ADOPTION OF TRANSPORT MANAGEMENT SYSTEMS IN THE SOUTH AFRICAN TAXI INDUSTRY

by

NYARADZO MUSANHI

50021508

submitted in accordance with the requirements
for the degree of

MASTER OF SCIENCE

in the subject

COMPUTING

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: DR. B. CHIPANGURA

CO-SUPERVISOR: DR. L. MOTSI

DATE SUBMITTED: 19 NOVEMBER 2021

DATE RE-SUBMITTED: 8 FEBRUARY 2022

DECLARATION

Name: NYARADZO MUSANHI

Student number: 50021508

Degree: MASTER OF SCIENCE IN COMPUTING

Exact wording of the title of the dissertation or thesis as appearing on the copies submitted for examination:

ADOPTION OF TRANSPORT MANAGEMENT SYSTEMS IN THE SOUTH AFRICAN TAXI INDUSTRY

I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

SIGNATURE

19 NOVEMBER 2021
DATE

ABSTRACT

This study investigated how the attitudes of taxi entrepreneurs affect their acceptance of transport management systems in the South African taxi industry. The study was instigated by a rise in the adoption of transport management systems the world over in the past years. In South Africa, the adoption of transport management systems has caused some friction between innovators and laggards, which is of intellectual interest for it requires an understanding of technology adoption in the transport industry. The friction can be interpreted as a fight for market domination on the one hand and as a fight to resist the adoption of transport management systems by traditional transport operators (the laggards) on the other hand. To investigate this phenomenon, this study adapted the Technology Acceptance Model (TAM) and collected quantitative data using a survey questionnaire. A total of 253 taxi entrepreneurs were selected from Sandton in Gauteng Province, South Africa, using a snowball sampling technique. Results of the correlation analysis could not falsify three hypotheses out of 14. Therefore, the three factors that positively influence the adoption of transport management systems by taxi entrepreneurs were found to be Attitude Towards Use (ATU), Behavioural Intention (BI) and Perceived Ease of Use (PEU). This study is valuable in identifying factors that can influence the adoption of transport management systems in South Africa. The results can inform policy and strategies for modernising the South African transport system.

Keywords: DOI, Shared economy, TAM, Technology Acceptance Model, Taxi Industry, TOE, TPB, TRA, Transport Technology, Uber.

ACKNOWLEDGEMENTS

Firstly, I would like to thank my supervisors for being my fountains of knowledge, for advising, pushing, encouraging and guiding me in doing and completing my dissertation.

I will forever be grateful to my son, Jayden Mutyakurewa and my daughter, Atalia Mutyakurewa for encouraging me to soldier on when the load became too much and for supporting me during the sleepless nights as I worked towards completing my dissertation.

Lastly, I would like to express my gratitude to my parents, Linet and Zachariah Musanhi and my brothers, Tamuka and Tanaka Musanhi for being my pillars of strength and for believing in me which, in turn, helped me to gain confidence to believe in myself.

Thank you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

TERMS AND ACRONYMS

Term	Acronym
Actual System Use	ASU
Applications	Apps
Attitude Towards Use	ATU
Behavioural Intention	BI
Call Taxi App	CTA
Car Technology Acceptance Model	CTAM
Confirmatory Factors Analysis	CFA
Diffusion of Innovation	DOI
Educational Technology	ET
Electronic Mail	Email
Executive Information System	EIS
Information and Communication Technology	ICT
Information Systems	IS
Information Technology	IT

Innovation Diffusion Theory	IDT
Learning Management System	LMS
Mobile Taxi Ordering	MTO
Perceived Ease of Use	PEOU
Perceived Usefulness	PU
Short Message Service	SMS
South Africa	SA
Structural Equation Modelling	SEM
Taxi Entrepreneurs' Actual System Use	ASU
Taxi Entrepreneurs' Attitude Towards Use	ATU
Taxi Entrepreneurs' Behavioural Intention	BI
Taxi Entrepreneurs' Perceived Convenience of Accessibility	PCA
Taxi Entrepreneurs' Perceived Customers' Trust	PCT
Taxi Entrepreneurs' Perceived Ease of Use	PEOU
Taxi Entrepreneurs' Perceived Pricing	PP
Taxi Entrepreneurs' Perceived Safety	PS
Taxi Entrepreneurs' Perceived Usefulness	PU
Technological, Organisational and Environmental	TOE
Technology Acceptance Model	TAM
Theory of Planned Behaviour	TPB
Theory of Reasoned Action	TRA
Transport Network Companies	TNC
Unified Theory of Acceptance and Use of Technology	UTAUT
University of Johannesburg	UJ
University of Witwatersrand	Wits

CHAPTER 1 - INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION AND PROBLEM STATEMENT

The lack of e-skills among micro-entrepreneurs in developing countries has been identified as an obstacle to technology adoption and business growth (Calitz, Cullen & Greyling, 2015; Twinomurinzi, Mavela, Rampa & Ismael, 2018). Even though technology adoption amid small and medium entrepreneurs in developing countries is slow, some *innovators* and *early adopters* have been observed (Rahayu & Day, 2015). A typical adoption pattern is reflected in the adoption of the metered taxi transport management system called Uber in South Africa (Bick, 2019; Salnikov, Lambiotte, Noulas & Mascotto, 2015). Furthermore, Taschler (2015) suggested that in the context of the South African metered taxi transport industry, the innovators and early adopters of Uber had an advantage of market domination over the *laggards*.

Researchers observed that the advantages that came with the Uber transport management system disrupted the operations of the South African metered taxi industry and affected its market share (Henama & Sifolo, 2017; Palmér, 2017). Intending to regain the market, the laggards chose to fight with the Uber innovators and early adopters physically and politically (Henama & Sifolo, 2017). Physically, the traditional taxi owners organised street fights to dispel the Uber operators from the streets and there were some casualties (Henama & Sifolo, 2017). Politically, the traditional taxi owners organised demonstrations in major cities such as Johannesburg, Pretoria and Cape Town, advocating for the government to force Uber operators to comply with the taxi industry regulations (Henama & Sifolo, 2017). The fights between the innovators and early adopters against the laggards of the Uber transport management system is of intellectual interest for it requires an understanding of technology adoption in this industry (Labson, Madiba & Roberts, 2016). At the surface level, the fights can be interpreted as a fight for market domination (Geissinger, Laurell & Sandström, 2020; Taschler, 2015). On the other hand, the fight against the innovators and early adopters of this technology can be interpreted as a fight to resist the adoption of transport management systems (Taschler, 2015). Therefore, this research aimed to investigate how the taxi entrepreneurs' attitude towards technology affect their acceptance of transport management systems in the South African taxi industry.

1.2 AIM AND OBJECTIVES OF THE STUDY

This research investigated how taxi entrepreneurs' attitude towards technology affect their acceptance

of transport management systems in the South African taxi industry.

The objectives of this study were to understand:

1. The taxi entrepreneurs' behavioural intention on the use of transport management systems in the South African taxi industry.
2. How easy it is for taxi entrepreneurs to use transport management systems in the South African taxi industry.
3. The taxi entrepreneurs' attitude towards the use of transport management systems in the South African taxi industry.
4. The extent of the usefulness of transport management systems to taxi entrepreneurs in the South African taxi industry.
5. How taxi entrepreneurs view the pricing, safety and convenience of the accessibility of transport management systems in the South African taxi industry.
6. Whether taxi entrepreneurs view transport management systems in the South African taxi industry as being trustworthy to customers.

1.3 HYPOTHESES

To investigate the research, aim and objectives, the following hypotheses were proposed. The hypotheses were derived from a proposed conceptual framework that adopted and extended the TAM theory (Davis, 1985). Chapter 2 presents the literature analysis and the conceptual framework of the study.

H1: Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on attitude towards use (ATU) of the transport management systems.
H2: Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on attitude towards use (ATU) of the transport management systems.
H3: Taxi entrepreneurs' perceived pricing (PP) has a positive influence on attitude towards use (ATU) of the transport management systems.
H4: Taxi entrepreneurs' perceived safety (PS) has a positive influence on attitude towards use (ATU) of the transport management systems.
H5: Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on attitude towards use (ATU) of the transport management systems.

H6: Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on attitude towards use (ATU) of the transport management systems.
H7: Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on behavioural intention (BI) on the transport management systems.
H8: Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) on the transport management systems.
H9: Taxi entrepreneurs' perceived pricing (PP) has a positive influence on behavioural intention (BI) on the transport management systems.
H10: Taxi entrepreneurs' perceived safety (PS) has a positive influence on behavioural intention (BI) on the transport management systems.
H11: Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on behavioural intention (BI) on the transport management systems.
H12: Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on behavioural intention (BI) on the transport management systems.
H13: Taxi entrepreneurs' attitude towards use (ATU) has a positive influence on behavioural intention (BI) on the transport management systems.
H14: Taxi entrepreneurs' behavioural intention (BI) has a positive influence on actual system use (ASU) of the transport management systems.

1.4 RESEARCH METHODOLOGY

This research was deductive. The research adopted the technology acceptance model (TAM) (Davis, 1985) to investigate taxi entrepreneurs' attitude towards their acceptance of transport management systems in South Africa. The theory was quantitatively tested with data collected through a survey. The selected constructs (Taxi Entrepreneurs' Perceived Usefulness (PU), Taxi Entrepreneurs' Perceived Ease of Use (PEOU), Taxi Entrepreneurs' Attitude Towards Use (ATU), Taxi Entrepreneurs' Behavioural Intention (BI), Taxi Entrepreneurs' Actual System Use (ASU), Taxi Entrepreneurs' Perceived Customer's Trust (PCT), Taxi Entrepreneurs' Perceived Safety (PS), and Taxi Entrepreneurs' Perceived Convenience of Accessibility (PCA) of TAM informed the design of the data collection tool, which was a questionnaire.

The survey was carried out in Sandton in Gauteng Province, South Africa, a convenient location that was selected for the researcher's accessibility to it and to cut research costs. In all, 300 questionnaires

were administered to taxi entrepreneurs who had been selected to participate in the research, using a snowball sampling technique. Two hundred and fifty-three of the questionnaires that had been returned were usable. Therefore, there were no gatekeepers for this research as taxi entrepreneurs could be approached at random.

For the research to adhere to the ethical guidelines, ethical clearance was granted by the University of South Africa and participation in the study was voluntary. All participants completed the consent and confidentiality forms and their personal details were not recorded during data collection.

The data collected from the survey was captured on *Microsoft Excel* and "cleaned" in preparation for analysis. Data captured on *Microsoft Excel* was then uploaded to IBM *SPSS* software for analysis, focusing on descriptive and inferential statistics. The hypotheses proposed in this study were tested using correlation analysis.

1.5 LIMITATIONS OF THIS STUDY

The first drawback of the study was that the data was only collected from taxi entrepreneurs who operate in Sandton in Gauteng Province, South Africa, hence the results of the survey cannot be generalised. However, the results are a true reflection of the taxi industry and should be understood within the South African context. Additional research may be required in other South African provinces to gather more insight across the country. Moreover, since the study was conducted in South Africa, it does not completely represent all developing countries, which is the second weakness of the study.

1.6 SIGNIFICANCE OF THIS STUDY

In this study, a proposed conceptual framework that extended the TAM model was developed. The new constructs (cost, convenience and safety) were added to the TAM model which helped in understanding the factors that are likely to influence the adoption of transport management systems within the South Africa context. This is a significant contribution to the body of knowledge. Practically, this study uncovered important factors that can positively influence the adoption of a transport management system by taxi entrepreneurs in South Africa. The three factors that positively influence the adoption of transport management systems were found to be Attitude Towards Use (ATU), Behavioural Intention (BI) and Perceived Ease of Use (PEU). The results can inform policy and strategies for modernising the South African transport system. This contributes towards resolving taxi "wars" that break out between

taxi operators who use technologies such as Uber and traditional taxi operators who do not use any technology in their businesses.

1.7 CHAPTER OUTLINE

This section gives a general summary of the dissertation's structure and organisation.

- The first chapter provides an overview of the taxi industry in South Africa. It discusses the research aim and objectives and establishes the problem statement. The research methodology is also outlined in this chapter.
- Chapter 2 presents the literature analysis. It elaborates on the types of transport used in the South African taxi industry and the various technologies associated with these types of transport. It also discusses the theoretical foundation of the research, elaborating on the various technology adoption models that exist. It also discusses the conceptual framework selected for the research. Furthermore, this chapter illustrates the conceptual model and how the hypotheses were formulated.
- Chapter 3 describes the research methodology that was followed. It deliberates the research approach that was followed together with the research strategy that was employed. The chapter also discusses the sampling and data collection methods that were used in the research.
- The data analysis and study findings are presented in Chapter 4. The chapter also describes how the study was conducted as well as explain the validity and reliability issues that existed in conducting the research.
- Chapter 5 discusses the research results, the contribution of the study as well as the recommendations. It also elaborates on the research limitations that were experienced, together with future research that can be carried out.

1.8 CONCLUSION

The main objective of this chapter was to provide background information on the research as well as an overview of the findings. The research problem was stated as well as the aim and objectives of the research. In addition, this chapter also outlined the hypotheses. The following chapter will provide a detailed review of the literature gathered to carry out this research.

CHAPTER 2 – LITERATURE REVIEW

2.1 INTRODUCTION

Brereton, Kitchenham, Budgen, Turner and Khalil (2007) suggested a methodology for doing the literature review. Planning the review, executing the review and reporting the results are the three primary steps of the approach (Alzahrani, Al-Karaghouli & Weerakkody, 2017).

2.1.1 Planning the review

The following was the study's key research question:
What are the underlying factors that will influence taxi entrepreneurs' intentions to adopt transport management systems in the South African taxi industry?

A search for literature published in English from 2002–2021 was conducted to be able to develop the review's protocol. Keywords were selected based on the adoption of transport management systems in the South African taxi industry, which included: "shared economy", "TAM", "technology adoption", "Technology Acceptance Model", "perceived usefulness", "meter taxi", "*tuk tuk*", "taxi industry", "transport technology", "Taxify", "transport in South Africa", "Uber", "kombi taxi" and "perceived ease of use". Published studies were identified through *Google Scholar* to access databases such as the UNISA library, *African Journals OnLine* (AJOL), *IEEE Xplore*, *Science Direct*, just to mention a few. This resulted in the discovery of 130 articles during the first search.

2.1.2 Conducting the review

The selection process for relevant studies included a systematic review of the abstracts of each article. In addition, the researcher went over each article to ensure that it fit specific criteria: published after 2002, in English and includes suitable discussions on technology adoption, transport technology and transport modes in the taxi industry. Articles that had limited discussion on technology adoption were excluded. Table 2.2-1 displays a list of 18 articles used for this research that were based on a technology adoption model to investigate transport technology. Table 2.2-2 displays a list of 17 articles that were based on a technology adoption model to investigate other small businesses which did not include transport and were also used for this research. Each article from these two tables was read prudently to identify technology adoption and the types of technology adoption models employed in the articles were identified.

2.1.3 Data reporting

To report the data gathered from the articles, two six-column tables were designed to explore the adoption of transport management systems in the South African taxi industry. This was done by analysing how other researchers conducted their studies regarding technology adoption, the theoretical frameworks that they employed in their studies, their findings in relation to the theoretical frameworks that they employed in their studies and the actual research aim. In terms of data reporting on transport technology research articles, the following headings were used for the columns as displayed in Table 2.1-1 and Table 2.1-2: Researcher, Research Aim, Research Approach, Research Location, Theoretical Framework and Research Findings. The tables were split with one table focusing on transport and the other on other small businesses.

Table 2.1-1: Transport Technology Research Articles

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
1	Liu (2015)	To look into the following: 1) How would a positive attitude towards a taxi-hailing app influence a user's behavioural intention to use a taxi-hailing app? 2) How would perceived ease of use affect the perceived usefulness of a taxi-hailing app? 3) How would perceived usefulness affect users' behavioural intention to use a taxi-hailing app? 4) How might perceived usefulness influence consumers' attitudes towards taxi-hailing apps? 5) How would perceived ease of use affect users' attitudes toward taxi-hailing apps?	Survey with 211 respondents	Göteborg, Sweden	Technology Acceptance Model (TAM)	The results of the study exhibited that TAM variables had a great influence on each other, where users' attitudes had minimal effect on behavioural intention. The study also showed that to be able to expand on users' acceptance levels, product managers and developers should have the ability to detect a vast number of users' purposes, intentions and preferences concerning a taxi-hailing system. In addition, they could incorporate these elements into the development approach.
2	Tanus (2017)	To examine aspects affecting customers' intention to use Go-Jek, a form of internet-based transport.	Survey with 150 respondents	Surabaya, Indonesia	Technology Acceptance Model (TAM)	The results deduced that TAM variables, perceived ease of use, attitude towards use, perceived usefulness and intention to use, could predict if users would adapt to Go-Jek. The results supported TAM and verified its robustness in being able to envisage customers' intention to use Go-Jek, a transport management system.
3	Keong (2016)	To investigate Mobile Taxi Ordering (MTO) adoption among passengers.	Survey with 368 respondents	Subang Jaya, Malaysia	Technology Acceptance Model (TAM)	The study disclosed that there was a meaningfully favourable connection between passengers' attitudes towards mobile taxi ordering (MTO) apps adoption and their beliefs about their perceived ease of use. The findings also showed that there was a meaningfully favourable connection between passengers' attitudes towards MTO apps technology adoption and their beliefs about their perceived usefulness. The results of the study further showed that TAM variables play a valuable part in the

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
						adoption intention of MTO apps.
4	Mohamad et al. (2016)	To discuss the properties that have an impact on customers' intention to select the Uber app instead of the traditional taxi in tourism destinations.	Existing literature	Pulau Pinang, Malaysia	Technology Acceptance Model (TAM)	The study's finding revealed that perceived usefulness influenced perceived ease of use of the Uber facility. The results also illustrated that the intention of customers to use the Uber facility contrasted with the traditional taxi service in tourism destinations that was influenced by perceived safety and perceived price.
5	Tshambula (2017)	To address how technological innovations can be diffused and adopted by a taxi industry that is in a second economy characterised by little education, minimal skills and high poverty.	Survey with 182 respondents	Johannesburg, South Africa	Innovation Diffusion Theory (IDT)	The study discovered that relative advantage, education, trialability and technology experience all have an impact on the likelihood of adoption. The findings revealed that different outcomes about innovative features may be found depending on the type of social system and different adopter groups can be identified in different social systems. Knowledge and education are required to modernise and formalise the taxi sector, which affects not only taxi owners but also taxi drivers and other social system members. The findings revealed that the majority of taxi drivers support the automated fare collection system.
6	Chen et al. (2017)	To assist in the knowledge of Transport Network Companies (TNC) user acceptance in China. Furthermore, the goal of this research was to look into the cause-and-effect linkages between unified theory of acceptance and use of technology (UTAUT2) parameters and TNC user acceptance in China.	Survey of 361 respondents	China	An extension of unified theory of acceptance and use of technology (UTAUT2)	The study's findings revealed information about the user acceptability of mobile digital technology. The findings provided guidance to the TNC industry's emerging market by offering management advice on how TNCs might boost user acceptance and market share.
7	Haba and Dastane	To find out what factors influence Malaysian customers' willingness to use taxi-hailing smartphone apps.	Survey with 202 respondents	Malaysia	An extension of unified theory of	The data revealed that behavioural intention, social influence, and performance expectancy all have a favourable impact on

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
	(2018)				acceptance and use of technology (UTAUT2)	user behaviour whereas behavioural intention and effort expectancy have no impact.
8	Peng et al. (2014)	To raise public awareness of the Call Taxi App's adoption mechanism (CTA).	Survey with 200 respondents	China	Technology Acceptance Model (TAM)	Compatibility, perceived usefulness, and perceived ease of use have an indirect positive effect on people's attitudes toward using CTA; perceived price level has a negative effect on both attitudes toward using and behavioural intention, perceived risk has a negative effect on behavioural intention and subjective norm has a positive effect on behavioural intention, according to the findings.
9	Hazen et al. (2015)	To look into the factors that influence people's willingness to use public bicycle sharing systems.	Survey with 421 respondents	Beijing, China	Technology Acceptance Model (TAM)	By providing a theoretical lens through which to consider system adoption and providing information to practitioners on what factors could contribute the most to adoption, the research findings added value to theory and practice in the growing literature on sustainable urban transportation and public bicycle systems.
10	Zmud and Sener (2017)	To collect empirical evidence on adoption and consumer acceptance, the factors related to intention to use, and how that might affect vehicle ownership and mode choice decisions.	Survey with 556 respondents, face-to-face interviews with 205 participants and follow-up interviews with 44 participants	Austin, Texas, USA	Car Technology Acceptance Model (CTAM)	The findings provided some preliminary information on who is likely to employ self-driving vehicles and why. Because autonomous vehicles are currently unavailable, it is impossible to say if the intention to use them correlates with actual use. The findings suggested that the correlation throughout several studies in varying fields displayed that the CTAM model, which was employed in the research, was qualified to predict actual use and provided credibility to the research approach and findings.

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
11	Zhang et al. (2016)	To explore the elements that influence customers' trust when using taxi-hailing applications in China as well as the characteristics of those clients.	Survey with 274 respondents	China	Technology Acceptance Model (TAM)	The results included the following key findings: social influence, perceived ease of use and perceived usefulness had positive effects on customers' trust and customers' trust had a positive influence on customers' continued use behaviour; customers' trust acted as a partial mediator between continued use and perceived usefulness, perceived ease of use and continued use, and social influence and continued use; moderating effects displayed that a perceived privacy risk negatively moderated the relationship between trust and perceived usefulness, trust and perceived ease of use, and trust and continued use behaviour; the influence of perceived privacy risk on customers' trust and continued use behaviour was significantly higher for men and older customers. In addition, the effects of social influence on customers' continued use behaviour were significantly greater for older customers and high-income customers.
12	Keszey (2020)	The goal of this study was to improve autonomous vehicle (AV) adoption research and practice by being the first to comprehensively examine empirical studies on behavioural intention to use AVs, which is a critical component of the adoption process.	Survey with 992 respondents	Hungary	Technology Acceptance Model (TAM) and unified theory of acceptance and use of technology (UTAUT)	The findings revealed that drivers' behavioural intentions to use autonomous vehicles differ significantly amongst users with low and high personal information technology innovativeness. Hedonic and utilitarian motives influenced the behavioural intentions of innovative users whereas hedonic motivation drove laggards and utilitarian motivation had little effect. Specific technological uncertainties (i.e., data privacy worries) influenced innovative users' behavioural intention to use AVs but those lagging were only affected by general, not specific concerns (i.e., overall technological concerns). The research also demonstrated how individual behavioural intention to use AVs interact with expected societal effects (e.g., equal opportunity for mobility).

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
13	Wang et al. (2019)	To investigate the factors that impact nonusers' desire to use ride-sharing services from the viewpoints of perceived risk and perceived value, both of which are posited as formative second-order constructs defined by their first-order value and risk components, respectively.	Survey with 378 respondents	China	Perceived Value and Perceived Risk were conceptualised	The empirical findings revealed that customer preparedness to participate in ridesharing was favourably related to perceived value whereas perceived danger was adversely related to consumers' intention to rideshare. Contrary to predictions, perceived risk aided the influence of perceived value on consumers' willingness to use ride-sharing services.
14	Yang et al. (2021)	To explore the issues that influence drivers' usage intention of mobile navigation applications.	Survey with 384 respondents	China	Technology Acceptance Model (TAM)	The findings implied that applicable developers should continually improve the improper and unsuitable use of navigation information and that they should attach significance to the amount and intelligibility of navigation information. Furthermore, the quick form of navigation information should please the requests and hopes of drivers with varying senses of direction. The study improved people's understanding of drivers' acceptance of mobile navigation applications and offered some significant practical implications to enhance mobile navigation services.
15	Salim et al. (2021)	The purpose of this study is to look at the actual beliefs and perceptions of Malaysians, particularly those who use shared mobility services. Its goal was to look into the elements that influence passengers' willingness to use e-hailing services.	Survey with 271 respondents	Malaysia	No model was employed. The independent variables of the research were the safety of using e-hailing applications, social influence, trialability, ease of use and relative advantage.	According to the findings, the linear regression revealed that safety, social influence, trialability, ease of use, and relative advantage all had a positive significant link with the passenger-impacting factor. With a Cronbach's alpha of 0.874, the simplicity of use was shown to be the most significant factor influencing passengers' decisions to utilise e-hailing services in Malaysia. This study provided important information and advantages, mostly to e-hailing services companies, to help them become more competitive in the business by better understanding the needs and concerns of passengers who use e-hailing services.

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
16	Huynh et al. (2020)	To investigate the major aspects influencing Uber/Grab customers' consumer behaviour.	Survey with 286 respondents	Vietnam	Technology Acceptance Model (TAM) and theory of planned behaviour (TPB)	The results displayed that the intention of the customer towards selecting the fitting shared mobility business model depended on eight factors. They are community and family influences, gender, age, cost of living, distance travelled, Uber/Grab utility, Uber/Grab popularity and the attraction of other ways of transportation.
17	Ruangkanjanases and Techapoolphol (2018)	The goal of this study was to investigate the factors that influence e-hailing app adoption in Thailand. Additionally, the purpose of this comparative study was to find out what factors influence male and female consumers' use of e-hailing applications.	Survey with 200 male respondents and 200 female respondents	Thailand	Technology Acceptance Model (TAM) and diffusion of innovations theory (DOI)	Ease of use and relative advantages increased the uptake of e-hailing services in both genders, according to the research. Surprisingly, male consumers' use of e-hailing apps was influenced only by physical security and social influence.
18	Zhang et al. (2017)	To investigate the elements that influence users' intention to suggest taxi-hailing applications in a Chinese scenario.	Survey with 261 respondents	China	Technology Acceptance Model (TAM)	The following key findings were revealed: perceived ease of use and perceived usefulness both had a positive effect on users' perceived benefits; perceived benefits had a positive influence on users' trust whereas perceived privacy risk had a negative influence on users' trust; users' trust had a positive influence on users' recommendation intention; perceived benefits acted as a partial moderator between perceived ease of use / users' trust and perceived usefulness / users' trust, and users' trust acted as a partial moderator between users' recommendation intention and perceived benefits.

Table 2.1-2: Technology Research Articles Excluding Transport Technology

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
1	Averweg (2008)	During the development and implementation stages of Executive Information Systems (EIS) in firms in South Africa (a developing country), the constructs of Actual System Use (ASU), Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) were addressed.	Survey on 31 Organisations	KwaZulu-Natal, South Africa	Technology Acceptance Model (TAM)	TAM's fundamental ideas, which emphasise the relevance of PU (rather than PEOU) as the most essential factor in acceptance were challenged by the findings. Perceived ease of use (rather than PU) was found to be a more powerful booster of IT acceptance. The data also demonstrated that perceived ease of use had a bigger influence than previously anticipated, influencing both perceived usefulness and usage.
2	Brown (2002)	To learn more about the perceived ease of using web-based technologies in a learning setting rather than a working setting and in a developing rather than a developed country.	Survey of 78 respondents	Cape Town, South Africa	Technology Acceptance Model (TAM)	Individual traits of computer anxiety and self-efficacy as well as website features, simplicity of understanding and finding were found to have a substantial impact on perceived ease of use. Furthermore, the data demonstrated that in poor countries, perceived usefulness may not predict adoption, underlining the importance of perceived ease of use as the key predictor of both perceived usefulness and usage.
3	Cloete et al. (2002)	To find out how common e-commerce is among small manufacturing businesses in the Western Cape region of South Africa.	Survey on 34 Businesses	Western Cape, South Africa	Technology Acceptance Model (TAM)	When the global use of the internet for electronic commerce by SMEs is compared to the situation in South Africa, the findings show that the available technologies are not being used to the extent required for long-term survival in a fast-changing environment.
4	Hart and Laher (2015)	Access to educational technology (ET), perceived competency, perceived cultural relevance and perceived usefulness are all elements that were hypothesised to influence teachers' views on educational technology.	Survey with 117 respondents	Johannesburg, South Africa	Attitude Towards Computer Scale (ATCS)	The results showed that the teachers' sentiments were mostly favourable. The findings also suggested that perceived utility, followed by perceived cultural relevance was the strongest predictor of teachers' attitudes. As a result, it was clear that when integrating ET into schools, instructors' judgments of ET's utility must be considered in order for integration to be successful. Furthermore, simply having access to ET and being able to use it is insufficient for effective ET integration in schools.

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
5	Yaghoubi and Bahmani (2010)	The goal of this study was to determine what factors influenced online banking development in Iran's Isfahan province.	Survey with 349 respondents	Isfahan province, Iran	Technology acceptance model (TAM) and theory of planned behaviour (TPB)	The results validated the robustness of the integrated TAM and TPB models in foretelling customers' intention to use online banking. The findings revealed that perceived utility and behavioural control had a beneficial impact on the intention to utilise internet banking.
6	Wu, Huang et al. (2016)	To find out how positive emotion and perceived utility could help reduce the negative impact of perceived risk on behaviour intention and predict consumer uptake of mobile payment services.	Survey with 430 respondents	China	Technology acceptance model (TAM)	Positive emotion and perceived usefulness both had a positive interaction with perceived risk on acceptance intention, implying that these two factors could mitigate perceived risk's detrimental impact on acceptance intention. As a result, this study could aid managers in developing strategies to increase the rate of adoption of mobile payments and other cutting-edge technology.
7	Wu, Liu et al. (2016)	To investigate: (1) the relative effects of affective (positive emotion) and cognitive (perceived risk and perceived utility) components on acceptance intention, (2) the function of positive emotion in boosting perceived usefulness and decreasing perceived risk and (3) the moderating effects of diffusion stages (introduction vs. growth) on the relationships among these three elements and users' intentions to adopt WeChat Payment, an innovative mobile payment that has several usage scenarios in China.	Two stages: Survey with 187 respondents in stage one and Survey with 297 respondents in stage two.	China	Technology acceptance model (TAM)	The outcomes of the study demonstrated that studying the moderating impact of diffusion stages on mobile payment acceptance provided a more thorough understanding of how to improve the acceptance rate of a new or developing mobile payment service.
8	Venter et al. (2012)	To investigate the reasons for fourth-year students studying business at a South African open and remote learning university through an online learning management system (LMS).	Survey with 213 respondents	South Africa	An extension of the technology acceptance model (TAM2)	The findings revealed that the key features of perceived ease of use and perceived usefulness as well as study relevance (job relevance in the TAM2 model) and enabling conditions as extensions were confirmed in the TAM and TAM2 models. However, the research did not support other aspects of the TAM2 model and extensions and the correlations between these dimensions, LMS use and behavioural intention were significant but not very robust. Despite the original structure's ostensible

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
						durability and the TAM core elements' dimensionality, its usefulness as a model to explain usage in this situation, particularly in a setting where acceptance and usage patterns had been established over lengthy periods, was limited. However, the data suggested several recommendations for improving the LMS's perceived usefulness.
9	Kamal et al. (2020)	To learn more about the elements that influence rural Pakistanis' acceptance of telemedicine services.	A face-to-face survey with 275 participants and 226 respondents	Pakistan	Technology acceptance model (TAM)	The findings suggested that resistance to technology, perceived danger, facilitating conditions, trust, perceived ease of usefulness, social influence, technological anxiety, and perceived ease of use all influence telemedicine service utilisation intention. The usefulness of TAM with the addition of extra factors to model the uptake of telemedicine services in underdeveloped countries was validated in this study. The study provided crucial information for policymakers and healthcare professionals to better understand the enablers of and impediments to widespread telemedicine adoption. Resistance to change, favourable conditions, trust and perceived risk are all characteristics that could aid in the design and provision of telemedicine services in developing nations, according to the study.
10	Rafique et al. (2020)	To use a proposed model stemmed from the technology acceptance model to experimentally study the adoption of Mobile Learning Applications (TAM).	Survey with 340 respondents	Pakistan	Unified theory of acceptance and use of technology (UTAUT)	The findings revealed that perceived ease of use and perceived usefulness were direct noteworthy predictors of the intention to use Mobile Library Applications (MLA), whereas system quality and habit were influencing factors. The findings benefited in the design and development of MLA by providing a direction for successful decision-making.
11	Zheng and Li (2020)	To learn more about students' intentions for using tablet computers in K-12 settings.	Tablet-based learning environment	China	An extended technology acceptance	The findings suggested that the extended TAM provided a reasonable explanation for K12 pupils' acceptance of tablet computers. The findings of this study not only illuminated the

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
			with 347 participants		model (TAM), unified theory of acceptance and use of technology (UTAUT) and theory of reasoned action (TRA)	successful implementation of educational technology projects but also laid the groundwork for future research.
12	Widanengsih (2021)	To look into the impact of perceived ease of use and utility on interest and attitude towards mobile banking.	Survey with 100 respondents	Jakarta, Indonesia	Technology Acceptance Model (TAM)	The findings revealed that perceived usefulness had little bearing on attitude. When it comes to mobile banking, perceived utility has little bearing on interest. The perceived ease of usage has a big impact on views. Interest in utilising mobile banking is not influenced by perceived ease of use, rather it is influenced by attitude.
13	Chaouali and El Hedhli (2019)	To develop and test a model for assessing how consumers' attitudes toward and trust in mature self-service technologies (SSTs) as well as social circumstances influence their intent to use a newly introduced SST such as mobile banking.	Survey with 1245 respondents	France	Theory of reasoned action (TRA)	Mimetic, normative and coercive pressures as well as attitude toward and trust in mobile banking were all significant predictors of mobile banking adoption intentions, according to the findings. Additionally, opinions on ATMs and internet banking were revealed to be significant predictors of attitude toward mobile banking. The studies also confirmed that ATM and internet banking trust had an impact on mobile banking trust. Variations in the relative impacts of attitude and trust, which had been predicted, were also confirmed. Attitude towards internet banking had a greater impact on attitude towards mobile banking than attitude towards ATMs. Furthermore, trust in online banking had a considerably greater impact on mobile banking than trust in ATMs.

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
14	Pramana (2018)	To understand more about the elements that influence university students' plans to incorporate mobile learning into their classes.	Survey with 696 respondents	Indonesia	Unified theory of acceptance and use of technology (UTAUT) and technology acceptance model (TAM)	Perceived usefulness and perceived enjoyment were the two most important factors in the adoption of mobile learning. Gender had an influence on the direct impact of learning autonomy on behavioural intention. In the areas of reported ease of use, perceived usefulness, social impact, perceived mobility, enabling situation, perceived enjoyment, and learning autonomy, new research discovered notable correlations and causal impacts.
15	Moorthy et al. (2017)	In order to better understand the reasons for low mobile commerce adoption among Malaysia's generation X, researchers looked at the resistance factors.	Survey with 227 respondents	Malaysia	Innovation resistance theory (IRT)	Apart from the pricing barrier, all other roadblocks had a substantial impact on mobile commerce adoption, according to this study. These findings could aid local businesses in developing ways to overcome opposition and gaining a better understanding of how to boost Malaysia's mobile commerce adoption rate. In this study, the innovation resistance theory model for the adoption intention of mobile commerce incorporated the perceived cost barrier construct, a negative valence aspect.
16	Jang et al. (2021)	The goal of this study was to see how prepared teachers were to incorporate AR (Augmented Reality) and VR (Virtual Reality) technologies into their teaching and learning activities. Teachers' intentions to use technology are influenced by motivational support (MS), social norms (SN) and technical pedagogical and content knowledge (TPACK), according to the study.	Survey with 292 respondents	Korea	Extended technology acceptance model (eTAM)	Perceived ease of use (PEU) and perceived usefulness (PU) were found to be influenced by TPACK but PU was influenced by SN. Furthermore, motivational support (MS) was discovered to have an effect on PEU, which influences attitude towards technology usage (ATU) and then behavioural intention (BI). The findings indicated that providing technology professional development (PD) and support for teachers is critical in encouraging the usage of AR and VR in the classroom.
17	Mallenius et al. (2007)	To recognise the elements that influence the senior population's adoption and use of mobile devices and services.	Interview with 16 respondents	Finland	Unified theory of acceptance and use of	The study's findings revealed that elderly individuals were lured to mobile phones and services but that these services had to provide genuine value to them. This ideal manifested itself in a

	Researcher	Research Aim	Research Approach	Research Location	Theoretical Framework	Research Findings
					technology (UTAUT)	more self-sufficient, meaningful, active and social life.

2.2 LITERATURE REVIEW FINDINGS

This subsection discusses the results of the research studies that were conducted in the research articles displayed in Table 2.1-1 and Table 2.1-2 above.

2.2.1 Research approach

The Research Approach columns in Table 2.1-1 and Table 2.1-2 indicate the research approach taken to conduct the research for each study. Surveys were used in most of the studies (91.4%), and 5.7% of the studies used interviews. Out of all the studies that were reviewed, only 2.9% had utilised existing literature. Wu, Liu and Huang (2016) conducted their survey in two stages; the second survey was conducted a year after the first one as the number of users related to their investigation had increased. The researchers Zmud and Sener (2017) used both surveys and interviews, where they also conducted follow-up interviews with a portion of their previous interviewees. Zheng and Li (2020) used a tablet-based learning environment.

2.2.2 Research theories

Most of the articles (85.7%) investigated studies based on the TAM variables which showed the robustness of TAM. From these articles, (85.7%) used TAM variables, 31.4% of the articles employed extensions of TAM, 2.9% used an extension of the technology acceptance model (TAM2), 2.9% used car acceptance technology model (CTAM), 14.3% used the unified theory of acceptance and use of technology (UTAUT), 5.7% used an extension of the unified theory of acceptance and use of technology (UTAUT2), 2.9% used extended technology acceptance model (eTAM) and the other 2.9% used attitude towards computer scale (ATCS). In addition, 5.7% of the articles employed both TAM and the theory of planned behaviour (TPB), 5.7% employed both TAM and UTAUT, 2.9% employed both TAM and diffusion of innovations theory (DOI), and 2.9% of the articles employed TAM, UTAUT and theory of reasoned action (TRA). Of the other 14.3% articles that did not employ TAM, 2.9% of the articles employed innovation diffusion theory (IDT), 2.9% employed innovation resistance theory (IRT), 2.9% employed TRA, 2.9% of the articles conceptualised Perceived Value and Perceived Risk, and 2.9% of the articles did not employ a technology model but used independent variables. Table 2.2-1 displays the number of articles per theoretical framework.

Table 2.2-1: Theoretical Frameworks

Theoretical Framework	**Number of**

	Articles
Technology acceptance model (TAM)	21
An extension of the technology acceptance model (TAM2)	1
Car technology acceptance model (CTAM)	1
Unified theory of acceptance and use of technology (UTAUT)	5
An extension of the unified theory of acceptance and use of technology (UTAUT2)	2
Theory of planned behaviour (TPB)	2
Theory of reasoned action (TRA)	2
Innovation diffusion theory (IDT)	1
Extended technology acceptance model (eTAM)	1
Diffusion of innovations theory (DOI)	1
Innovation resistance theory (IRT)	1
Attitude towards computer scale (ATCS)	1

2.2.3 Research origins

The majority of the articles (28.6%) focused on studies conducted in China. Of these, 20% employed TAM, 2.9% used an extension of unified theory of acceptance and use of technology (UTAUT2), 2.9% conceptualised Perceived Value and Perceived Risk, and 2.9% used a combination of an extended technology acceptance model (TAM), unified theory of acceptance and use of technology (UTAUT) and theory of reasoned action (TRA); 17.1% of papers focused on South African-based studies.

Furthermore, among the studies conducted in South Africa, 8.6% of the studies employed TAM, 2.9% used an extension of the technology acceptance model (TAM2), 2.9% employed innovation diffusion theory (IDT) and 2.9% used attitude towards computer scale (ATCS); 14.3% of the articles investigated studies based in Malaysia. Of these, 5.7% of the studies employed TAM, 2.9% used an extension of unified theory of acceptance and use of technology (UTAUT2), 2.9% employed innovation resistance theory (IRT) and 2.9% did not employ a technology model but used independent variables; 8.6% of the articles investigated studies based in Indonesia. Of these, 5.7% of the studies employed TAM, 2.9% used a combination of unified theory of acceptance and use of technology (UTAUT) and TAM; 5.7% of the articles investigated studies based in Pakistan, where 2.9% employed TAM and 2.9% used unified theory of acceptance and use of

technology (UTAUT).

In addition, 2.9% of the articles of the investigated studies in Sweden employed TAM. In France, 2.9% of the articles employed the theory of reasoned action (TRA) in their studies. In studies investigated in the USA, 2.9% of the articles used car acceptance technology model (CTAM). In Hungary, 2.9% of the articles used unified theory of acceptance and use of technology (UTAUT) and 2.9% of the articles also used unified theory of acceptance and use of technology (UTAUT) in Finland. A combination of TAM and theory of planned behaviour (TPB) was used in 2.9% of the articles in Iran. In Thailand, used a combination of diffusion of innovations theory (DOI) and TAM. A combination of TAM and theory of planned behaviour (TPB) was used in 2.9% of the articles in Vietnam while 2.9% used the extended technology acceptance model (eTAM) in Korea.

2.3 LITERATURE ANALYSIS DISCUSSION

This section discusses the transport management systems in South Africa, theories of technology adoption, technology adoption in small businesses and transport management systems adoption.

2.3.1 South African transport system

Minibus/Kombi taxis

The minibus/kombi taxi industry has grown at an alarming rate in Africa (Saddier, McLachlan & Dass, 2019) and has dominated the South African transport system (Henama & Sifolo, 2017). It transports 65% of daily commuters in South Africa (Schalekamp & Klopp, 2018) of which the majority are less privileged people who reside in townships (Agbiboa, 2020). Ingle (2009) observed that the South African taxi industry is managed and regulated by associations. Unfortunately, there is a lot of violence in this industry due to inter-association competition (Agbiboa, 2020). Rival taxi associations may become violent towards each other due to disagreements on what taxi routes to take (Agbiboa, 2020; Ingle, 2009). Decisions on who should operate on which route are made by these various taxi associations that exist in all provinces of South Africa (Schlüter, Sörenson & Coetzee, 2020).

Despite the violence in the taxi industry, commuters continue to use kombi taxis because it is a fast way to get to a desired destination (Rayle, Shaheen, Chan, Dai & Cervero, 2014). However, waiting times for them to arrive in order to board one or waiting times for them to depart a taxi

rank may be long (Ibrahim & Alhassan, 2020; Wan, Mohamad, Shahib, Azmi, Kamal & Abdulla, 2016). In South Africa, there is currently no proof that kombi taxis employ technology for transportation.

Uber

Uber is an online car- and ride-sharing platform that allows people to access taxi- and ride-sharing services (Geissinger et al., 2020; Martin, 2016). It was initiated by Garret Camp and Travis Kalanick in 2009 in San Francisco, USA (Wan et al., 2016). In 2014, Uber had 160000 drivers in over 250 cities across 50 countries (Wallsten, 2015). Uber is a successful ride-sharing company and it now operates in over 58 countries with an approximate market value of over 41 billion USD (Taschler, 2015).

Uber operates on a mobile phone (Zhao & Su, 2019) using shared economy technology that is app-based and works with an internet connection (Martin, 2016). According to Henama and Sifolo (2017), to operate on the Uber platform, drivers have to subscribe to the platform and use their own cars to operate a taxi business. The Uber platform allows taxi booking to be done using a smartphone from any location (Juma, 2016).

Researchers Labson et al. (2016) highlighted that Uber operates in eight African countries: Ghana, Egypt, Morocco, Kenya, South Africa, Nigeria, Tanzania and Uganda. In South Africa, it has operated since September 2013 with over 4000 drivers of which 2500 operate in Gauteng (Henama & Sifolo, 2017). Since then, according to Labson et al. (2016) and Young et al. (2020), it has established a strong brand among its customers. There are now dedicated Uber drop-off zones at various shopping malls in South Africa (Henama & Sifolo, 2017). Wesbank, a South African vehicle finance provider, has launched a lease option for Uber as it saw potential profit from it, so there will be an increase in the supply of Uber cars (Henama & Sifolo, 2017). Like South Africa, Uber has been adopted by the transport industry and more so in other developing countries, thereby allowing people to access taxi- and ride-sharing services (Martin, 2016; Okeke-Uzodike & Olaniyan, 2018).

According to Scheer (2015), the advantages of Uber are that it is flexible because it does not charge for downloading its application (app) and passengers can pay using cash or credit card. Juma (2016) adds that Uber charges by distance which is cheaper and more cost-effective than other ordinary traditional taxis; Labson et al. (2016) also indicate that, unlike in other countries,

Uber does not have much competition in South Africa. In Kenya though, Little Cab is promising, effective competition for Uber and most people do not use credit cards, unlike in South Africa (Labson et al., 2016). The primary method of payment for Little Cab is M-Pesa, a popular mobile money transfer service commonly used in Kenya (Labson et al., 2016). The other advantage of Uber is that it is useful in areas that do not have transport (Palmér, 2017). On the other hand, Salnikov et al. (2015) indicate that Uber's benefits have disrupted the traditional transportation industry in South Africa. According to Palmér (2017), this has led to battles between Uber and the traditional taxis, making it unsafe for Uber to operate. Henama and Sifolo (2017) point out that in South Africa, metered taxi drivers have been fighting with Uber drivers to get them to comply with their rules and regulations. Unfortunately, Uber drivers are victims of crime all over the world; they are attacked and hijacked and their cars are torched (Henama & Sifolo, 2017). Nevertheless, Salnikov et al. (2015) found that the growth of Uber, as the worldwide fallback taxi operator, has fascinated the general public. Uber has still expanded even without specific regulation and the related regulatory challenges that have risen (Labson et al., 2016; Oppegaard et al., 2019).

Meter taxis

Meter taxis are shared taxis and they complement the absence of minibus/kombi services (Kumar & Barrett, 2008). The metered taxi sector which makes up for 10% of the taxi industry, operates through phone call technology, by booking from specific ranks or by driving through streets looking for passengers (Lowitt, 2006). These taxis are sedan cars (Kane, 2006); some of the taxi drivers own the cars and some rent cars from their owners (Grosskopf & Pearce, 2020; Kumar & Barrett, 2008).

Juma (2016) indicated that the advantage of metered taxis is that they complement public transport since there are places like airports where commuters cannot access public transport. In addition, they also provide an acceptable level of comfort (Kumar & Barrett, 2008; Task Force, 2020). The metered taxi charges the customer based on a fixed rate that the fare regulators set according to the distance of the ride (Palmér, 2017). However, the disadvantage is that they tend to overcharge customers (Juma, 2016) by taking long routes instead of shorter ones (Wallsten, 2015). This is because they are not making as much profit as they used to due to competition from Uber (Henama & Sifolo, 2017). On the other hand, the existence of Uber has led to the improvement of the quality of metered taxis and the quality of the service that they provide, in an attempt to attract/retain their customers (Wallsten, 2015). In 2016, a metered taxi company called

Zebra Cabs implemented electronic taxi-hailing technology to introduce a mobile app for their services because of the declining business in the meter taxi industry due to Uber (Labson et al., 2016). Unfortunately, they only made little progress (Labson et al., 2016).

Taxify/Bolt

Taxify is also referred to as Bolt (Ilsøe & Jesnes, 2020). It is a ridesharing platform (Hagtvedt, 2016) that makes use of shared economy technology, like Uber (Riasanow, Galic & Böhm, 2017). Taxify was founded in 2013 in Estonia (Čulík, Kalašová, Otahálová, 2020) and now operates in 17 countries and 22 cities (Virkus, 2017). It entered the South African market in 2015 (Labson et al., 2016) and only operates in Johannesburg, Pretoria and Cape Town (Henama & Sifolo, 2017). Taxify is associated with the colours yellow and black (Santervás Garrido, 2017). Taxify users pay cash or through its application (Santervás Garrido, 2017).

The problem facing Taxify is that it is struggling to penetrate the transport market worldwide due to Uber (Labson et al., 2016; Lakemann & Lay, 2019; Juma, 2016). Taxify is not very popular in South Africa (Scheer, 2015) and as a result, operates at a loss (Virkus, 2017). In Estonia, Taxify competes well with Uber and other conventional taxi services (Hagtvedt, 2016) yet its main focus is Africa since its only major competition there is Uber (Virkus, 2017). As a result, it has done more rides in Johannesburg, South Africa in a year and a half than it has done in Tallinn, Estonia in three years, where it was founded (Virkus, 2017).

Tuk-tuks

Tuk-tuks are three-wheeled taxis (Permana & Petchsasithon, 2019) that sprung from the three-wheeled *samlors* or pedicabs in Japan in the early twentieth century (Mbara, 2016). They are cheaper than ordinary taxis (Anbalagan & Kanagaraj, 2014) and they transport up to three people per trip (Mutiso & Behrens, 2011). *Tuk-tuks* have been used for over 60 years all over the world (Adero & Aligula, 2012). However, according to Mbara (2016), it took *tuk-tuks* nearly two years to enter the South African market as it was difficult to obtain an operating license but they were eventually introduced to South Africa in 2012 due to their simplicity, efficiency and inexpensive operational cost (among others) (Bokopane, Kusakana & Vermaark, 2014). They are a relatively new system of transport in Johannesburg, South Africa especially for students (Mbara, 2016). Most University of Johannesburg (UJ) students who stay off-campus use *tuk-tuks* as their mode of transport (Thaba & Jacobs, 2017). University of Witwatersrand (Wits) students also use *tuk-tuks* (Mbara, 2016). There are no set routes for *tuk-tuks* to operate in South Africa as in Asia

(Gray, 2018; Mbara, 2016). To book a *tuk-tuk*, users make voice calls to the *tuk-tuk* call centre or directly to the drivers as well as using SMS and email or waving down *tuk-tuks* that are parked or driving by (Mbara, 2016). The advantage of making phone calls and SMSs (short message service) is that anyone can easily operate a mobile cell phone (Santos & Xavier, 2013; Wallsten, 2015).

Nevertheless, *tuk-tuks* have disadvantages since they are slow and relatively unsafe because they can overturn easily (Kumar & Barrett, 2008; Mutekanga, Havugimana & Katamba, 2020). Furthermore, *tuk-tuks* have inefficient combustion engines that pose a pollution threat (Bokopane et al., 2014). They also lack reliability and comfort (Keskin, Brezet & Diehl, 2009). Although *tuk-tuks* make at least 14 trips a day (Mbara, 2016) they can only travel short distances (Keskin et al., 2009). On the other hand, *tuk-tuks* perform a big role in fulfilling the transport gap as they also transport commuters to and from other modes of public transport—since they have no set routes (Mbara, 2016). Mbara (2016) further indicated that they seem to be killing the metered taxis' business since *tuk-tuks* charge half their price or even less.

2.3.2 Technology adoption theories

The technological, organisational and environmental framework (TOE) is a technology adoption theory that has been used to analyse e-business adoption (Mawela et al., 2020; Scott, 2007). It was constructed to outline the organisational components that influence a firm's adoption rulings (Lippert & Govindrajulu, 2006). Diffusion of innovation theory (DOI) is utilised to evaluate the elements influencing the adoption of social networking sites innovation (Folorunso, Vincent, Adekoya & Ogunde, 2010). Users' acceptance and utilisation of "fresh" items or technology are two crucial components of DOI. DOI takes a procedure-oriented approach to demonstrate how an innovation can be obtained and disseminated among individuals (Rahayu & Day, 2015). According to Folorunso et al. (2010), DOI is also a concept that explains why, how and at what rate fresh ideas and technology spread between cultures. The majority of research on IT adoption at the corporate level are based on DOI and TOE (Oliveira & Martins, 2011).

The theory of reasoned action (TRA) is effective in predicting and explaining behaviour (Fishbein & Ajzen, 1974). It amalgamates two batches of belief variables namely subjective norms and behavioural attitudes (Taylor, Bury, Campling, Carter, Newbould & Rennie, 2006). Rahayu and Day (2015) indicated that based on this theory, the behaviour of an individual is mostly deduced by the intent of the individual to execute the behaviour, where this intent is

mutually affected by subjective norms and attitudes towards behaviour. Rahayu and Day (2015) pointed out that this model was later criticised by Ajzen (2006) because the model was unable to compromise in circumstances where the individual was not under volitional control. The model also showed its limited power when applied to circumstances where actual behaviour and intention tally highly (Rahayu & Day, 2015). Based on the gaps, Ajzen (2006) then repaired the limitations of TRA in response to these criticisms and a new construct called Perceived Behavioural Control was included (Rahayu & Day, 2015). As a result, the theory of planned behaviour (TPB) was born (Nasri, 2012).

According to Ajzen (2006), TPB declares that human behaviour is regulated by three types of factors: control beliefs, normative beliefs and behavioural beliefs. The three combined lead to behavioural intention (BI) (Fu, 2020). The introduction of the perceived behavioural construct in TPB shows the internal and external constraints on behaviour and is directly affiliated with both BI to use and actual use (Nasri, 2012). However, TPB has been criticised for focusing on the influential features of attitudes to the detriment of effective aspects (Conner & Norman, 2005). Both TPB and TRA were found to be useful in forecasting an extensive scale of behaviour (Chang, 1998). TPB was found to be better than TRA at predicting unethical behaviour (Chang, 1998). In addition, TPB and TRA have been implemented in consumer behaviour technology acceptance and system use (Nasri, 2012). These theories have been widely used in the reflective analysis of health behaviour (Taylor et al., 2006). However, TPB is a more complex model since it tends to use the additional variable (Chuttur, 2009) which is Perceived Behavioural Control (Rahayu & Day, 2015). TRA is not explicit about the circumstances that drive attitudes to be translated into intentions (Conner & Norman, 2005). Rahayu and Day (2015) specified that like TPB, TRA still shows limited power when applied to circumstances where actual behaviour and intention tally highly, although the two display some sense of closeness.

The Fishbein/TRA model provides the major theoretical basis for TAM (Davis, 1985; Manis & Choi, 2019). This model that was produced by Fred Davis in 1985 and is based on the TRA basically intends to interpret individual behaviour concerning computer use (Rahayu & Day, 2015). TAM is one of the principal theories in technology adoption research (Plewa, Troshani, Francis & Rampersad, 2012). It has received significant attention in IS/IT acceptance literature (Nasri, 2012). According to Davis (1985), TAM was developed to improve the mastering of user acceptance processes, thereby giving fresh theoretical intuitions into the successful design and implementation of information systems. Davis (1985) further indicated that TAM was developed

to give a theoretical source for a solid user acceptance testing process that would allow implementers and system designers to examine recommended fresh systems before their implementation. Another aim of TAM is to give an illustration of the grounds for computer acceptance that is basic, competent at elaborating user behaviour beyond a vast range of user populations and end-user computing technologies (Pal & Vanijja, 2020). However, TAM aims to be simultaneously both sparing and theoretically justified (Pal & Vanijja, 2020). In essence, TAM was put forward to elaborate on user acceptance of fresh computing technologies in the organisational context (Chen & Adams, 2005). Hence, it is important to improve and understand usability in technology, especially mobile applications (Chen & Adams, 2005; Sun, Lee, Law & Hyun, 2020).

On the one hand, TAM is criticised because it does not include the consequences of many valuable factors that originate both from outside and within the organisation (Rahayu & Day, 2015). TAM excludes the chance of domination from institutional, social and personal control factors (Plewa et al., 2012). It may not be enough to explain the intention to adapt to new technology (Jing, Chen, Shi, Zhan & Xie, 2021). On the other hand, when it comes to mastering acceptance and usage of information technology, TAM is of great benefit because it gives a framework to discover the impact of external variables on system usage (Nasri, 2012). It is important to grasp how users make use of mobile devices and what is valuable to users when they use these devices and the mobile applications that come with them (Chen & Adams, 2005; Widanengsih, 2021).

TAM's two main beliefs, perceived usefulness (PU) and perceived ease of use (PEOU) are critical in illustrating a user's attitude and intention to use fresh technology (Plewa et al., 2012; Scherer, Siddiq & Tondeur, 2019). PEOU and PU contribute to the actual use (ASU), the attitude toward use (ATU) and the intention to use (Dwivedi, Wade & Schneberger, 2011; Kamal et al., 2020). PU is the way a system could improve users' job performances (Chen & Adams, 2005); it is the extent to which the user presumes that using the technology would refine the performance of a task at hand (Nasri, 2012). Conversely, PEOU is the extent to which a person presumes that using a certain system would be easy (Nasri, 2012). This theory shows that BI highly affects actual behaviour, where BI is mutually established by attitude toward (ATU) and PU, and where PEOU together with PU also affect ATU (Nasri, 2012; Rahayu & Day, 2015). In other words, the model concentrates on attitudinal interpretations of the intention to use a specific service or technology (Nasri, 2012). TAM is therefore used to measure self-predicted use of the target

system (Davis, 1985).

2.3.3 Technology adoption in small businesses

Yaghoubi and Bahmani (2010) conducted studies by combining TAM with TPB models to investigate factors that influence the adoption of online banking in the Isfahan province of Iran. The results of the study support the integrated TAM and TPB models and validated their reliability in predicting customer intentions for online banking. In this study, perceived behavioural control and PU were found to have a positive impact on the intention to use online banking.

Mallenius, Rossi and Tuunainen (2007) employed UTAUT to identify factors that govern the adoption and usage of mobile devices and services by an elderly population. The results of the study indicated that elderly people were drawn to using mobile phones and services but these services needed to provide real value for them, such as e-commerce services.

Access to educational technology (ET), perceived competency, perceived cultural relevance and perceived utility were all explored by Hart and Laher (2015) as factors that influence teachers' views toward educational technology. The data revealed that perceived usefulness was the strongest predictor of teachers' attitudes, followed by perceived cultural relevance. As a result, while integrating ET into schools, instructors' perspectives on the utility of ET must be considered for integration to be successful. Furthermore, having access to ET and knowing how to use it were insufficient for effective ET integration in schools (Hart & Laher, 2015).

Factors that affect technology adoption were broken down into themes as displayed in Table 2.3-1 and the corresponding authors were also included.

Table 2.3-1: Themes and their Authors

Themes	Authors
Perceived Ease of Use (PEOU)	Venter et al. (2012), Liu (2015), Averweg (2008), Brown (2002), Mbara (2016), Thaba and Jacobs (2017), Santos and Xavier (2013), Martin (2016), Scheer (2015), Keszey (2020), Yang et al. (2021), Ruangkanjanases and

	Techapoolphol (2018), Kamal et al. (2020), Rafique et al. (2020), Zheng and Li (2020), Widanengsih (2021), Pramana (2018), Jang et al. (2021)
Perceived Usefulness (PU)	Wu, Huang et al. (2016), Wu, Liu et al. (2016), Labson et al. (2016), Juma (2016), Scheer (2015), Virkus (2017), Hagtvedt (2016), Liu (2015), Keszey (2020), Yang et al. (2021), Kamal et al. (2020), Rafique et al. (2020), Zheng and Li (2020), Widanengsih (2021), Chaouali and El Hedhli (2019), Pramana (2018), Jang et al. (2021)
Behavioural Intention (BI)	Tanus (2017), Liu (2015), Mohamad et al. (2016), Hazen et al. (2015), Keszey (2020), Huynh et al. (2020), Kamal et al. (2020), Rafique et al. (2020), Zheng and Li (2020), Widanengsih (2021), Chaouali and El Hedhli (2019), Pramana (2018), Moorthy et al. (2017), Jang et al. (2021)
Attitude Toward Use (ATU)	Liu (2015), Keong (2016), Keszey (2020), Yang et al. (2021), Ruangkanjanases and Techapoolphol (2018), Zheng and Li (2020), Widanengsih (2021), Chaouali and El Hedhli (2019), Jang et al. (2021)
Actual System Use (ASU)	Cloete et al. (2002), Ščeulovs and Gaile-Sarkane (2011), Calitz et al. (2015) Keszey (2020)
Price	Taschler (2015), Juma (2016), Palmér (2017), Wallsten (2015), Henama and Sifolo (2017), Anbalagan and Kanagaraj (2014), Mbara (2016), Keszey (2020), Chaouali and El Hedhli (2019)
Safety	Ingle (2009), Ahmed (1999), Salnikov et al.

	(2015), Palmér (2017), Henama and Sifolo (2017), Kumar and Barrett (2008), Bokopane et al. (2014), Keszey (2020), Chaouali and El Hedhli (2019)
Convenience of Accessibility	Henama and Sifolo (2017), Juma (2016), Palmér (2017), Wan et al. (2016), Kumar and Barrett (2008), Wallsten (2015), Keskin et al. (2009), Mbara (2016), Santervás Garrido (2017)
Customer's Trust	Zhang et al. (2016), Zhang et al. (2017), Keszey (2020), Kamal et al. (2020), Chaouali and El Hedhli (2019)

Perceived Ease of Use (PEOU)

Technology's perceived ease of use (PEOU) has been studied in transportation and other small companies such as education and information systems. Brown (2002) investigated the PEOU of web-based technologies in a learning setting rather than a working one in order to broaden knowledge. Brown (2002) concentrated his research on a developing country rather than a developed country. PEOU was significantly influenced by individual characteristics of computer fear and self-efficacy according to the findings. Brown (2002) found that in undeveloped countries, PU may not predict adoption, emphasising the importance of PEOU as the primary predictor of both PU and usage.

Averweg (2008) conducted research to discuss the PU, PEOU and ASU structures during the development and implementation stages of executive information systems (EIS) in South African enterprises (Averweg, 2008). However, the findings contradicted TAM's main premises which emphasise the importance of PU above PEOU as the most important factor of acceptance (Averweg, 2008). The findings revealed that PEOU could be a more powerful trigger for IT acceptance than PU (Averweg, 2008). PEOU, according to Averweg (2008), takes on greater significance because it influences both usage and PU. The findings revealed that how an object or system is seen as easy to use has an impact on how it is perceived as beneficial. The findings by Brown (2002) agreed with Averweg's (2008) findings where PEOU takes precedence over PU.

Venter, Van Rensburg and Davis (2012) led a study at a South African open and distance learning university that examined the determinants of fourth-year business students' use of an online learning management system (LMS) using TAM2 as a theoretical framework. The results demonstrated that PU and PEOU were established as essential components of the TAM and TAM2 models, demonstrating the stability of the TAM variables (Venter et al., 2012). According to Venter et al. (2012), TAM's utility as a model to explain usage in this context as well as in a setting where acceptability and usage patterns had been established over long periods was limited. Despite the apparent strength of the underlying structure and the complexity of the TAM core structures, this was the case (Venter et al., 2012).

Liu (2015) performed a study to investigate how PEOU would positively influence users' attitudes towards taxi-hailing apps as well as how PEOU would positively influence PU of a taxi-hailing app in a metropolitan setting. Based on the findings by Liu (2015), it was evident that the way the users perceived the taxi-hailing app as being easy to use, influenced the users to utilise the taxi-hailing app. In addition, the findings showed that the way the users perceived the taxi-hailing app as being easy to use, influenced how they perceived the taxi-hailing app's usefulness.

In South Africa, *tuk-tuks* are perceived as being easy to use, consequently, a lot of students use them (Mbara, 2016), particularly the majority of university students who stay off-campus—as they can just make a phone call to access them (Thaba & Jacobs, 2017). Uber has also been perceived as being easy to use since it operates on a mobile phone (Santos & Xavier, 2013) using shared economy technology that is app-based and works with an internet connection for its customers to access it (Martin, 2016).

Perceived Usefulness (PU)

Liu (2015) investigated how PU would positively affect users' attitudes towards taxi-hailing apps and how PU would positively influence users' BI to use a taxi-hailing app in a metropolitan setting. The results of the study showed that all these TAM variables had a great influence on each other. According to Liu (2015), it was evident that the way users perceived the taxi-hailing app as being useful influenced their attitude towards utilising the taxi-hailing app. Furthermore, the findings show that the way users perceived the taxi hailing app as being useful influenced their intention to use it.

Wu, Huang and Liu (2016) used the function of PU and positive emotion in minimising the negative impact of perceived risk on behaviour intention to predict customer acceptance of WeChat Pay. Consumers' willingness to accept WeChat Pay was positively connected to PU and happy emotion, but negatively related to perceived risk, according to the findings. According to Wu et al. (2016), both PU and pleasant emotion exhibited a positive interaction with perceived risk on acceptance intention, implying that these two characteristics could help to mitigate the detrimental influence of perceived risk on acceptance intention. Additionally, the results showed that the way a system was perceived as being useful, together with having positive emotions to use it, influenced the intention to use the system (Wu, Huang et al., 2016).

Wu, Liu and Huang (2016) looked at the relative effects of affective (positive emotion) and cognitive (perceived risk and PU) components on acceptance intention as well as the role of positive emotion in boosting PU and lowering perceived risk. The findings revealed that positive emotion, PU and perceived risk were all connected to users' acceptance intentions (Wu, Liu et al., 2016).

Wu, Huang et al. (2016) indicated that if a system was being used for a longer period, more users would intend to use it since the usefulness of the system would be evident. This corresponds with the issue that Taxify currently experiences in South Africa, where it is finding it challenging to enter the transport market worldwide due to Uber, since Uber has been used for a longer period (Labson et al., 2016; Juma, 2016). Taxify is not as popular in South Africa because it is not perceived as being useful (Scheer, 2015) and as a result, has been operating at a loss (Virkus, 2017). In Estonia, Taxify competes well with Uber and other conventional taxi services because Taxify has been operating there for a longer time, which has increased its PU and customers' intention to use it (Hagtvedt, 2016).

Behavioural Intention (BI)

Liu (2015) explored the BI perceptions and motivations of users concerning taxi-hailing apps in a metropolitan establishment. The results showed that to be able to expand users' acceptance levels, product managers and developers must have the ability to detect a vast number of users' purposes, intentions and preferences concerning a taxi-hailing system and should eventually have the ability to incorporate these elements into the development approach (Liu, 2015).

TAM was used by Hazen, Overstreet and Wang (2015) to investigate factors that influence

people's willingness to use public bicycle sharing systems. The findings revealed that the direct relationships between perceived value, perceived convenience, and perceived quality and adoption intention were all significant and positive while the indirect relationships revealed that value played a significant role in potential users' acceptance of public bicycle sharing systems.

Mohamad, Fuad, Shahib, Azmi, Kamal and Abdullah (2016) compared customers' intention to use the Uber app and the traditional taxi in tourism destinations. The results found that the intention of customers to use the Uber service compared to the traditional taxi service was influenced by perceived safety and perceived price (Mohamad et al., 2016). The results showed that customers perceived Uber as being safer and cheaper than the traditional taxi. PEOU of the Uber service was influenced by PU (Mohamad et al., 2016), meaning that the way the customers perceived Uber to be useful influenced the way they perceived it to be easy to use.

Tanus (2017) investigated factors affecting customers' intention to use Go-Jek, a form of internet-based transport in Surabaya, Indonesia. The study inferred that ATU, BI, PEOU and PU could predict whether users would adopt Go-Jek (Tanus, 2017). The results of the study supported TAM and verified its robustness in being able to predict customers' intention to use Go-Jek (Tanus, 2017).

Attitude Towards Use (ATU)

Attitude towards use (ATU) of technology was explored in transport research. Liu (2015) studied how the attitude towards a taxi-hailing app would positively influence users' BI to use a taxi-hailing app in a metropolitan setting. The results of the study exhibited that users' attitudes had minimal impact on BI (Liu, 2015).

Keong (2016) conducted a study on mobile taxi ordering (MTO) adoption among passengers. The study found that there was a notably favourable connection between passengers' attitudes towards MTO apps adoption and their beliefs about its PEOU. The results found a significant connection between passengers' attitudes towards MTO apps technology and their PU. TAM variables such as perceived usefulness, perceived ease of use and attitude towards use played a valuable role in the adoption intention of MTO apps (Keong, 2016). The results of the study by Keong (2016) indicated that attitude towards using a system played a big role in the way a system was perceived as being useful or easy to use.

Actual System Use (ASU)

Cloete, Courtney and Fintz (2002) conducted a study in the Western Cape to determine the current level of e-commerce use by small manufacturing enterprises. When the global use of the internet for electronic commerce by SME's was compared to the South African situation, the findings revealed that the available technologies were not utilised to the extent that was required for survival in a fast-changing environment (Cloete et al., 2002). The study by Cloete et al. (2002) showed that in South Africa, actual system use was low because technology adoption was low. It was observed that the exploitation of technology in business is minimal due to a lack of e-skills among entrepreneurs in developing countries (Ščeulovs & Gaile-Sarkane, 2011). The lack of e-skills among micro-entrepreneurs in developing countries like South Africa was identified as an obstacle to technology adoption and business growth (Calitz et al., 2015).

Price

Taschler (2015) suggested that the emergence of Uber resulted in a huge crisis for metered taxis, as Uber is cheaper and more efficient. Juma (2016) added that Uber charges by distance, which is cheaper and more cost-effective than other, ordinary traditional taxis. On the other hand, metered taxis charge the customer based on a fixed rate that is set by the fare regulators, according to the distance or duration of the ride (Palmér, 2017). However, the problem is that they tend to overcharge customers (Juma, 2016) by taking long routes (Wallsten, 2015). This is because they are not making as much profits as they used to due to competition with Uber (Henama & Sifolo, 2017). Moreover, *tuk-tuks* are cheaper than ordinary taxis (Anbalagan & Kanagaraj, 2014). As a result, *tuk-tuks* are disrupting the business of meter taxis because *tuk-tuks* charge less or even half the price of the metered taxi fees (Mbara, 2016).

Safety

Ingle (2009) observed that the South African taxi industry is managed and regulated by associations. Unfortunately, there is a lot of violence in this industry due to inter-association competition (Ahmed, 1999). Rival taxi associations may become violent towards each other due to disagreements about what taxi routes to take which causes kombi taxis to be unsafe (Ingle, 2009). Decisions on who should operate on which route are made by the various taxi associations existing in all provinces of South Africa (Ahmed, 1999).

Salnikov et al. (2015) indicated that Uber's benefits were disrupting the traditional transportation industry in South Africa. According to Palmér (2017), this led to battles between Uber and the

traditional taxi, making it unsafe for Uber to operate. Henama and Sifolo (2017) pointed out that in South Africa, meter taxi drivers were fighting with Uber drivers to force the latter to comply with their rules and regulations and unfortunately, Uber drivers have been victims of crime all over the world—being attacked, hijacked or having their cars torched. *Tuk-tuks* are also unsafe as they can easily overturn (Kumar & Barrett, 2008). Furthermore, *tuk-tuks* have inefficient combustion engines that pose a pollution threat (Bokopane et al., 2014).

Convenience of accessibility

The Uber platform has proven to be convenient and accessible as it allows taxi booking to be done using a smartphone from any location (Juma, 2016). Juma (2016) indicated that metered taxis complement public transport such as kombi taxis since there are places like airports where commuters cannot access the latter. These metered taxis also provide an acceptable level of comfort (Kumar & Barrett, 2008). Furthermore, the existence of Uber has led to the improvement of the quality of metered taxis and the service that they provide in attempting to attract/retain their customers (Wallsten, 2015). Unfortunately, the same cannot be said about *tuk-tuks*, as they lack reliability and comfort (Keskin et al., 2009). Although *tuk-tuks* make at least 14 trips a day (Mbara, 2016) they can only travel over short distances (Keskin et al., 2009). On the other hand, *tuk-tuks* perform a major role in filling the transport gap since they also transport commuters to and from other modes of public transport because they have no set routes, thereby making them easily accessible and convenient (Mbara, 2016). Like Uber, Taxify is also convenient as users can pay with cash or via its application (Santervás Garrido, 2017).

Customers' trust

Zhang, Ma, Yang and Bian (2016) analysed factors influencing customers' trust in taxi-hailing apps in the Chinese setting. The results of the study indicated that social influence, PEOU AND PU had positive effects on customers' trust. Customers' trust had a positive effect on customers' continued use behaviour and mediated between continued use and perceived usefulness, between perceived ease of use and continued use as well as social influence and continued use. Moderating effects showed that perceived privacy risk negatively moderated the relationship between PU and trust, PEOU and trust, and trust and continued use behaviour. The influence of perceived privacy risk on customers' trust and continued use behaviour was significantly higher for men and older customers. In addition, the effects of social influence on customers' continued use behaviour were significantly greater for older and high-income customers. The results of the study by Zhang et al. (2016) indicated that customers' trust in a system is influenced by how

socially influential the system is; by how easy to use or by how useful the system is perceived to be.

In a study conducted in China, Zhang, Ma and Zhang (2017) looked at the factors that influence users' willingness to suggest taxi-hailing applications. According to the findings, both PEOU and PU had a positive influence on users' perceived benefits; perceived benefits had a positive influence on users' trust whereas perceived privacy risk had a negative influence on users' trust. In addition, users' trust had a positive influence on users' recommendation intention and perceived benefits acted as a partial intermediary between PU/users' trust and PEOU/users' trust, and users' trust acted as a partial intermediary between perceived benefits and users' recommendation intention. The results of the study by Zhang et al. (2017) basically indicated that for a user to recommend a system, the customer's trust plays a big role.

2.3.4 Transport management systems adoption

Tshambula (2017) investigated how industries in the second economy are characterised by less education, high poverty, lack of the required skills and less adoption of technological innovations. This study used the innovation diffusion theory (IDT) in illuminating technology adoption in the South African taxi industry. The findings of the study indicated that trialability, relative advantage, technology experience and education influence the probability of adoption. According to Tshambula (2017), knowledge and education must be tackled in order to formalise and modernise the taxi industry, not just that of taxi owners but taxi drivers as well as other associates of the social system too. The results showed that most taxi owners had positive attitudes about the electronic fare collection system (Tshambula, 2017).

Peng, Wang, He, Guo and Lin (2014) employed TAM to investigate the adoption patterns of a transport management systems called Call Taxi App (CTA). The results revealed that subjective norms had a positive influence on BI and that PEOU, PU and compatibility had an indirect positive impact on people's attitudes towards using CTA (Peng et al., 2014). In addition, perceived risk negatively impacted BI and perceived price level negatively impacted both BI and ATU (Peng et al., 2014).

To assess the adoption variables of taxi-hailing mobile apps among Malaysian customers, Haba and Dastane (2018) used the unified theory of acceptance and use of technology (UTAUT). According to the findings, BI, social influence and performance expectancy all had a favourable

impact on user behaviour and the adoption of taxi-hailing mobile apps but effort expectancy and BI had no impact (Haba and Dastane, 2018). In a separate study, Chen, Salmanian and Akram (2017) investigated user acceptance of digitally embedded transport network companies (TNCs) in China using the UTAUT extension. The findings of the research by Chen et al. (2017) revealed that users accept mobile digital technology and gave direction to the TNC industry's growing market by offering management suggestions on how TNCs may increase market share and user acceptance (Chen et al., 2017).

Zmud and Sener (2017) gathered empirical evidence on self-driving vehicle adoption patterns, people's likely use of them and how this might alter car ownership, mode choice, travel amount and other travel behaviour considerations. Because self-driving cars were not yet on the market, the adoption and use of a car technology acceptance model (CTAM) was used to better understand uptake and use. Because autonomous vehicles were not yet available, it was impossible to establish a link between intent to use and actual use.

2.3.5 Proposed conceptual model and hypotheses formulation

Based on the existing literature and from the theories discussed, TAM was selected as the theoretical basis for this research. TAM has been adopted to explore how to gain consumers acceptance in e-commerce (Chen & Adams, 2005). It has also been adopted to describe factors influencing the usage of internet banking and individual acceptance in India (Kesharwani & Singh Bisht, 2012) and in addition, to explain *Facebook* adoption (Nasri, 2012) as well as the adoption of email and text editor technologies (Lee, Kozar & Larsen, 2003). Based on some of these examples and the literature analysis, we can say there is strong evidence to support that TAM is a model that can be used for predicting system usage behaviour (Chuttur, 2009).

Chuttur (2009) indicated that TAM is much simpler than other frameworks and is easy to implement since it can be applied to various studies. This is because TAM is considered to be the most robust model and is widely used by researchers in investigating technology adoption (Kesharwani & Singh Bisht, 2012). It is employed for studying the adoption of ICT innovation and adoption (Alshamaila, Papagiannidis & Li, 2013) and therefore applied to the aim of this research. Thus, this study is underpinned by TAM. The main advantage of TAM is that its beliefs, i.e., BI, PEOU and PU can be generalised across various settings, compared to other frameworks (Chan-Olmsted, Rim & Zerba, 2013). According to Chan-Olmsted et al. (2013), a person’s beliefs about fresh technology tends to deduce their attitude toward using it and as a

result, impacts their intention to use it. Figure 2.3-1 below shows the technology acceptance model (TAM).

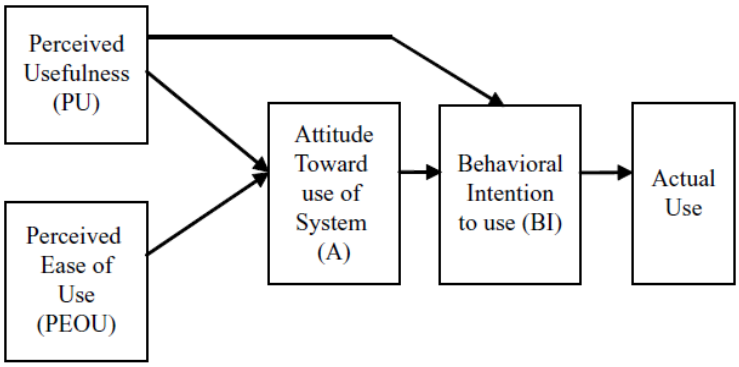


Figure 2.3-1 - Technology Acceptance Model (TAM) (Dwivedi et al., 2011)

Both TRA and TPB were unsuitable for this research as they focus primarily on behavioural development. This was inconsistent with the intent of the research. In addition, the DOI and TOE were not suitable for this research because they focus primarily on organisations or businesses, which was not consistent with the research objective.

TAM constructs, actual system use (ASU), behavioural intention to use (BI), attitude towards use of system (ATU), perceived ease of use (PEOU) and perceived usefulness (PU) were adopted from the conceptual model. To address the objectives of the study, perceived usefulness (PU) was modified to taxi entrepreneurs' perceived usefulness (PU); perceived ease of use (PEOU) was modified to taxi entrepreneurs' perceived ease of use (PEOU); attitude towards use of system (ATU) was modified to taxi entrepreneurs' attitude towards use of system (ATU); behavioural intention to use (BI) was modified to taxi entrepreneurs' behavioural intention to use (BI) and actual system use (ASU) was modified to taxi entrepreneurs' actual system use (ASU). Figure 2.3-2 displays how the initial hypotheses were formulated.

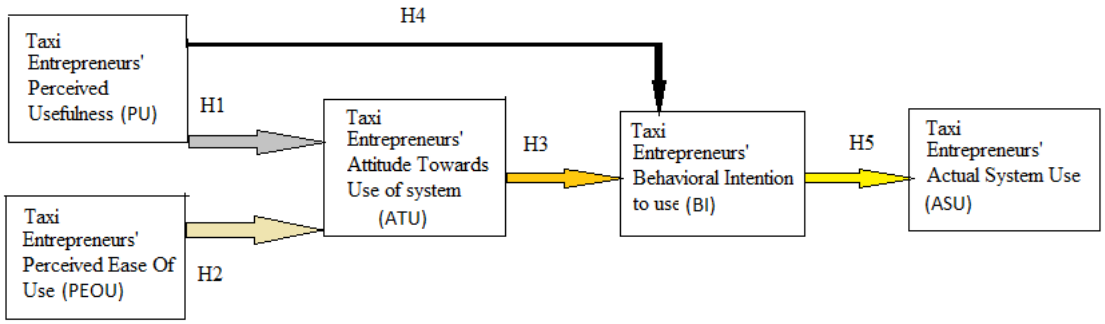


Figure 2.3-2 - Initial Hypothesis formulation based on TAM (Dwivedi et al., 2011)

The TAM model was further modified with the introduction of new constructs (Price, Safety, Convenience of Accessibility and Customer's Trust) which were then added to the conceptual framework. "Price" became taxi entrepreneurs' perceived pricing (PP); "safety" became taxi entrepreneurs' perceived safety (PS); "convenience of accessibility" became taxi entrepreneurs' perceived convenience of accessibility (PCA) and "customers' trust" became taxi entrepreneurs' perceived customers' trust (PCT). Hypotheses for this study were then formulated, based on the modified conceptual framework. The modified conceptual model of the study is depicted in Figure 2.3-3 showing the constructs and the formulated hypotheses.

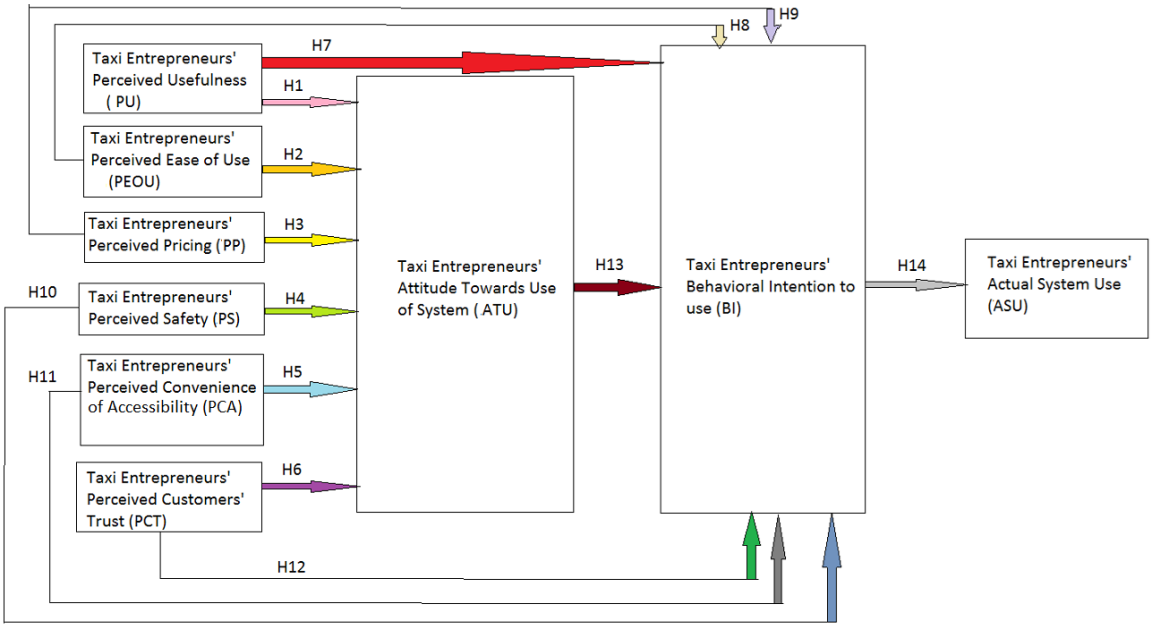


Figure 2.3-3 - Proposed Conceptual Model

Based on the proposed conceptual model in Figure 2.3-3 the following hypotheses were deduced.

H1 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on attitude towards use (ATU) of the transport management systems.
H2 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on attitude towards use (ATU) of the transport management systems.
H3 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on attitude towards use (ATU) of the transport management systems.

H4 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on attitude towards use (ATU) of the transport management systems.
H5 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on attitude towards use (ATU) of the transport management systems.
H6 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on attitude towards use (ATU) of the transport management systems.
H7 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on behavioural intention (BI) on the transport management systems.
H8 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) on the transport management systems.
H9 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on behavioural intention (BI) on the transport management systems.
H10 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on behavioural intention (BI) on the transport management systems.
H11 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on behavioural intention (BI) on the transport management systems.
H12 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on behavioural intention (BI) on the transport management systems.
H13 – Taxi entrepreneurs' attitude towards use (ATU) has a positive influence on behavioural intention (BI) on the transport management systems.
H14 – Taxi entrepreneurs' behavioural intention (BI) has a positive influence on actual system use (ASU) of the transport management systems.

As previously mentioned, the proposed research aimed to investigate how taxi entrepreneurs' attitude towards technology were affecting their acceptance of transport management systems in the South African taxi industry. PU, PEOU, PP, PS, PCA and PCT were independent variables as they were the ones that were manipulated or tested by the researcher to determine the dependent variable. ASU was the dependent variable that the researcher measured. ATU and BI were the mediate variables as they explained the relationship between the independent variables and the dependent variables in this research.

2.4 CHAPTER SUMMARY

The purpose of this chapter was to provide a detailed review of the literature gathered to carry

out the research. It also discussed the theoretical foundation of the research, elaborating on the various technology adoption models that exist. In addition, the conceptual framework selected for the research was discussed. Furthermore, this chapter illustrated the conceptual model and how the hypotheses were formulated. The following chapter will explain the detailed methodology that was followed to conduct the research.

CHAPTER 3 - RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter provides an overview of the research approach that was employed for the study. The research onion model was used to frame and describe the research design as well as the methodology of the research.

This chapter is structured as follows: Section 3.2 discusses the research design that was followed. In Section 3.3, the validity and reliability issues are discussed. Section 3.4 discusses ethical clearance procedures and ethical considerations. Section 3.5 concludes the chapter.

3.2 RESEARCH DESIGN

The following subsections outline the research design and methodology, based on the research onion model displayed in Figure 3.2-1. According to Saunders, Lewis and Thornhill (2009), the research onion encompasses philosophies/paradigms, research approaches, research strategies, sample selection and data collection and data analysis.

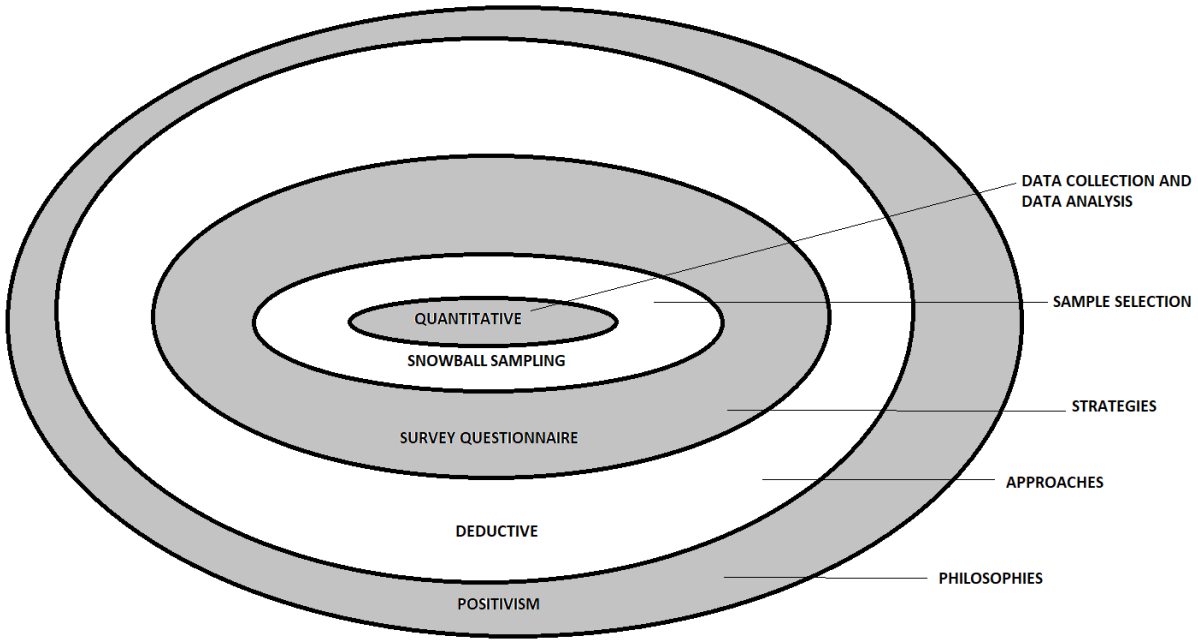


Figure 3.2-1 - The Research Onion Model

3.2.1 Philosophy/Paradigm

A paradigm is defined as a collection of standards, practices, concepts and assumptions that

develop a method of looking at reality for the community or organisation that shares them, mainly in an intellectual discipline (Göktürk, 2005). According to Neuman (2013), it is described as a way of thinking. This study recognises the existence of research paradigms such as interpretivism, pragmatism and others, however, the paradigm adopted in this research is positivism.

According to Neuman (2013), positivism has been a domineering paradigm in social science. Its aim in research is to learn natural laws so that people can forecast and control events (Neuman, 2013). Positivists are focused on theory verification (Creswell, 2009), hence, they prefer quantitative data and normally use experiments, statistics and surveys (Neuman, 2013) to test their theories. This paradigm focuses on uncovering the truth and presenting it in empirical ways (Bhattacherjee, 2012). According to Bhattacherjee (2012), the ontological view of positivists is that reality should be objective and therefore fact-based. Their epistemological view is that facts are drawn by testing theories (Saunders et al., 2009). Neuman (2013) further noted that the methodological view of positivists is that good evidence should be based on observations that can be repeated by others since they rely more on facts. According to Saunders et al. (2009), positivists' axiology view is that research is conducted in a value-free manner, whereby the researcher is unaffected by the facts and retains an impartial position.

The research for this study was conducted by collecting data from taxi entrepreneurs in order to gather facts. This corresponds with the ontological view of positivism, where reality should be objective and is always fact-based (Bhattacherjee, 2012). The research tested a conceptual framework that extended the TAM theory whose epistemological point of view is positivist (Saunders et al., 2009). Furthermore, the researcher was objective and independent of the data. This is the positivists' axiological view in which the researcher is unaffected by the data and retains an objective position (Saunders et al., 2009).

3.2.2 Research approach

This research used the deductive approach to test a conceptual framework that extended the TAM model proposed in this study. Quantitative data for testing the proposed conceptual framework was collected from taxi entrepreneurs. The approach adopted in this study is in line with Bhattacherjee (2012) who indicated that a deductive approach aims to improve or refine an existing theory.

A deductive approach is a theory-testing procedure making use of concrete empirical evidence for falsification or confirmation (Neuman, 2013). The purpose of data gathering is to evaluate hypotheses or proposals that are related to an existing theory (Saunders et al., 2009). The hypotheses are examined in order to test or verify the theory (Creswell, 2009) where the goal may be to improve or extend the theory (Bhattacherjee, 2012). When using a deductive approach, theory directs the research design and the explanation of the results (Neuman, 2013). In addition, the deductive approach is a method of obtaining conclusions about a behaviour or phenomenon based on logical or theoretical reasons on an initial set of presumptions (Bhattacherjee, 2012). That approach utilises quantitative techniques and is suitable for this research.

3.2.3 Research strategy

This section describes two potential research strategies and chooses and justifies the strategy adopted for this research. The approaches discussed are the survey strategy and experimentation strategy.

Survey

For this study, a survey in the form of a questionnaire was considered as a possible research approach because it facilitates the gathering of similar data from a group of people in an organised manner (Salkind, 2010). A survey strategy is viewed as an appropriate strategy for collecting data in positivist research (Creswell, 2009) which matched the paradigm choice of this study.

The advantage of a survey is that conducting a survey where similar closed-ended questions are asked is that it allows quantitative analysis to be done easily (Neuman, 2013). In addition, a survey would be an easy and efficient way to collect data if it is conducted across a large number of different taxi entrepreneurs (Bhattacherjee, 2012). Furthermore, a survey would help study taxi entrepreneurs' beliefs, emotions, feelings, attitudes and behaviour towards the research problem (Neuman, 2013).

On the other hand, the disadvantage of surveys is that conducting a survey where open-ended questions are asked could produce answers that are difficult to analyse quantitatively since participants could provide different or varying answers (Neuman, 2013). In addition, participants might misunderstand open-ended questions and so irrelevant answers could be given (Neuman, 2013). Furthermore, participants might choose not to answer open-ended questions if they do not

know the answer and so there may be limited data to analyse (Neuman, 2013). For example, if the survey includes questions more aligned to taxi passengers, the taxi entrepreneurs might be unable to answer and *vice versa*. Another disadvantage is that if a survey is not done face-to-face, participants may not be able to get clarification that they might have on some questions and so the answers given may not be accurate (Bhattacherjee, 2012). Moreover, if a survey is done in person, the researcher's body language could have a negative effect on the participant's response (Bhattacherjee, 2012), for example, the researcher's reaction to a participant's answers or how the question is asked. In addition, participants might complete a survey more than once which may produce biased results (Bhattacherjee, 2012). Furthermore, since participants are forced to select from a list of options provided when answering closed-ended questions, they may select inaccurate answers, thereby producing biased results (Neuman, 2013). The order of the questions may also affect how participants answer them, which may produce biased results (Bhattacherjee, 2012). The survey results may apply to a specific group of people (Bhattacherjee, 2012), for example, taxi drivers only and not taxi entrepreneurs.

The survey questions were developed based on the proposed conceptual model variables illustrated in Figure 2.3-3, Chapter 2. This made it easier to address the research questions because each research question was investigated based on the proposed conceptual model variables. Furthermore, the survey facilitated the analysis of data collected from various taxi entrepreneurs to get different views. The relationship that a survey has with the research paradigm is that surveys are quantitative and positivists focus more on quantitative approaches (Creswell, 2009). In addition, this research followed a deductive approach, which is associated with surveys (Neuman, 2013). Furthermore, surveys were more suitable for this research as quantitative analysis could easily be done since similar closed-ended questions were asked (Neuman, 2013). Surveys also helped in studying the taxi entrepreneurs' beliefs, emotions, feelings, attitudes and behaviour regarding the research problem (Neuman, 2013) which made it easier to address the research questions.

3.2.4 Sample selection

The site of the research was Sandton in Gauteng Province, South Africa. Sandton was chosen due to its accessibility and to cut research costs. Taxi entrepreneurs were the most appropriate to collect data from as data obtained from them would help to address the main research question. Taxi entrepreneurs were approached randomly and asked to participate in the research and were given a brief introduction to the intentions of the research. If they were unable to participate, the

researcher approached other taxi entrepreneurs. Therefore, there were no gatekeepers for this research as taxi entrepreneurs were approached at random. The same survey questions were posed to each taxi entrepreneur. The survey questions were distributed to 300 taxi entrepreneurs selected by using the snowball sampling technique.

3.2.5 Data collection and questionnaire design

To address the research problem, the research strategy followed was that of a survey questionnaire. The questionnaires were distributed to collect data from taxi entrepreneurs. In addition, the questionnaire consisted of similar closed-ended questions so that quantitative analysis could easily be done. Table 3.2-1 below presents the survey questions that are linked to constructs of the conceptual framework and the hypotheses.

Table 3.2-1: Development of Survey Questions

Constructs of the Conceptual Framework	Hypotheses	Survey Questions
Taxi entrepreneurs' perceived usefulness (PU)	H1 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on attitude towards use (ATU) of the transport management systems.	1. How useful are transport management systems to taxi entrepreneurs? 2. Does the level of usefulness of transport management systems to taxi entrepreneurs affect the taxi entrepreneurs' attitude towards the use of transport management systems?
Taxi entrepreneurs' perceived ease of use (PEOU)	H2 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on attitude towards use (ATU) of the transport management systems.	3. How easy to use are transport management systems to taxi entrepreneurs? 4. Does the level of ease of use of transport management systems to taxi entrepreneurs affect the taxi entrepreneurs' attitude towards the use of transport management systems?
Taxi entrepreneurs' perceived pricing (PP)	H3 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on attitude towards use (ATU) of the transport management systems.	5. How profitable is the taxi business to taxi entrepreneurs when operated using transport management systems? 6. How does the price of mobile data for taxi entrepreneurs affect the taxi entrepreneurs' attitude towards the use of transport management systems? 7. Does the pricing of taxi fares by taxi entrepreneurs when operating on transport management systems affect the taxi entrepreneurs' attitude towards the use of transport management systems?
Taxi entrepreneurs' perceived safety (PS)	H4 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on attitude towards use (ATU) of the transport management systems.	8. How safe is it to transport customers, for taxi entrepreneurs when operating using transport management systems? 9. Does the level of safety for taxi entrepreneurs when transporting customers whilst operating with transport management systems affect the taxi entrepreneurs' attitude towards the use of transport management systems?
Taxi entrepreneurs' perceived convenience of accessibility (PCA)	H5 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on attitude towards use (ATU) of the transport management systems.	10. How convenient is it for taxi entrepreneurs to get customers when operating using transport management systems? 11. How accessible are customers to taxi entrepreneurs when operating using transport management systems? 12. Does the level of convenience for taxi entrepreneurs to get customers when operating using transport management systems affect the taxi entrepreneurs' attitude towards the use of transport management systems? 13. Does the level of accessibility to customers for taxi entrepreneurs when operating using transport management systems affect the taxi entrepreneurs' attitude towards the use of transport management systems?
Taxi entrepreneurs' perceived customers' trust (PCT)	H6 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on attitude towards use (ATU) of the transport management systems.	14. How is the customer's trust towards taxi entrepreneurs when it comes to using taxis that operate using transport management systems? 15. Does the level of customers' trust towards taxi entrepreneurs when using taxis that operate using

Constructs of the Conceptual Framework	Hypotheses	Survey Questions
		transport management systems affect the taxi entrepreneurs' attitude towards the use of transport management systems?
Taxi entrepreneurs' perceived usefulness (PU)	H7 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on behavioural intention (BI) on the transport management systems.	16. Does the level of usefulness of transport management systems for taxi entrepreneurs affect the taxi entrepreneurs' intention to use transport management systems?
Taxi entrepreneurs' perceived ease of use (PEOU)	H8 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) on the transport management systems.	17. Does the level of ease of use of transport management systems for taxi entrepreneurs affect the taxi entrepreneurs' intention to use transport management systems?
Taxi entrepreneurs' perceived pricing (PP)	H9 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on behavioural intention (BI) on the transport management systems.	18. Does the pricing of taxi fares by taxi entrepreneurs when operating using transport management systems affect the taxi entrepreneurs' intention to use transport management systems? 19. How does the price of mobile data for taxi entrepreneurs affect the taxi entrepreneurs' intention to use transport management systems?
Taxi entrepreneurs' perceived safety (PS)	H10 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on behavioural intention (BI) on the transport management systems.	20. Does the level of safety for taxi entrepreneurs when transporting customers, whilst operating using transport management systems affect the taxi entrepreneurs' intention to use transport management systems?
Taxi entrepreneurs' perceived convenience of accessibility (PCA)	H11 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on behavioural intention (BI) on the transport management systems.	21. Does the level of convenience for taxi entrepreneurs to get customers when operating using transport management systems affect the taxi entrepreneurs' intention to use transport management systems? 22. Does the level of accessibility to customers for taxi entrepreneurs when operating using transport management systems affect the taxi entrepreneurs' intention to use transport management systems?
Taxi entrepreneurs' perceived customers' trust (PCT)	H12 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on behavioural intention (BI) on the transport management systems.	23. Does the level of customers' trust towards taxi entrepreneurs when operating using transport management systems affect the taxi entrepreneurs' intention to use transport management systems?
Taxi entrepreneurs' attitude towards use (ATU)	H13 – Taxi entrepreneurs' attitude towards use (ATU) has a positive influence on behavioural intention (BI) on the transport management systems.	24. How is the attitude of taxi entrepreneurs towards the use of transport management systems? 25. Does the attitude of taxi entrepreneurs towards the use of transport management systems affect the taxi entrepreneurs' intention to operate using transport management systems?
Taxi entrepreneurs' behavioural intention (BI)	H14 – Taxi entrepreneurs' behavioural intention (BI) has a positive influence on actual system use (ASU) of the transport management systems.	26. How is the level of intention of taxi entrepreneurs to operate using transport management systems? 27. Does the level of intention of taxi entrepreneurs to operate using transport management systems affect the taxi entrepreneurs' actual use of transport management systems?

Survey questionnaires were designed to collect taxi entrepreneurs' biographical information which included age, gender, educational qualifications, taxi entrepreneurial experience, business location; the level of experience in technology such as shared economy, SMS, phone calls, emails, *Google Maps*, GPS, mobile cell phones and tablet computers.

3.2.6 Data analysis

Data collected as part of this study has been analysed quantitatively. The data was entered into *Microsoft Excel* and "cleaned up" in preparation for analysis. Data from a *Microsoft Excel* spreadsheet was imported into the IBM *Statistical Package for the Social Sciences* (*SPSS*) version 26 software package for analysis. The statistical tests carried on the data are now discussed.

Descriptive statistics

Descriptive statistics were utilised to analyse the collected data to understand the distribution of the data. The data was presented in graphs and tables and analysed to understand measures of central tendency and variability. Measures of central tendency focused on mean, average and median whilst measures of variability focused on dispersion of data, such as variance.

Inferential statistics

Inferential statistics were employed to analyse the collected data as they build on probability theory to test hypotheses formally (Neuman, 2013). Furthermore, inferential statistics are used to test whether descriptive results are probably due to a real relationship or random factors (Neuman, 2013). They also provide a method to illustrate how confident one can be when inferring from the results in a sample to the population (Neuman, 2013). According to Bhattacherjee (2012), chi-square is a type of statistical technique that falls under inferential statistics and was used to analyse data for this research. In addition, chi-square can be used as a measure of association in descriptive statistics but for this research, it was used for inferential statistics only, to confirm the results obtained from the descriptive statistics (Bhattacherjee, 2012). Chi-square tells the researcher that the probability that any association found is likely to be due to chance factors (Saunders et al., 2009). In his definition, Neuman (2013) stated that chi-square is also a type of bivariate statistic.

Bivariate analysis

Bivariate analysis examines the relationship between two variables (Bhattacherjee, 2012). The

bivariate correlation is the most popular bivariate statistic and was used for this research (Bhattacherjee, 2012). Saunders et al. (2009) argued that the strength of a relationship between two variables is measured through bivariate correlation, which is a value between minus one (-1) and plus one (+1). According to Neuman (2013), the number shows a statistical relationship between variables. Therefore, this analysis method was suitable for this research since the components of the hypotheses PU, PEOU, BI, ATU, ASU, PCA, PCT, PS and PP show some dependencies on each other. Thus, bivariate analysis was used to examine the relationships between the above-mentioned constructs.

Factor analysis

The underlying structure of a certain dataset is analysed in the exploratory factor analysis (EFA) method through the processes of reduction and summarisation (Malhotra & Birks, 2007). This method of analysis results in the reduction of variables to enable a simpler understanding of the available data and variables. It is used to regroup variables according to their shared variances (Yong & Pearce, 2013). In the context of this research, exploratory factor analysis was utilised to establish relationships between the underlying variables, namely PU, PEOU, BI, ATU, ASU, PCA, PCT, PS and PP.

Factor analysis involved the following:

- The p-value of Bartlett's test of sphericity had to be below 0.01 and had to be significant at the 99% confidence level. It would then be suitable for factor analysis because a 99% confidence level displays significance (Pallant, 2013).
- Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to measure the sampling adequacy during the analysis. According to Pallant (2013), the KMO value of 0.6 or greater is the degree of common variance among variables and significant enough to direct a factor analysis. Therefore, variables with KMO > 0.6 would be suitable for factor analysis.
- A Scree plot was conducted to determine which factors would be retained (Yong & Pearce, 2013). Values with an eigenvalue greater than one were selected. In addition, because the eigenvalues started decreasing below one after that point, the scree plot of the eigenvalues and factors visually supported that a four-factor structure was a rational estimate.

Correlation analysis

To determine the relationship between the dependent and independent variables, correlation testing was used. In addition, to see if there was a link between TAM variables (PU, PEOU, ATU, ASU and BI) and user acceptance of transportation management systems, Pearson correlation was used. The Pearson product–moment correlation coefficient is a measure of the solidity of a linear relationship between two variables (Lane, 2013).

According to Lane (2013), a correlation more than or equal to 0.50 represents a greater correlation, greater than or equal to 0.30 suggests a medium correlation, greater than or equal to 0.10 implies a moderate correlation, and a value less than or equal to 0.10 reveals a weak connection.

Regression analysis

Lane (2013) states that regression is used to test relationships and to predict what one variable will do based on the score of the other. Regression was employed to test the hypotheses, using correlation. The purpose of correlation in regression is to test for collinearity. The purpose of regression analysis was to determine the causal influence of the study's hypotheses and to determine the extent of the connection between the dependent and independent variables. In addition, typical multiple regression analysis was used to determine the contribution of each independent variable to the overall connection. Linear regression models developed in *Microsoft Excel* from the data were also be used to test the hypotheses.

3.3 VALIDITY AND RELIABILITY ISSUES

The data obtained during the research must be reliable in terms of consistency and stability (Salkind, 2010); it needs to be transparent and cannot be misrepresented in any way (Creswell, 2009) and be reusable (Neuman, 2013). To guarantee the reliability of the survey, pilot testing was performed whereby the survey was distributed to 15 taxi entrepreneurs in Sandton in Gauteng Province, South Africa before the main study began. Conducting this pilot study allowed the researcher to make sure that the questions selected were appropriate for the taxi entrepreneurs and that they were able to respond to the research questions.

Upon completion of the pilot study, the survey was distributed to 300 taxi entrepreneurs who were selected using snowball sampling. This technique was selected because it might have been

difficult to distinguish between taxi entrepreneurs and taxi drivers since some taxi drivers may not be the actual taxi owners. Thus, to obtain reliable data, taxi entrepreneurs were selected using snowball sampling. Based on Saunders et al. (2009), snowball sampling is used when it is hard to identify members of a preferred population, in this case, taxi entrepreneurs versus taxi drivers. Saunders et al. (2009) also stated that to carry out this sampling method the researcher would need to contact one or two taxi entrepreneurs. These taxi entrepreneurs would then help to further identify other taxi entrepreneurs until a sample size of 300 participants was attained.

According to Salkind (2010), it is of great importance that the data obtained during the research is valid and addresses the research questions. The data should be acceptable (Neuman, 2013). To ensure validity, the chosen approach was to ask similar questions of all the taxi entrepreneurs. Furthermore, selecting the taxi entrepreneurs using snowball sampling ensured that only taxi entrepreneurs participated in the research, ensuring that the data collected was valid. In addition, the findings were generalised to South Africa alone as the research was carried out in South Africa and so data was valid to South Africa (Salkind, 2010). Another way to ensure the validity of the data was by researching numerous taxi entrepreneurs; 300 taxi entrepreneurs took part in the research.

In addition, the constructs of the conceptual model were tested for validity and reliability. Validity measures the precision of a tool while reliability measures the quality and uniformity of a tool. The confirmatory factor analysis (CFA), the exploratory factor analysis (EFA) and the factor analysis methods were used to evaluate this broad analysis. Indicators like fundamental factors or Kaiser-Meyer-Olkin measures were used to verify the adequacy of data for factor analysis (Hill, 2011). Cronbach's alpha was defined by Thanasegaran (2009) as a coefficient that guesses the degree of internal consistency between variables or inter-items measuring one construct. As a result, determining internal consistency is critical before any test can be utilised for research purposes in order to assure the study's validity. Therefore, the study used the Cronbach's alpha test to determine construct reliability. The Cronbach's alpha dependability of the constructs suggested great internal consistency while the aggregate Cronbach's alpha values indicated a very strong internal consistency of constructs (Pallant, 2013). Based on the above, the questionnaire was also considered reliable (DeVellis, Lewis & Sterba, 2003).

3.4 ETHICAL CLEARANCE PROCEDURES AND ETHICAL CONSIDERATIONS

Any research must adhere to ethical guidelines (Jupp, 2006). The management of ethical issues related to data gathering and analysis will be discussed in this section.

3.4.1 Ethical clearance procedures

Prior to the start of data collection, the University of South Africa (UNISA) granted ethics approval. The data collection tool of this study (a survey questionnaire) was developed and submitted to the UNISA Ethics Committee for approval. Completed and signed ethical clearance application forms were also submitted to the ethics committee. This committee assessed the submitted documentation to ascertain whether the proposed research and the survey questions to be asked during data gathering conformed to the ethical standards for research. Approval was granted after the ethics committee was satisfied that the research met the ethics requirements and they provided ethical clearance in the form of a signed document. Once the ethical clearance from the University of South Africa ethics committee was obtained, the data collection process resumed.

3.4.2 Ethical considerations

For the research to adhere to the ethical guidelines, the researcher explained to the taxi entrepreneurs what the research was about and what it would be used for, assuring them that participation was voluntary and provided them with consent and confidentiality forms. Anonymity was also maintained during surveys. The taxi entrepreneurs, for privacy's sake, were not named. They were also provided with a copy of the ethical clearance approval document obtained from the University of South Africa to assure them that the research was purely for research purposes.

3.5 CHAPTER SUMMARY

The purpose of this chapter was to outline the research approach used in the study to answer the research questions. The research onion model was used to structure and describe the research design and methodology. First, the research paradigm, positivism, was identified and then the deductive approach was determined to be the appropriate research approach for the study. A survey was chosen as the appropriate research strategy for collecting data from taxi entrepreneurs in Sandton in Gauteng Province, South Africa. The data was analysed quantitatively. Validity

and reliability issues were also discussed. Ethical concerns and ethical clearance procedures were also taken into account and described. The following chapter looks at the data and discusses the results of the research. It will also discuss how the research was conducted.

CHAPTER 4 – DATA ANALYSIS AND RESULTS

The findings of the study are presented and discussed in this chapter. The IBM *Statistical Package for the Social Sciences* (*SPSS*) version 26 software package was used to analyse the data generated through the questionnaires. To identify the study's aim and objectives, descriptive, inferential and reliability statistics were applied to the data.

This chapter is divided into the following sections: Section 4.1 outlines the data screening procedure and Section 4.2 discusses demographic data. The variables' descriptive statistics are discussed in Section 4.3. The exploratory factor analysis is explained in Section 4.4. Section 4.5 looks at the reliability of the constructs. The correlation analysis is done in Section 4.6. To answer the research questions, the relationship between predictor and predicted variables is explored in Section 4.7. Section 4.8 discusses the final research model and a summary of the chapter is given in Section 4.9.

4.1 DATA SCREENING

A total of 300 completed responses were received from the questionnaires that had been distributed within the South African taxi industry of which 47 were excluded due to missing data. There were 253 valid responses and the response rate was 84.33%. All the returned questionnaires were suitable for analysing.

4.2 RESPONDENT DEMOGRAPHICS

The demographic information of the 253 participants is shown in Tables 4.2-1 to 4.2-11.

4.2.1 Gender

In terms of gender, 224 (88.5%) males and 29 (11.5%) females responded. There were more males than females who participated in the survey, which showed that the taxi industry is male-dominated. The number of respondents is shown in Table 4.2-1.

Table 4.2-1: Gender

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
GENDER	Male	224	88.5	253
	Female	29	11.5	

4.2.2 Age

In terms of age, 106 (41.9%) were from the age group 31–40 years. Fifty-seven (22.5%) respondents were aged 25 to 30 years and 44 (17.4%) were under 25 years of age. In addition, 29 (11.5%) respondents were between 41 and 50 years old and 17 (6.7%) respondents were in the age group of over 50 years. The observation was that the taxi industry is dominated by taxi entrepreneurs in the age group of 31–40 years. The number of respondents is shown in Table 4.2-2.

Table 4.2-2: Age

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
AGE	Less than 25 years	44	17.4	253
	25–30 years	57	22.5	
	31–40 years	106	41.9	
	41–50 years	29	11.5	
	More than 50 years	17	6.7	

4.2.3 Qualifications

With respect to qualifications, 75 (29.6%) diploma or degree holders responded; 74 (29.2%) of the respondents had Matric (Grade 12); 71 (28.1%) were Certificate holders; 15 (5.9%) respondents had a postgraduate qualification and 18 (7.1%) had other qualifications. The observation was that the taxi industry is dominated by educated taxi entrepreneurs with only a few who have postgraduate qualifications. Table 4.2-3 displays the number of respondents.

Table 4.2-3: Qualifications

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
QUALIFICATIONS	Matric (Grade 12)	74	29.2	253
	Certificate (1–2 years)	71	28.1	
	Diploma / Degree	75	29.6	
	Postgraduate	15	5.9	
	Other	18	7.1	

4.2.4 Entrepreneurial experience

Regarding entrepreneurial experience, 101 (39.9%) had 1–3 years of entrepreneurial experience; 66 (26.1%) had less than one year's entrepreneurial experience; 59 (23.3%) had 3–10 years of entrepreneurial experience and a further 27 (10.7%) had over 10 years of entrepreneurial experience. The observation was that the taxi industry is dominated by taxi entrepreneurs with 1–3 years of entrepreneurial experience. The number of respondents is shown in Table 4.2-4.

Table 4.2-4: Entrepreneurial Experience

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
ENTREPRENEURIAL EXPERIENCE	Less than 1 year	66	26.1	253
	1–3 years	101	39.9	
	Between 3 and 10 years	59	23.3	
	More than 10 years	27	10.7	

4.2.5 Handheld devices

With regard to handheld devices, 25 (9.9%) had novice mobile cell phone experience; 109 (43.1%) had competent mobile cell phone experience; 119 (47%) had expert mobile cell phone experience; 53 (20.9%) had novice tablet computer experience; 132 (52.2%) had competent tablet computer experience and 68 (26.9%) had expert tablet computer experience. The observation was that the taxi industry is dominated by taxi entrepreneurs who are experts in using mobile cellphones, however, when it comes to tablet computers, the taxi industry is dominated by taxi entrepreneurs who are competent. The number of respondents is shown in Table 4.2-5.

Table 4.2-5: Handheld devices

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
MOBILE CELL PHONE EXPERIENCE	Novice	25	9.9	253
	Competent	109	43.1	
	Expert	119	47.0	
TABLET COMPUTER EXPERIENCE	Novice	53	20.9	253
	Competent	132	52.2	
	Expert	68	26.9	

4.2.6 *Google Maps* experience

As for *Google Maps* experience, 51 (20.2%) had novice experience; 143 (56.5%) had competent experience and 59 (23.3%) had expert experience. The observation was that the taxi industry is dominated by taxi entrepreneurs who are competent in using *Google Maps*. The number of respondents is shown in Table 4.2-6.

Table 4.2-6: Google Maps Experience

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
GOOGLE MAPS EXPERIENCE	Novice	51	20.2	253
	Competent	143	56.5	
	Expert	59	23.3	

4.2.7 Shared economy experience (Uber/Bolt/Taxify)

When it comes to shared economy experience, 52 (20.6%) had novice experience; 130 (51.4%) had competent experience and 71 (28.1%) had expert experience. The observation was that the taxi industry is dominated by taxi entrepreneurs who are competent in using Uber/Bolt/Taxify. The number of respondents is shown in Table 4.2-7.

Table 4.2-7: Shared Economy Experience

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
SHARED ECONOMY EXPERIENCE	Novice	52	20.6	253
	Competent	130	51.4	
	Expert	71	28.1	

4.2.8 GPS technology experience

In terms of GPS technology experience, 35 (13.8%) had novice experience; 106 (41.9%) had competent experience and 112 (44.3%) had expert experience. The observation was that the taxi industry is dominated by taxi entrepreneurs who are competent in using GPS. The number of respondents is shown in Table 4.2-8.

Table 4.2-8: GPS Technology Experience

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
GPS EXPERIENCE	Novice	35	13.8	253
	Competent	106	41.9	
	Expert	112	44.3	

4.2.9 Experience in using SMS in the taxi industry

With regard to SMS experience, 28 (11.1%) had novice experience; 94 (37.2%) had competent experience and 131 (51.8%) had expert experience. The observation was that the taxi industry is dominated by taxi entrepreneurs who are competent in using SMS. The number of respondents is shown in Table 4.2-9.

Table 4.2-9: Experience in using SMS in the taxi industry

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
SMS EXPERIENCE	Novice	28	11.1	253
	Competent	94	37.2	
	Expert	131	51.8	

4.2.10 Experience in using email in the taxi industry

In terms of electronic mail (e-mail) experience, 42 (16.6%) had novice experience; 118 (46.6%) had competent experience and 93 (36.8%) had expert experience. The observation was that the taxi industry is dominated by taxi entrepreneurs who are competent in using email. The number of respondents is shown in Table 4.2-10.

Table 4.2-10: Experience in using email in the taxi industry

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
ELECTRONIC MAIL (E-MAIL) EXPERIENCE	Novice	42	16.6	253
	Competent	118	46.6	
	Expert	93	36.8	

4.2.11 Experience in using phone calls in the taxi industry

In connection with phone call experience, 17 (6.7%) had novice experience; 81 (32%) had competent experience and 155 (61.3%) had expert experience. The observation was that the taxi industry is dominated by taxi entrepreneurs who are experts at using phone calls. The number of respondents is shown in Table 4.2-11.

Table 4.2-11: Experience in using Phone Calls in the taxi industry

BIOGRAPHICAL INFORMATION			Percentage	TOTAL
PHONE CALL EXPERIENCE	Novice	17	6.7	253
	Competent	81	32.0	
	Expert	155	61.3	

The next section presents the descriptive statistics per the variables, namely Taxi Entrepreneurs' Perceived Usefulness (PU), Taxi Entrepreneurs' Perceived Ease of Use (PEOU), Taxi Entrepreneurs' Attitude Towards Use (ATU), Taxi Entrepreneurs' Behavioural Intention (BI), Taxi Entrepreneurs' Actual System Use (ASU), Taxi Entrepreneurs' Perceived Customer's Trust (PCT), Taxi Entrepreneurs' Perceived Safety (PS), and Taxi Entrepreneurs' Perceived Convenience of Accessibility (PCA).

4.3 DESCRIPTIVE STATISTICS OF TAM VARIABLES

This section presents descriptive statistics of TAM variables. For each instrument, the statistics are displayed per construct as shown in Table 4.3-1. The analysis then follows.

Table 4.3-1: Statistics per Instrument

Constructs	Mean	Standard Deviation
Taxi Entrepreneurs' Perceived Usefulness (PU)	3.23	1.08
Taxi Entrepreneurs' Perceived Ease of Use (PEOU)	3.33	1.09
Taxi Entrepreneurs' Perceived Convenience of Accessibility (PCA)	3.56	0.93
Taxi Entrepreneurs' Perceived Customer's Trust (PCT)	3.60	0.87
Taxi Entrepreneurs' Attitude Towards Use (ATU)	4.36	0.74
Taxi Entrepreneurs' Behavioural Intention (BI)	4.08	0.81
Taxi Entrepreneurs' Actual System Use (ASU)	4.09	0.80
Total Mean	3.70	0.90

A Likert scale with values ranging from one (strongly disagree) to five (strongly agree) was used in the questionnaire. Mean scores ranged from 3.23 to 4.36. The lowest mean score (M =3.23, SD = 1.08) was obtained for Taxi Entrepreneurs' Perceived Usefulness. The highest mean score (M = 4.36, SD = 0.74) was obtained for Taxi Entrepreneurs' Attitude Towards Use.

The highest standard deviation of 1.09 was on Taxi Entrepreneurs' Perceived Ease of Use (PEOU) and the lowest was 0.74 on Taxi Entrepreneurs' Attitude Towards Use (ATU). The bigger the standard deviation, the more the data was spread over a larger range of values. A lower standard deviation, on the other hand, indicates that the data was scattered tightly around the mean. The total statistic is N = 253; Mean 3.70; SD = 0.90, which shows the extent of central tendency for the variables being considered.

4.4 EXPLORATORY FACTOR ANALYSIS

To test the validity and the reliability of the constructs in the conceptual model, both factor analysis methods, the Confirmatory Factor Analysis (CFA) and the Exploratory Factor Analysis (EFA) were used. The subsections that follow will discuss the validity tests, while the reliability

test of the constructs will be discussed in Section 4.5.

4.4.1 Bartlett's test of sphericity and the Kaiser-Meyer-Olkin value

Bartlett's test of sphericity was used to examine partial correlations as well as bivariate correlations to further investigate the matrix's factorability. In addition, the Kaiser-Meyer-Olkin (KMO) sample adequacy metric was examined during the analysis to assess sampling adequacy. The results of Bartlett's sphericity test, the Kaiser-Meyer-Olkin (KMO) value, are shown in Table 4.4-1. The degree of shared variation across the nine variables (PU, PEOU, BI, ATU, ASU, PCA, PCT, PS and PP) is 0.892, according to Pallant (2013), and is substantial enough to undertake a factor analysis (KMO > 0.6). The p-value of Bartlett's test ($p < 0.000$), which is below 0.01, is significant at the 99% confidence level. It is suitable for factor analysis because a 99% confidence level displays significance. Hence, as a result of the findings of these tests, the factor analysis can be judged appropriate.

In principle, precise pointers like inherent factors or Kaiser-Meyer-Olkin measures can be applied to verify the adequacy of data for factor analysis (Hill, 2011). Before proceeding with EFA, several various assumptions must be tested. Two tests were applied to test the appropriateness of the execution of factors analysis. The first test was to investigate the sufficiency and suitability of the data or KMO. The other test was Bartlett's Test. Table 4.4-1 shows results for KMO and Bartlett's Test, which show that both were significant with 0.886 and Chi-Square of 1345.695 at $p<0.001$, respectively.

4.4.2 Communalities

The communalities show how closely an individual item is related to the other ones (Hartung & Knapp, 2005; Pallant, 2013). A value close to one (1) implies that an item has a strong correlation with the others. Items with low communalities (below 0.3) should be removed from the equation (Pallant, 2013; Rohani et al., 2009). The communalities for all 30 items were observed to be reasonable when a method of extraction called the Principal Component Analysis was used.

Communalities, according to Boduszek (2016), can be regarded as the R2 for each of the variables included in the research. It denotes the proportion of variance explained by the factors for each item. This is calculated from the initial solution and then extracted. Table 4.4-1 shows the results.

Table 4.4-1: Total Variance

Total Variance Explained									
Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	10,395	34,649	34,649	10,395	34,649	34,649	6,576	21,921	21,921
2	5,200	17,334	51,983	5,200	17,334	51,983	4,466	14,887	36,809
3	2,320	7,733	59,715	2,320	7,733	59,715	4,401	14,672	51,481
4	1,697	5,656	65,372	1,697	5,656	65,372	3,212	10,706	62,186
5	1,666	5,553	70,925	1,666	5,553	70,925	2,260	7,535	69,721
6	1,436	4,788	75,713	1,436	4,788	75,713	1,665	5,550	75,271
7	1,339	4,463	80,176	1,339	4,463	80,176	1,471	4,905	80,176
8	0,732	2,439	82,615						
9	0,615	2,049	84,664						
10	0,522	1,739	86,402						
11	0,442	1,473	87,875						
12	0,398	1,326	89,202						
13	0,364	1,215	90,416						
14	0,340	1,134	91,550						
15	0,306	1,019	92,568						
16	0,283	0,943	93,512						
17	0,233	0,778	94,289						

Total Variance Explained									
Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
19	0,217	0,724	95,753						
20	0,185	0,617	96,370						
21	0,184	0,613	96,983						
22	0,150	0,501	97,484						
23	0,135	0,449	97,933						
24	0,113	0,376	98,308						
25	0,105	0,350	98,658						
26	0,100	0,334	98,992						
27	0,092	0,307	99,299						
28	0,079	0,265	99,564						
29	0,070	0,235	99,798						
30	0,061	0,202	100,000						
Extraction Method: Principal Component Analysis.									

Initial communalities are approximations of the variance in each variable accounted for by all components or factors, as seen in the table above. The variance in each variable accounted for by the components in the factor solution is estimated by extraction communalities. In this analysis, values less than four (4) were ignored. The number of components extracted in the first phase was equal to the number of variables. This indicates that all of the original variability explained by the components and communalities was reduced to a single value. These are the communalities once the number of selected components has been set, for example, one rule based on the eigenvalues above (Mazzochi, 2008). Specifically, communalities show the degree of variance that is accounted for in each variable.

4.4.3 Principal component analysis

The surveys were examined using exploratory factor analysis (EFA) based on the principal component analysis (PCA) technique and the Varimax method to evaluate distinctions among the decision variables. The primary goal of utilising Varimax was to identify hidden constructs that were not evident through direct analysis (Pallant, 2013). As an initial solution, principal component analysis was carried out on the eight variables (PU, PEOU, ATU, ASU, BI, PCT, PCA and PP) in the questionnaire before rotating the factors to estimate the factorability of the correlation matrix and the likely number of factors.

The construct Taxi Entrepreneurs' Perceived Pricing had lower loadings and eigenvalues less than 1.0, hence it was removed from this investigation. The findings of the total variance explained are shown in Table 4.4-2, which is an extract from the component matrix. The results consist of seven variables (PU, PEOU, ATU, ASU, BI, PCT and PCA) that have eigenvalues greater than 1.0 as shown in Tables 4.4-2 which is above 60 per cent of the threshold required.

Table 4.4-2: Rotated Component Matrix

Rotated Component Matrix[a]							
	Component						
	1	2	3	4	5	6	7
B1_1			0,870				
B1_2			0,842				
B1_3			0,885				
B1_4			0,895				

Rotated Component Matrix[a]							
	Component						
	1	2	3	4	5	6	7
B1_5			0,856				
C2_1		0,847					
C2_2		0,864					
C2_3		0,895					
C2_4		0,856					
C2_5		0,839					
D3_1	-0,693						
D3_2	0,787						
D3_3	0,870						
D3_4	-0,663						
D3_5	0,890						
E4_1	0,834						
E4_2	0,870						
E4_3	0,860						
E4_4	0,722						
F5_1				0,782			
F5_2				0,829			
F5_3				0,842			
F5_4				0,825			
H7_4							0,835
H7_5							0,830
I8_1						0,888	
I8_2						0,901	
J9_1					0,796		
J9_3					0,841		
J9_4					0,876		
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.							
a. Rotation converged in 7 iterations.							

The visual inspection of the scree plot was applied to find the number of factors that are ideal to be analysed. The scree plot findings are shown in Figure 4.4-1. The scree plot did not provide a clear indication of which components should be kept. Eigenvalues above one (1) were considered. All the eigenvalues were plotted in their decreasing order. However, considering the different criteria used, a decision was made to extract seven variables (PU, PEOU, ATU, ASU, BI, PCT and PCA) as shown in Figure 4.4-1.

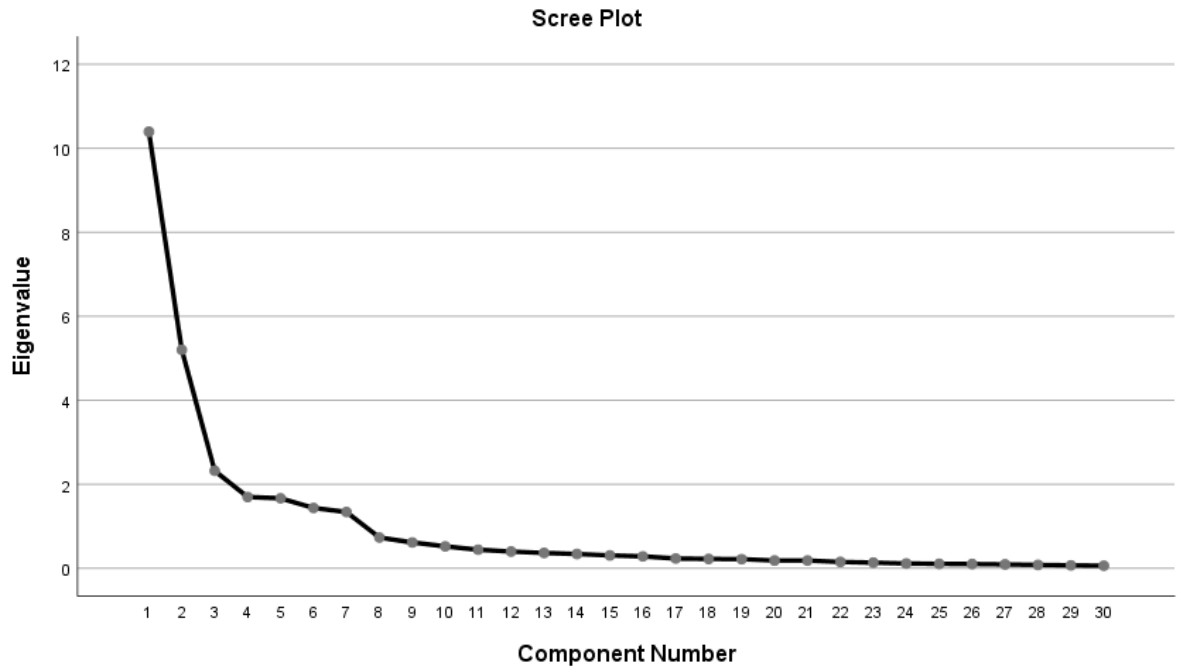


Figure 4.4-1 - Scree Plot

Because the eigenvalues began to dip below one (1) beyond that point, the scree plot of the factors and eigenvalues visually confirmed that a four-factor structure was a reasonable estimate.

4.5 RELIABILITY OF THE CONSTRUCTS

Cronbach's alpha was defined by Thanasegaran (2009) as a coefficient that estimates the extent of internal consistency between variables or inter-items measuring one construct. As such, internal consistency must be determined before any test can be used for research purposes—to ensure the validity of the study. In this study, the Cronbach's alpha coefficient per construct was reported in Table 4.5-1.

The study, therefore, applied a measure of construct reliability based on the Cronbach's alpha test. The overall Cronbach's alpha value is 0.939 and in Table 4.5-1 the Cronbach's alpha values for most constructs were shown between 0.8 and 0.9, indicating very good internal consistency of constructs whereas the Cronbach's alpha reliability of the constructs Taxi Entrepreneurs' Perceived Usefulness, Taxi Entrepreneurs' Perceived Ease of Use, Taxi Entrepreneurs' Attitude Towards Use, Taxi Entrepreneurs' Behavioural Intention, Taxi Entrepreneurs' Actual System Use and Taxi Entrepreneurs' Perceived Customer's Trust was above 0.9, indicating excellent internal consistency (Pallant, 2013). In addition, the reliability coefficient for Taxi

Entrepreneurs' Perceived Convenience of Accessibility was above 0.70 and this value was an adequate reliability value. On the other hand, the Cronbach's alpha for Taxi Entrepreneurs' Perceived Ease of Use was 0.963 and was the highest. Therefore, the sightings on the instruments or questionnaire were considered as most reliable except for Taxi Entrepreneurs' Perceived Pricing and Taxi Entrepreneurs' Perceived Safety. As a result, the data collection instrument (the questionnaire) was found to be reliable.

As can be seen from Table 4.5-1, the reliability analysis of the questionnaire showed that Cronbach's alpha reliability coefficient for internal consistency of the questionnaire was 0.945, indicating that the questionnaire had good internal consistency (DeVellis et al., 2003).

Table 4.5-1: Cronbach's Alpha Coefficient per Instrument

Constructs	**Total Cronbach's alpha α**	**Number of Items**
Taxi Entrepreneurs' Perceived Usefulness (PU)	0.961	5
Taxi Entrepreneurs' Perceived Ease of Use (PEOU)	0.963	5
Taxi Entrepreneurs' Attitude Towards Use (ATU)	0.929	5
Taxi Entrepreneurs' Behavioural Intention (BI)	0.913	4
Taxi Entrepreneurs' Actual System Use (ASU)	0.935	4
Taxi Entrepreneurs' Perceived Pricing (PP)	0.257	3
Taxi Entrepreneurs' Perceived Safety (PS)	0.385	4
Taxi Entrepreneurs' Perceived Convenience of Accessibility (PCA)	0.781	2
Taxi Entrepreneurs' Perceived Customer's Trust (PCT)	0.935	3

Number of participants (N) = 253

4.6 CORRELATION ANALYSIS

To determine if there was a link between TAM variables (PU, PEOU, ATU, ASU and BI) and user approval of transportation management systems, Pearson correlation was used. A measure

of the strength of a linear relationship between two variables is the Pearson product–moment correlation coefficient (Lane, 2013). Using the PCA-generated indexes, the Pearson correlation coefficient was used to determine whether any of the theory's constructs have a significant impact on the adoption of transport management systems in the context of the South African taxi industry. In this section, the relationship between the variables Taxi Entrepreneurs' Perceived Usefulness, Taxi Entrepreneurs' Perceived Ease of Use, Taxi Entrepreneurs' Attitude Towards Use, Taxi Entrepreneurs' Behavioural Intention, Taxi Entrepreneurs' Actual System Use, Taxi Entrepreneurs' Perceived Customer's Trust, Taxi Entrepreneurs' Perceived Safety, and Taxi Entrepreneurs' Perceived Convenience of Accessibility is discussed. The relationship between these constructs was expressed using Pearson correlations as shown in Table 4.6-1 and Table 4.6-2.

Table 4.6-1: Multivariate Correlations

	Taxi Entrepreneurs' Perceived Usefulness	Taxi Entrepreneurs' Perceived Ease of use	Taxi Entrepreneurs' Attitude Towards Use	Taxi Entrepreneurs' Behavioral Intention	Taxi Entrepreneurs' Actual System Use	Taxi Entrepreneurs' Perceived Customer's Trust	Taxi Entrepreneurs' Perceived Safety	Taxi Entrepreneurs' Perceived Convenience of Accessibility
Taxi Entrepreneurs' Perceived Usefulness	1.0000	0.6098	0.2536	0.1963	0.1690	0.2847	0.1188	0.1668
Taxi Entrepreneurs' Perceived Ease of use		1.0000	0.3844	0.2711	0.2203	0.1914	0.0592	0.1226
Taxi Entrepreneurs' Attitude Towards Use			1.0000	0.8093	0.6073	0.1318	0.1204	0.1251
Taxi Entrepreneurs' Behavioral Intention				1.0000	0.5905	0.1344	0.0593	0.0788
Taxi Entrepreneurs' Actual System Use					1.0000	0.2397	0.0482	0.1219
Taxi Entrepreneurs' Perceived Customer's Trust						1.0000	0.0847	0.0970
Taxi Entrepreneurs' Perceived Safety							1.0000	-0.0716
Taxi Entrepreneurs' Perceived Convenience of Accessibility								1.0000

Table 4.6-2: Correlation Probability

	Taxi Entrepreneurs' Perceived Usefulness	Taxi Entrepreneurs' Perceived Ease of use	Taxi Entrepreneurs' Attitude Towards Use	Taxi Entrepreneurs' Behavioral Intention	Taxi Entrepreneurs' Actual System Use	Taxi Entrepreneurs' Perceived Customer's Trust	Taxi Entrepreneurs' Perceived Safety	Taxi Entrepreneurs' Perceived Convenience of Accessibility
Taxi Entrepreneurs' Perceived Usefulness	<.0001	<.0001	<.0001	0.0017	0.0071	<.0001	0.0592	0.0078
Taxi Entrepreneurs' Perceived Ease of use		<.0001	<.0001	<.0001	0.0004	0.0022	0.3483	0.0515
Taxi Entrepreneurs' Attitude Towards Use			<.0001	<.0001	<.0001	0.0361	0.0557	0.0469
Taxi Entrepreneurs' Behavioral Intention				<.0001	<.0001	0.0326	0.3478	0.2117
Taxi Entrepreneurs' Actual System Use					<.0001	0.0001	0.4456	0.0528
Taxi Entrepreneurs' Perceived Customer's Trust						<.0001	0.1795	0.1238
Taxi Entrepreneurs' Perceived Safety							<.0001	0.2567
Taxi Entrepreneurs' Perceived Convenience of Accessibility								<.0001

The following subsection will discuss how regression analysis was employed to test the hypotheses, using correlation. The purpose of correlation in regression analysis is to test for collinearity. According to Lane (2013), a correlation greater than or equal to 0.50 indicates a huge correlation exists, greater than or equal to 0.30 shows that medium correlation exists, greater than or equal to 0.10 displays that the correlation is small and a weak relationship is displayed by a correlation less than 0.10.

4.6.1 Hypotheses testing

The hypotheses were tested using regression analysis with the objective to find relationships between independent and dependent variables and then make a prediction based on the effect of changes in one variable on the other.

This led to the testing of the following hypotheses with regression analysis:

H1 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on attitude towards use (ATU) of the transport management systems.

H2 – Taxi entrepreneurs' perceived ease of use (PEU) has a positive influence on attitude towards use (ATU) of the transport management systems.

H4 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on attitude towards use (ATU) of the transport management systems.

H5 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on attitude towards use (ATU) of the transport management systems.

H6 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on attitude towards use (ATU) of the transport management systems.

H8 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) of the transport management systems.

Thus, correlation enabled carrying out regression to test causal effect.

This led to the testing of the following hypotheses with regression analysis:

H13 – Taxi entrepreneurs' attitude towards use (ATU) has a positive influence on behavioural intention (BI) on the transport management systems.

H14 – Taxi entrepreneurs' behavioural intention (BI) has a positive influence on actual system use (ASU) of the transport management systems.

Therefore, there was a medium positive relationship between Taxi Entrepreneurs' Perceived Ease of Use and Taxi Entrepreneurs' Attitude Towards Use.

4.7 THE RELATIONSHIP BETWEEN THE PREDICTOR AND PREDICTED VARIABLE

This subsection will present the results of the regression analysis, where the relationship regarding linear regression is discussed. According to Lane (2013), regression analysis is used to test relationships and to predict what one variable will do based on the score of the other. As already mentioned, the predicted variables in this study, were Taxi Entrepreneurs' Behavioural Intention, Taxi Entrepreneurs' Actual System Use and Taxi Entrepreneurs' Attitude Towards Use. In addition, the predictor variables were Taxi Entrepreneurs' Perceived Usefulness, Taxi Entrepreneurs' Perceived Ease of Use, Taxi Entrepreneurs' Perceived Customer's Trust, Taxi Entrepreneurs' Perceived Safety and Taxi Entrepreneurs' Perceived Convenience of Accessibility.

4.7.1 Taxi entrepreneurs' actual system use

The type of relationship between variables was scrutinised using regression analysis. The coefficient of regression (R^2) for Taxi Entrepreneurs' Actual System Use was 0.35 and this indicated a medium effect of Taxi Entrepreneurs' Behavioural Intention on Taxi Entrepreneurs' Actual System Use. This relationship is displayed in Table 4.7-1.

Table 4.7-1: Model Summary Regression Analysis Actual System Use

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.590[a]	0,349	0,346	0,65385

4.7.2 Taxi entrepreneurs' behavioural intention

The coefficient of regression (R^2) for Taxi Entrepreneurs' Behavioural Intention was 0.45, which indicated that the independent variables influenced the dependent variables to a less extent (Taxi Entrepreneurs' Behavioural Intention). This is illustrated in Table 4.7-2.

Table 4.7-2: Model Summary Regression Analysis Behavioural Intention

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.673[a]	0,453	0,439	0,60616
a. Predictors: (Constant), Taxi Entrepreneurs' Attitude Towards Use, Taxi Entrepreneurs' Perceived Ease of Use				

4.7.3 Taxi entrepreneurs' attitude towards use

The coefficient of regression (R^2) for Taxi Entrepreneurs' Attitude Towards Use was 0.01. This value indicated the low effect of the independent variable on Taxi Entrepreneurs' Attitude Towards Use as displayed in Table 4.7-3. A coefficient of regression of greater than 0.30 indicated a medium magnitude on Taxi Entrepreneurs' Attitude Towards Use and above 0.050 indicated a high magnitude of Taxi Entrepreneurs' Attitude Towards Use of transport management systems.

Table 4.7-3: Model Summary Regression Analysis Attitude Towards Use

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.305[a]	0,093	0,075	0,24721
a. Predictors: (Constant), Taxi Entrepreneurs' Perceived Safety, Taxi Entrepreneurs' Perceived Convenience of Accessibility, Taxi Entrepreneurs' Perceived Customer's Trust, Taxi Entrepreneurs' Perceived Ease of Use, Taxi Entrepreneurs' Perceived Usefulness				

4.7.4 Analysis of variance and parameter estimates

Taxi Entrepreneurs' Behavioural Intention had a high influence in predicting the Taxi Entrepreneurs' Actual System Use as displayed in Table 4.7-4 and Table 4.7-5.

Table 4.7-4: ANOVA Actual System Use

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	**Regression**	57,442	1	57,442	134,362	0.000[b]
	Residual	107,307	251	0,428		
	Total	164,749	252			
a. Dependent Variable: Taxi Entrepreneurs' Actual System Use						
b. Predictors: (Constant), Taxi Entrepreneurs' Behavioural Intention						

Table 4.7-5: Coefficients Actual System Use

Coefficients[a]						
Model		**Unstandardised Coefficients**		**Standardised Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	**(Constant)**	1,684	0,211		7,964	0,000
	Behavioural Intention	0,590	0,051	0,590	11,591	0,000
a. Dependent Variable: Taxi Entrepreneurs' