economy. *Organization Science*, 33(1), 38-58.
- Cartwright, A., Palmer, I., Taylor, A., Pieterse, E., Parnell, S., & Colenbrander, S. (2018). Developing prosperous and inclusive cities in Africa-national urban policies to the rescue. *London and Washington DC: Coalition for Urban Transitions*.
- Castellanos, S., Grant-Muller, S., & Wright, K. (2022). Technology, transport, and the sharing economy: Towards a working taxonomy for shared mobility. *Transport reviews*, 42(3), 318-336.

- Cats, O., Kucharski, R., & Danda, S. (2020). Beyond the dichotomy: Comparing fare policies of ride-hailing services. *Transportation Research Record*, 2674(10), 570-584. <https://doi.org/10.1177/0361198120943880>.
- Chen, P., Wu, Y., & Zhang, Y. (2017). The impact of ride-hailing services on traffic congestion: Evidence from Chengdu, China. *Transportation Research Part C: Emerging Technologies*, 85, 296-309.
- Chen, S., Zhang, X., & Wu, C. (2018). Factors influencing the usage intentions of e-hailing services: An empirical study in China. *Journal of Transport Geography*, 67, 11-20.
- Chen, Y., Xiong, X., & Chen, W. (2019). Matching Drivers and Riders: A Review on Online Ride-hailing Platforms. *Transportation Research Part C: Emerging Technologies*, 106, 487-509.
- Chen, Y., Xiong, X., & Chen, W. (2021). Pricing strategies in ride-hailing platforms: A review. *Transportation Research Part E: Logistics and Transportation Review*, 149, 102302.
- Cheng, T., Choudhury, T., & Sheng, Z. (2017). Ride-sharing, driver strategies, and user welfare. *Transportation Research Part B: Methodological*, 98, 154-171.
- Cheng, X., Hou, T., & Mou, J. (2021). Investigating perceived risks and benefits of information privacy disclosure in IT-enabled ridesharing. *Information & Management*, 58(6), 103450.
- Clewlow, R. R., & Mishra, G. S. (2017). Disruptions in urban mobility. *Nature*, 551(7680), 456-465.
- Comi, A., & Russo, F. (2022). Emerging information and communication technologies: The challenges for the dynamic freight management in city logistics. *Frontiers in Future Transportation*, 3, 887307.
- Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approach. *Sage publications*.
- Di Marino, M., Tabrizi, H. A., Chavoshi, S. H., & Sinitsyna, A. (2023). Hybrid cities and new working spaces: The case of Oslo. *Progress in Planning*, 170, 100712.
- Dieppa, K. (2019). Exploring the impact of incorporating on-demand drivers into a child rideshare platform (Doctoral dissertation, Massachusetts Institute of Technology).
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). Internet, phone, mail, and mixed-mode surveys: The tailored design method. John Wiley & Sons.
- Ehidiamen, A. (2022). Shared Mobility and Sharing Culture: The Case of ride sharing in Lagos, Nigeria (Doctoral dissertation, The University of Huddersfield).
- Engle, R. F., Ledoit, O., & Wolf, M. (2019). Large dynamic covariance matrices. *Journal of Business & Economic Statistics*, 37(2), 363-375.
- Feng, S., Duan, P., Ke, J., & Yang, H. (2022). Coordinating ride-sourcing and public transport services with a reinforcement learning approach. *Transportation Research Part C: Emerging Technologies*, 138, 103611.
- Fielbaum, A., & Tirachini, A. (2021). The sharing economy and the job market: The case of ride-hailing drivers in Chile. *Transportation*, 48(5), 2235-2261.

- Fong, S. K., Char, A. K., Tanakinjal, G. H., Boniface, B., Sigang Gukang, A., & Anak Lubang, L. (2023). Price, service quality, customer trust and safety influence towards customer satisfaction on online transportation. *Labuan Bulletin of International Business and Finance (LBIBF)*, 21(1), 78–90. <https://doi.org/10.51200/lbibf.v21i1.4076>
- Fu, Z. (2018). Regulating ride-hailing platforms: A case study of China. *Research in Transportation Economics*, 70, 86-93.
- Goetz, A. R. (2019). Transport challenges in rapidly growing cities is there a magic bullet. *Transport Reviews*, 39(6), 701-705.
- Gomez, J., Aguilera-García, Á., Dias, F. F., Bhat, C. R., & Vassallo, J. M. (2021). Adoption and frequency of use of ride-hailing services in a European city: The case of Madrid. *Transportation Research Part C: Emerging Technologies*, 131, 103359. <https://doi.org/10.1016/j.trc.2021.103359>
- Gupta, H., Malhotra, A., Jain, A., & Gaur, H. (2022). Examining consumers' trust-distrust in using e-hailing services: A grey DEMATEL based approach. *Journal of Retailing and Consumer Services*, 63, <https://doi.org/10.1016/j.jretconser.2021.102703>
- Hall, J. D., Palsson, C., Price, J., & Stollman, J. (2018). Is Uber a substitute or complement for public transit? *Journal of Urban Economics*, 108, 36-50.
- Hansen, R. (2022). The benefits of using advanced technology in ride-hailing services. Onde App. Retrieved August 23, 2023, from <https://onde.app/blog/why-ride-hailing-services-should-use-advanced-technology>
- Hart, R. A. S. (2021). Strategies uber drivers use to enhance competitive advantage for increased profits and incomes (Doctoral dissertation, Walden University).
- Hazlett, T. W. (2016). Understanding the disruptive innovation wrought by computers and the internet: A review. *International Journal of the Economics of Business*, 23(3), 391-408.
- Henao, A., & Marshall, W. (2019). The impact of e-hailing services on traffic congestion: A case study of Uber in the United States. *Transportation Research Part A: Policy and Practice*, 119, 151-164.
- Huang, J., Luo, Y., Xu, M., Hu, B., & Long, J. (2022). Share: Privacy-preserving ride-sharing system with minimum-detouring route. *Applied Sciences*, 12(2), 842.
- Huang, R., Wang, X., & Zhang, F. (2020). Can platform hybridization improve driver retention in the ride-hailing industry? *Transportation Research Part E: Logistics and Transportation Review*, 137, 101924.
- Inan, D. I., Nizar Hidayanto, A., Juita, R., Andiyani, K., Hariyana, N., Tiffany, P., Prima Tangis Pertiwi, T., & Kurnia, S. (2022). Technology anxiety and social influence towards intention to use of ride-hailing service in Indonesia. *Case Studies on Transport Policy*, 10(3), 1591–1601. <https://doi.org/10.1016/j.cstp.2022.05.017>
- Jain, A. K., Adlakha, S., & Marwah, T. (2020). The e-hailing revolution. *Emerald Publishing Limited*.
- Jain, V. (2022). Benefits of multi-subscription model for drivers in taxi apps. Appicial applications. Retrieved September 18, 2023

<https://www.appicial.com/blog/benefits-of-multi-subscription-model-for-drivers-in-taxi-apps.html>

- Jamaluddin, N., Rahim, S. A. S. M., Roslan, A., Haron, N. Z., & Jamaluddin, A. (2021). Driver profile and travel distance among e-hailing drivers: An exploratory study. *International Journal of Road Safety*, 2(1), 24-29.
- Javaid, M., Haleem, A., Rab, S., Singh, R. P., Suman, R., & Mohan, S. (2022). Progressive schema of 5G for industry 4.0: Features, enablers, and services. *Industrial Robot: The International Journal of Robotics Research and Application*, 49(3), 527-543.
- Jiang, G., Yang, W., & Zhang, N. (2022). Effect of perceived risks, perceived benefits and regulatory events on users' supervision intention towards e-hailing platforms: A mixed method. *Journal of Information Science*, 01655515221128422.
- Johnson, P. (2019). The rise and regulation of ride-hailing in US cities. *Journal of Transport Geography*, 79, 102432.
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31-36. <https://doi.org/10.1007/BF02291575>
- Kim, D., Park, Y., & Ko, J. (2019). Factors underlying vehicle ownership reduction among carsharing riders: A repeated cross-sectional analysis. *Transportation Research Part D: Transport and Environment*, 76, 123-137.
- Kitchin, R., & Lauriault, T. P. (2019). Towards critical data studies: Charting and unpacking data assemblages and their work. *Regional Studies, Regional Science*, 6(1), 82-96.
- Kumar, A., Gupta, A., Parida, M., & Chauhan, V. (2022). Service quality assessment of ride-sourcing services: A distinction between ride-hailing and ride-sharing services. *Transport Policy*, 127, 61-79.
- Lau, P. S., Lee, W. L., Mifzal, A. B. F., Wan, Z. W., & Iskandar, H. B. N. (2023). Artificial Intelligence in Empowerment of E-hailing Industry. Retrieved November 24 from, https://www.researchgate.net/publication/368683270_artificial_intelligence_in_empowerment_of_e-hailing_industry
- Li, L., & Wang, D. (2018). A literature review on the key factors influencing the adoption of e-hailing services. *Journal of Cleaner Production*, 181, 48-58.
- Li, W., & Wang, Y. (2016). The impact of GPS-based taxi dispatching systems on taxi drivers and passengers: Evidence from a field experiment. *Journal of Public Economics*, 141, 1-12. Doi: 10.1016/j.jpubeco.2016.06.004
- Li, X., Liu, H., Wang, Y., & Wu, L. (2019). Evaluating the impacts of ride-hailing services on traffic congestion: A case study of Wuhan, China. *Transportation Research Part A: Policy and Practice*, 124, 666-678.
- Liang, D., Lau, N., Baker, S. A., & Antin, J. F. (2020). Examining senior drivers' attitudes toward advanced driver assistance systems after naturalistic exposure. *Innovation in Aging*, 4(3). <https://doi.org/10.1093/geroni/igaa017>
- Lin, Y. (2023). Mobile Usage Statistics. Statista. Retrieved January 15, 2024 <https://www.oberlo.com/blog/mobile-usage-statistics>

- Liu, Y., Li, Y., & Wang, L. (2019). Factors influencing consumers' intention to use e-hailing services: A case study of Didi Chuxing in China. *Transportation Research Part A: Policy and Practice*, 127, 58-72.
- Liyanage, S., Dia, H., Abduljabbar, R., & Bagloee, S. A. (2019). Flexible mobility on-demand: An environmental scan. *Sustainability*, 11(5), 1262.
- Luo, Y., Hwang, J., & Kim, S. (2018). Can platform companies change an industry? A comparative study of Uber in the USA and Didi in China. *Technovation*, 71, 1-13.
- Machado, C. A. S., de Salles Hue, N. P. M., Berssaneti, F. T., & Quintanilha, J. A. (2018). An overview of shared mobility. *Sustainability*, 10(12), 4342.
- Makore, R., Vaz, F., & Visser, G. (2017). Uber in South Africa: A bridging technology amidst institutional voids. *Case Studies on Transport Policy*, 5(4), 616-625.
- Malik, P. (2019). How regulation shapes innovation: Roadblocks and loopholes in Indian ride-hailing industry. *Technological Forecasting and Social Change*, 145, 49-59.
- Malik, S., Muhammad, K., & Waheed, Y. (2023). Nanotechnology: A revolution in modern industry. *Molecules*, 28(2), 661-675.
- Mäntymäki, M., Baiyere, A., & Islam, A. N. (2019). Digital platforms and the changing nature of physical work: Insights from ride-hailing. *International Journal of Information Management*, 49, 452-460.
- Melia, E. (2020). African jobs in the digital era: Export options with a focus on online labour (No. 3/2020). Discussion Paper.
- Mhlanga, L., Sibiya, G., & Odendaal, N. (2021). The impact of e-hailing services on urban planning: Evidence from South Africa. *Journal of Transport Geography*, 91, 102977.
- Micha, A., Poggi, C., & Pereyra, F. (2022). When women enter male-dominated territories in the platform economy: gender inequalities among drivers and riders in Argentina. *Gender & Development*, 30(3), 575-600.
- Miller, K. M. (2022). Autonomous motives: Tech, shared mobility, privatization, and the utopian imaginary in the bay area. University of California, Santa Cruz.
- Mohajan, H. K. (2020). Quantitative research: A successful investigation in natural and social sciences. *Journal of Economic Development, Environment and People*, 9(4), 50-79.
- Mohamed, M. J. H. (2022). The use of Uber pool and its Relationship with Public Transport-A London case study (Doctoral dissertation).
- Morrar, R., Arman, H., & Mousa, S. (2017). The fourth industrial revolution (Industry 4.0): A social innovation perspective. *Technology Innovation Management Review*, 7(11), 12-20.
- Musah, B. I., Peng, L., & Xu, Y. (2020). Urban congestion and pollution: A quest for cogent solutions for Accra city. 435(1), 012026. <https://doi.org/10.1088/1755-1315/435/1/012026>
- Nguyen-Phuoc, D. Q., Tran, P. T. K., Su, D. N., Oviedo-Trespalacios, O., & Johnson, L. W. (2021). The formation of passenger loyalty: Differences between ride-

- hailing and traditional taxi services. *Travel Behaviour and Society*, 24, 218–230. <https://doi.org/10.1016/j.tbs.2021.04.006>
- Nyamweya, P. G., Opiyo, J. O., & Shimelman, J. K. (2019). Complementary or competitive? The impact of e-hailing services on public transportation in Nairobi, Kenya. *Case Studies on Transport Policy*, 7(2), 319–328.
- Obiri-Yeboah, G., Sarfo, F. K., & Owusu-Antwi, R. (2022). Comparative analysis of fuel usage among urban transport modes in Kumasi. *Results in Engineering*, 15, 100461. <https://ouci.dntb.gov.gh/en/works/4V252BW4>
- Odame, P. K., Amoako-Sakyi, R. O., Abane, A., & Mensah, M. N. M. (2023). Alternative travel mode for commuters with disability in Accra: The lived experiences of Uber and taxi users. *Case Studies on Transport Policy*, 11. <https://doi.org/10.1016/j.cstp.2023.100968>
- Ofori, K. S., Anyigba, H., Adeola, O., Junwu, C., Osakwe, C. N., & David-West, O. (2022). Understanding post-adoption behaviour in the context of ride-hailing apps: the role of customer perceived value. *Information Technology & People*, 35(5), 1540–1562.
- Okyere-Manu, B. (2023). African development and disruptive innovations: An ethical implication of the e-hailing services on the metered taxi industry in South Africa (pp. 143–154). https://doi.org/10.1007/978-3-031-32898-5_10
- Oosterbaan, C., Arku, G., & Asiedu, A. B. (2012). Conversion of residential units to commercial spaces in Accra, Ghana: A policy dilemma. *International Planning Studies*, 17(1), 45–66. <https://doi.org/10.1080/13563475.2011.638185>
- Osei-Asamoah, A., Bertolaccini, K., Lownes, N. E., & Garrick, N. W. (2012). urban street design in Ghana: A case study of Accra. <https://trid.trb.org/view/1130950>
- Ouma, G. A., & Ngugi, R. W. (2021). Regulating ride-hailing services in Africa: Insights from Kenya. *Transportation Research Interdisciplinary Perspectives*, 10, 100404.
- Owusu, G., & Oteng-Ababio, M. (2015). Moving unruly passengers? Urban public transport services in Accra and the challenges of regulation. *Ghana Journal of Geography*, 7(1), 32–49.
- Owusu, G., Han, J., & Xie, Y. (2017). Evaluating the impacts of Uber and Lyft on taxi travel times and ridership in Chicago. *Journal of Transport Geography*, 62, 250–259.
- Pakusch, C., Meurer, J., Tolmie, P., & Stevens, G. (2020). Traditional taxis vs automated taxis: Does the driver matter for Millennials? *Travel Behaviour and Society*, 21, 214–225.
- Pasquali, P., Commenges, H., & Louail, T. (2022). “It’s a three-way ring”: E-hailing platforms, drivers and riders reshaping Accra’s mobility landscape. *Case Studies on Transport Policy*, 10(3), 1743–1753. <https://doi.org/10.1016/j.cstp.2022.07.005>
- Poku-Boansi, M., Amoako, C., & Atuah, D. O. (2019). Urban travel patterns and safety among school children around Accra, Ghana. *Journal of Transport & Health*, 15, 100660.

- Pollio, A. (2021). Uber, airports, and labour at the infrastructural interfaces of platform urbanism. *Geoforum*, 118, 47-55.
- Rafiq, R., & McNally, M. G. (2023). An exploratory analysis of alternative travel behaviours of ride-hailing riders. *Transportation*, 50(2), 571–605. <https://doi.org/10.1007/s11116-021-10254-9>
- Ramanan, S. (2022). GPS tracking mechanism in e-hailing cabs and motorcycles: Headless ecommerce, video on demand platform, OTT & IPTV on the Webnexs blog. Blog.Webnexs.com. Retrieved August 23, 2023, from <https://blog.webnexs.com/gps-tracking-mechanism-e-hailing-cabs-motorcycles/>
- Ramseier, S. (2022). Sharing mobility economy in China: A business model analysis with a focus on the market leader DiDi Chuxing.
- Rao, P., & Ramesh, S. (2020). Regulating ride-hailing in India: A comparative analysis of Ola and Uber. *Transportation Research Part A: Policy and Practice*, 139, 203-222.
- Rathnayaka, R. P. D. T., Ekanayake, K. V. J. P., Rathnayake, H. U. W., & Jayetileke, H. R. (2021, December). Fleet management with real-time data analytics. In *2021 6th International Conference on Information Technology Research (ICITR)* (pp. 1-6). IEEE.
- Raychaudhuri, T. (2020). Predatory Pricing and Market Determination in Non-Traditional Markets: An analysis of recent cases decided by the Competition Commission of India. *Indian JL & Just.*, 11, 31.
- Rayle, L., Dai, D., Chan, N., Cervero, R., & Shaheen, S. (2016). Just a better taxi? A survey-based comparison of taxis, transit, and ride sourcing services in San Francisco. *Transport Policy*, 45, 168-178.
- Reyes, J., Cansino, J. M., Román-Collado, R., & Mundaca, L. (2020). car sharing services in Sweden and Spain: Market, environmental and behavioural insights.
- Rogers, B. (2015). Employment Rights in the Platform Economy: Getting Back to Basics.
- Rosenblat, A. (2018). Uber land: How algorithms are rewriting the rules of work. *University of California Press*.
- Rosenblat, A., Levy, K., Barocas, S., & Hwang, T. (2017). Discriminating tastes: Uber's customer ratings as vehicles for workplace discrimination. *Policy & Internet*, 9(3), 256-279. <https://doi.org/10.1002/poi3.159>
- Roukouni, A., & Homem de Almeida Correia, G. (2020). Evaluation methods for the impacts of shared mobility: Classification and critical review. *Sustainability*, 12(24), 10504.
- Ruhrort, L. (2020). Reassessing the role of shared mobility services in a transport transition: Can they contribute the rise of an alternative socio-technical regime of mobility? *Sustainability*, 12(19), 8253.
- Ryseck, B. B. (2022). Enabling equitable access to public transport information to enhance hybrid system use in Cape Town, South Africa.

- Sahir Jais, A., & Marzuki, A. (2018). Urban mobility using e-hailing in the historic city of Melaka, Malaysia: Preliminary findings. *In Built Environment in Developing Countries* (ICBEDC).
- Sánchez-García, J., Martínez-Ruiz, M. P., & Jiménez-Zarco, A. I. (2022). The subscription business model in transportation: A systematic literature review and research agenda. *Transportation Research Part E: Logistics and Transportation Review*, 157, 102439.
- Shaheen, S. A., Chan, N. D., & Bansal, N. (2017). Influence of socioeconomic factors on shared-use vehicle adoption: A case study of one-way carsharing in the San Francisco Bay area. *Transportation Research Record*, 2653(1), 1-10.
- Shaheen, S. A., Chan, N. D., & Bansal, S. (2016). Flying under the radar: The growth of app-based ride services and traffic, parking, and environmental impacts in California. UC Berkeley: *Institute of Transportation Studies*.
- Shaheen, S., & Cohen, A. (2019). Shared ride services in North America: Definitions, impacts, and the future of pooling. *Transport reviews*, 39(4), 427-442. <https://doi.org/10.1080/01441647.2018.1497728>
- Shamim, A., Khan, A. A., Qureshi, M. A., Rafique, H., & Akhunzada, A. (2021). Ride or not to ride: Does the customer deviate toward ridesharing? *International journal of environmental research and public health*, 18(19), 10352.
- Shibayama, T., & Emberger, G. (2020). New mobility services: Taxonomy, innovation and the role of ICTs. *Transport Policy*, 98, 79-90.
- Shibghatullah, A. S., Jalil, A., Abd Wahab, M. H., Soon, J. N. P., Subaramaniam, K., & Eldabi, T. (2022). Vehicle tracking application based on real time traffic. *International Journal of Electrical and Electronic Engineering and Telecommunications*, 11(1), 67-73.
- Shiftan, Y., Frenkel, A., Gal-Tzur, A., Tavory, S. S., Lerner, O., Antoniou, C., Cantelmo, G., Amini, R. E., Lima Azevedo, C., Monteiro, M. M., Kamargianni, M., Shachar, F. S., Municipality, I., Aviv-Yafo, T., Behrisch, C., Schiff, K., Shalev, J., & Autotel, D. P. (2021). Activity deliverable shared mobility rewards summary report EIT Urban mobility-mobility for more liveable urban spaces.
- Smith, A. (2019). The transportation network company industry: Economic, legal, and regulatory challenges for the taxi industry. *Journal of Public Transportation*, 22(1), 1-22.
- Smith, A. D. (2016). Ridesharing's house of cards: O'Connor v. Uber Technologies, inc. and the viability of Uber's labour model in Washington. *Wash. L. Rev.*, 90, 1431.
- Smith, J., & Johnson, R. (2017). The Impact of Mobile Applications on the Ride-Sourcing Industry. *Journal of Urban Economics*, 102, 1-10. Doi: 10.1016/j.jue.2017.05.003
- Smith, L. (2020). Assessing the adoption and utilisation of e-hailing services: The case of Cape Town, South Africa.
- Soares, J. L., Christino, J. M. M., Gosling, M. D. S., Vera, L. A. R., & Cardozo, É. A. A. (2020). Acceptance and use of e-hailing technology: a study of Uber based on the UTAUT2 model. *International Journal of Business Information Systems*, 34(4), 512-535.

- Srnicek, N. (2016). Platform capitalism. John Wiley & Sons.
- Stein, M. (2021). Working for small change: Investigating the livelihoods of ride-hailing drivers in Cape Town, South Africa.
- Stewart, K. J. (2003). Trust transfer on the world wide web. *Organization science*, 14(1), 5-17. <https://doi.org/10.1287/orsc.14.1.5.12810>
- Sultana, S., Salon, D., & Kuby, M. (2019). Transportation sustainability in the urban context: a comprehensive review. *Urban Geography*, 40(3), 279-308.
- Sumakha, K. (2022, January 29). How does Uber work & make money: Business model. The strategy story.
- Surie, A., & Koduganti, J. (2016). The emerging nature of work in platform economy companies in Bengaluru, India: The case of Uber and Ola cab drivers. *E-Journal of International and Comparative Labour Studies*, 5(3).
- Tabachnick, B. G., & Fidell, L. S. (2007). Using multivariate statistics (5th ed.). Pearson.
- Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273-1296. <https://doi.org/10.1007/s11165-016-9602-2>
- Tan, F. T. C., Tan, B., Lu, A., & Land, L. (2017). Delivering disruption in an emergent access economy: A case study of an e-hailing platform. *Communications of the Association for Information Systems*, 41(1), 22.
- Tan, S. Y., & Taeihagh, A. (2020). Smart city governance in developing countries: A systematic literature review. *sustainability*, 12(3), 899.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Taylor, P. (2023, June 1). Number of global mobile subscriptions 1993-2022. Statista. Retrieved on September 15, 2023, <https://www.statista.com/statistics/262950/global-mobile-subscriptions-since-1993/>
- Thakur, R., Jain, S., & Sharma, P. (2020). Analysing the impact of ride-hailing services on traffic congestion: A case study of Delhi, India. *Case Studies on Transport Policy*, 8(3), 1133-1143.
- Timmermans, C., Alhajyaseen, W., Reinolsmann, N., Nakamura, H., & Suzuki, K. (2019). Traffic safety culture of professional drivers in the State of Qatar. *IATSS research*, 43(4), 286-296.
- Tirachini, A. (2020). Ride-hailing, travel behaviour and sustainable mobility: An international review. *Transportation*, 47, 2011-2047. <https://doi.org/10.1007/s11116-019-10070-2>.
- Turkson, F. E., Amissah, E., & Gyeke-Dako, A. (2022). The role of formal and informal finance in the informal sector in Ghana. *Journal of Small Business & Entrepreneurship*, 34(3), 333-356. <https://doi.org/10.1080/08276331.2020.1724002>

- Vega-Gonzalo, M., Aguilera-García, Á., Gomez, J., & Vassallo, J. M. (2023). Traditional taxi, e-hailing or ride-hailing? A GSEM approach to exploring service adoption patterns. *Transportation*, 1-40.
- Vignon, D., Yin, Y., & Ke, J. (2023). Regulating the ride-hailing market in the age of uberization. *Transportation Research Part E: Logistics and Transportation Review*, 169, 102969.
- Wang, C., Li, Z., & Cai, Y. (2016). The employment relationship in an on-demand economy: A case study of ride-hailing platform drivers in China. *Transportation Research Part A: Policy and Practice*, 94, 328-338
- Wang, D., & Ma, J. (2018). Investigating user satisfaction of e-hailing services: A latent class regression and structural equation modelling approach. *Transportation Research Part C: Emerging Technologies*, 86, 416-431.
- Wang, D., Xu, M., & Lin, Y. (2018). The impact of ride-hailing services on public transportation ridership in Indian cities. *Transportation Research Part C: Emerging Technologies*, 89, 24-36.
- Wang, H. & Yang, H. (2019). Ride sourcing systems: A framework and review. *Transportation Research Part B: Methodological*, 129, 122-155. <https://doi.org/10.1016/j.trb.2019.07.009>.
- Wang, J., Wu, Q., Mao, F., Ren, Y., Chen, Z., & Gao, Y. (2021). Influencing factor analysis and demand forecasting of intercity online car-hailing travel. *Sustainability*, 13(13), 7419. <https://doi.org/10.3390/su13137419>
- Wang, T., Zhang, Y., Li, M., & Liu, L. (2019). How do passengers with different using frequencies choose between traditional taxi service and online car-hailing service? A case study of Nanjing, China. *Sustainability*, 11(23), 6561.
- Wood, L. (2021). Global e-hailing markets report 2021-2026 featuring Uber, Lyft, Didi Chuxing Technology, Ola Cabs, MyCar, Grab Holdings, Gojek, & Bolt. <https://www.globenewswire.com/en/news-release/2021/11/18/2337074/28124/en/Global-e-Hailing-Markets-Report-2021-2026-Featuring-Uber-Lyft-Didi-Chuxing-Technology-Ola-Cabs-MyCar-Grab-Holdings-Gojek-Bolt.html>
- Wyman, K. M. (2017). Taxi regulation in the age of Uber. *NYUJ Legis. & Pub. Pol'y*, 20, 1.
- Xu, M., David, J. M., & Kim, S. H. (2018). The fourth industrial revolution: Opportunities and challenges. *International Journal of Financial Research*, 9(2), 90-95.
- Yasmin, R., Hanif, I., & Khan, A. N. (2017). Issues & challenges for ‘app-based ‘taxi services in developing countries. In *Transportation Research Board 96th Annual Meeting* (No. 17-05600).
- Yeakey, P. M., Thompson, M. R., Brooks, B., & Steiner, R. (2022). Ride-hailing regulation in developing countries: Understanding implications through the case of Ghana. *Case Studies on Transport Policy*. <https://doi.org/10.1016/j.cstp.2022.01.013>

- Yee, C. J., & Salleh, M. I. (2022). “How” and “What” service quality influence passenger’s satisfaction in Grab, ride-hailing service, Malaysia. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 7(5), e001482-e001482.
- Zhang, F., Zhu, Z., & Zhang, X. (2016). Operational efficiency of taxi-hailing platforms: evidence from Didi Chuxing. *Transportation Research Part C: Emerging Technologies*, 71, 251-264.



APPENDIX I
UNIVERSITY OF EDUCATION, WINNEBA
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF GEOGRAPHY EDUCATION
Questionnaire for E-hailing Riders

Introduction

This questionnaire gathers valuable insights into the modus operandi of e-hailing services (Uber, Bolt, Yango, and Shaxi) within the Accra Metropolitan Area. This study explores the reasons behind the increasing popularity of Uber, Bolt, Yango, and Shaxi compares their functional modules and traditional taxi services and investigates the influence of e-hailing mobile-ICT apps on various stakeholders' roles and power dynamics. Participation in this study is voluntary, and your information will be confidential. The data collected will be used solely for research purposes. Your valuable input will contribute to a better understanding of the e-hailing service landscape in Ghana, particularly in the Accra Metropolitan Area. The estimated time for completing this questionnaire is between 15-20 minutes. Thank you for your participation.

SECTION A: Respondents biodata

1. Gender
☐ Male
☐ Female
2. Age
3. Education
☐ No formal
☐ Primary
☐ JHS
☐ SHS/Voc
☐ Tertiary
4. Employment
☐ Unemployed
☐ Private formal
☐ Private informal
☐ Public formal
☐ Public informal

- ☐ Retired
- ☐ Student
5. Household income
- ☐ Below GH¢ 500
- ☐ GH¢ 500 – 1,000
- ☐ GH¢ 1,001 -1,500
- ☐ GH¢ 1,501 – 2,000
- ☐ GH¢ 2,001 – 2,500
- ☐ above GH¢ 2,500
6. Which e-hailing service do you often use?
- ☐ Uber
- ☐ Bolt
- ☐ Yango
- ☐ Shaxi
- ☐ Accra Cab
- Other specify
7. How often in a week do you use e-hailing services (Uber, Bolt, Yango, and Shaxi)?
- ☐ once a week,
- ☐ 2-3 times a week,
- ☐ 4-6 times a week
- ☐ Every day of the week
8. How often in a week do you use traditional taxi services?
- ☐ once a week,
- ☐ 2-3 times a week,
- ☐ 4-6 times a week
- ☐ Every day of the week
9. For what purpose do you typically use Uber, Bolt, Yango, and Shaxi in the Accra Metropolitan Area?
- ☐ Work-related purposes
- ☐ personal use
- ☐ both work and personal use
- ☐ other (specify).....
10. At what point in time do you use Uber, Bolt, Yango, and Shaxi?



- ☐ Morning
- ☐ Afternoon
- ☐ Evening
- ☐ Throughout the day

11. Where do you frequently take e-hailing services (Uber, Bolt, Yango, and Shaxi)?
(Tick as many as applicable)

- ☐ Office/work
- ☐ Shopping mall
- ☐ Market
- ☐ Church
- ☐ School
- ☐ Hospital
- ☐ Other (specify).....

SECTION B: Factors Contributing to the Growth of E-Hailing Services (Uber, Bolt, Yango, and Shaxi)

Rate your level of agreement or disagreement with each statement using a scale of
1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

Factors	1	2	3	4	5
12. Economic					
I can split fares with other riders while using Uber, Bolt, Yango, and Shaxi.					
I spend less of my monthly salary on using Uber, Bolt, Yango, and Shaxi					
Cost of using Uber, Bolt, Yango, and Shaxi is cheaper than the traditional taxi and trotro service.					
I can save more money when I use Uber, Bolt, Yango, and Shaxi					
I have control over the cost of trip.					
I use Uber, Bolt, Yango, and Shaxi because of the discounts I get for a ride.					
I am able to clearly estimate the cost of every trip.					
I pay the exact fee stated on the app for the trip.					

13. Ease of Use					
The Uber, Bolt, Yango, and Shaxi application is easier to read and use.					
Uber, Bolt, Yango, and Shaxi allows me to give feedback after using the ride.					
The driver rating system is essential to me when choosing Uber, Bolt, Yango, and Shaxi					
Uber, Bolt, Yango, and Shaxi application enables me to easily locate available vehicles more quickly as compared to traditional taxi services.					
It is easier for me to obtain follow up service (report stolen items, retrieve driver information, etc) on Uber, Bolt, Yango, and Shaxi app.					
It is easy to make payments using Uber, Bolt, Yango, and Shaxi apps or mobile payment options					
Uber, Bolt, Yango, and Shaxi is always available whenever I need a ride					
Uber, Bolt, Yango, and Shaxi cars have enough space and leg room for riders.					
14. Safety					
Uber, Bolt, Yango, and Shaxi cars are not overloaded with passengers.					
Uber, Bolt, Yango, and Shaxi cars are not frequently involved in traffic accidents.					
Uber, Bolt, Yango, and Shaxi ensure the condition of the exterior components of their cars (body, tyres, driving mirrors, etc.) are in good condition.					
Uber, Bolt, Yango, and Shaxi cars never break down during trips.					
Uber, Bolt, Yango, and Shaxi drivers have the ability (based on physique) to handle their cars.					
Uber, Bolt, Yango, and Shaxi has been in operations for a long time.					

Uber, Bolt, Yango, and Shaxi has a good company reputation (public image) among riders.					
Uber, Bolt, Yango, and Shaxi drivers are always in a positive outward emotional state.					
15. Security					
Uber, Bolt, Yango, and Shaxi application provides me booking transparency information. (e.g., driver's name, driver's number, and plate number).					
Uber, Bolt, Yango, and Shaxi protects me from being abused (verbal, sexual and physical).					
Uber, Bolt, Yango, and Shaxi gives security alerts of various cities.					
No other person can detect my location through the Uber, Bolt, Yango, and Shaxi app.					
Uber, Bolt, Yango, and Shaxi cars have emergency customer support for contacting service provider in case of any problem.					
Uber, Bolt, Yango, and Shaxi systematically records historic trips.					
Uber, Bolt, Yango, and Shaxi application enables me to declare my location via message, e-mail or on social network.					
Uber, Bolt, Yango, and Shaxi protects riders from being robbed while using service.					

SECTION C: Functional Modules of E-Hailing and Traditional Taxi Services

A. Operational modules of e-hailing service (Uber, Bolt, Yango, and Shaxi)

Rate your level of agreement or disagreement with each statement using a scale of 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

Statements	1	2	3	4	5
16. Which operational modules do you consider a strength of Uber, Bolt, Yango, and Shaxi ?					
Convenience (e.g., easy to book a ride)					

Safety (e.g., ability to track the ride and driver)					
Price transparency (e.g., upfront pricing)					
Payment options (e.g., ability to pay by credit card)					
Customer service (e.g., ability to rate the driver)					
17. Which operational modules do you consider a weakness of Uber, Bolt, Yango, and Shaxi?					
Dependability (e.g., availability of rides during peak hours)					
Driver experience (e.g., knowledge of routes and navigation)					
Privacy (e.g., sharing personal information with the app)					
Comfort (e.g., quality of the vehicle)					
Flexibility (e.g., ability to hail a ride on the street)					
18. In what ways can Uber, Bolt, Yango, and Shaxi improve to compete with traditional taxi services?					
Increase dependability (e.g., availability of rides during peak hours)					
Improve driver experience (e.g., knowledge of routes and navigation)					
Improve privacy measures (e.g., data protection)					
Increase comfort (e.g., quality of the vehicle)					
Increase flexibility (e.g., ability to hail a ride on the street)					
Increase convenience (e.g., better booking options)					
Improve safety measures (e.g., tracking the ride and driver)					
Increase transparency in pricing (e.g., upfront pricing)					
Improve payment options (e.g., the ability to pay by credit card)					
Improve customer service (e.g., ability to rate the driver)					

B. Operational modules of traditional taxi services

Rate your level of agreement or disagreement with each statement using a scale of

1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

Statements	1	2	3	4	5
19. Which operational modules do you consider a strength of traditional taxi services?					
Convenience (e.g., easy to book a ride)					
Safety (e.g., ability to track the ride and driver)					
Price transparency (e.g., upfront pricing)					
Payment options (e.g., ability to pay by credit card)					
Customer service (e.g., ability to rate the driver)					
20. Which operational modules do you consider a weakness of traditional taxi services?					
Dependability (e.g., availability of rides during peak hours)					
Driver experience (e.g., knowledge of routes and navigation)					
Privacy (e.g., sharing personal information with the app)					
Comfort (e.g., quality of the vehicle)					
Flexibility (e.g., ability to hail a ride on the street)					
21. In what ways can traditional taxi services improve to compete with e-hailing services?					
Increase dependability (e.g., availability of rides during peak hours)					
Improve driver experience (e.g., knowledge of routes and navigation)					
Improve privacy measures (e.g., data protection)					
Increase comfort (e.g., quality of the vehicle)					
Increase flexibility (e.g., ability to hail a ride on the street)					
Increase convenience (e.g., better booking options)					
Improve safety measures (e.g., tracking the ride and driver)					
Increase transparency in pricing (e.g., upfront pricing)					
Improve payment options (e.g., the ability to pay by credit card)					
Improve customer service (e.g., ability to rate the driver)					

SECTION D: E-Hailing Mobile Apps and Power of Stakeholders (Drivers, Riders and E-Hailing Company).

Rate your level of agreement or disagreement with each statement using a scale of 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

Statements	1	2	3	4	5
23. E-hailing riders					
I have control over booking of rides					
I have control over rejection of rides					
I can review driver ratings					
I can provide feedback for better services					
I have control over cost of trips					
I have control over driver's job security					
I have control over drivers work schedules					
I determine the type of vehicles drivers use for their operations					

25. Overall, how will you rate the level of quality of user experience with Uber,

Bolt, Yango, and Shaxi?

☐ Poor

☐ Fair

☐ Good

☐ Very good

☐ Excellent

26. Overall, I am satisfied with the quality of service provided by Uber, Bolt, Yango, and Shaxi in the city.

☐ Strongly disagree

☐ Disagree

☐ Neutral

☐ Agree

☐ Strongly agree

APPENDIX II
UNIVERSITY OF EDUCATION, WINNEBA
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF GEOGRAPHY EDUCATION
INTERVIEW GUIDE FOR E-HAILING DRIVERS (UBER, BOLT, YANGO,
AND SHAXI)

Introduction:

I am Anthony Fiangor a final year MPhil candidate from the Department of Geography Education from the University of Education, Winneba. My thesis is focused on the Modus Operandi of E-hailing Services: Lessons for Intra Urban Transport Needs and Planning. The purpose of this interview is to gather information about the experiences and perspectives of e-hailing drivers. Your responses will help me better understand the e-hailing industry and the experiences of drivers like yourself. During the interview, I will ask you a series of questions about your experiences as an e-hailing driver. Your responses will remain confidential and will only be used for research purposes. Thank you for taking the time to participate in this interview. Your input is valuable to me. If you have any questions or concerns, please feel free to ask.

1. Describe the processes you go through to become an e-hailing driver?
2. What measures are in place to ensure passenger safety and service quality (convenience, reliability etc.) in e-hailing services?
3. In what way do your operations differ from traditional taxi services?
4. What makes e-hailing services more attractive than traditional taxi services?
5. What control do you have in accepting or rejecting ride requests from riders? (does it come with a penalty if you cancel? explain)
6. How long is your work schedule? Does the company influence the duration of your work? (Are you happy with such control?)
7. Under what circumstances can you lose your job as an e-hailing driver?
8. How does customer ratings and feedback improve the quality of your services?

Thank you for your time and valuable input.

Capture Sheet for E-hailing drivers.

Socio-demographic characteristics of the person being interviewed:

Age	
Gender	
Company, you drive for	
Vehicle type	
Average monthly income	
Work area	
Highest level of education	
Years as driver for e-hailing company	
Have you switched between e-hailing companies (i.e driving for other e-hailing companies)	



APPENDIX III
UNIVERSITY OF EDUCATION, WINNEBA
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF GEOGRAPHY EDUCATION
INTERVIEW GUIDE FOR E-HAILING COMPANIES (UBER, BOLT, YANGO,
AND SHAXI)

Introduction:

Thank you for agreeing to participate in this interview. Your insights are invaluable to me. I am Anthony Fiangor a final year MPhil candidate from the Department of Geography Education from the University of Education, Winneba. My thesis is focused on the Modus Operandi of E-hailing Services: Lessons for Intra Urban Transport Needs and Planning. The purpose of this interview is to gather information about the e-hailing industry from the perspective of e-hailing companies. Your responses will help me better understand the e-hailing landscape and the experiences of companies operating in this space. Your responses will remain confidential and will only be used for research purposes. Thank you again for your time and valuable input.

1. Can you provide an overview of your company and its services in Accra.
2. What is the current size of your fleet? (how do you manage the demand for your services)
3. How do you ensure your drivers comply with transportation laws and regulations?
4. How do you handle customer complaints to ensure customer satisfaction?
5. How do you ensure passengers' safety using your services?
6. What are the advantages of e-hailing services compared to traditional taxi services?
7. How do you see e-hailing services evolving, and what role will your company play in this evolution?
8. How do you collaborate with drivers of your service to improve transportation services in the Accra? (what about riders?)
9. Has e-hailing apps affected the power dynamics between your company and the drivers as well as riders? If so, how?
10. Can you elaborate on the revenue distribution between e-hailing companies and drivers? How does the mobile app contribute to this distribution?

11. How does the decision-making process work when it comes to selecting the type of vehicle for drivers? What factors are considered in this decision?
12. In what ways do e-hailing companies impact the job security of their drivers? Can you provide specific examples or policies that demonstrate this control?
13. How do e-hailing companies exercise control over pricing? Are drivers and involved in pricing decisions?
14. How do you regulate and control the work schedules of drivers? Are there any mechanisms in place to ensure a fair balance between the company's needs and the drivers' preferences?
15. How do you think regulators should approach the regulation of e-hailing apps to ensure that drivers and riders are protected?
16. Is there anything else you want to add regarding the modus operandi of e-hailing services.

Thank you for your time and valuable input

Capture Sheet for E-hailing companies.

Socio-demographic characteristics of the person being interviewed:

Name	
Age	
Gender	
Designation	
Years in office	
Highest level of education	
Years in operation as an e-hailing company	

APPENDIX IV

Structure Matrix

Items	Components			
	Economic	Safety	Ease of Use	Security
EC3	.908			
EC6	.877			
EC1	.869			
EC4	.853			
EC2	.848			
EC7	.787			
SF4		.865		
SF7		.856		
SF3		.840		
SF6		.819		
SF2		.780		
SF8		.764		
SF1		.563		
EOU6			.927	
EOU1			.883	
EOU2			.862	
EOU5			.848	
EOU4			.793	
SC6				.851
SC2				.836
SC7				.760
SC4				.750
SC8				.591
Kaiser-Meyer-Olkin	0.848			
Bartlett's Test of Sphericity	$X^2=7991.581$			
Sig.	0.000			

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization

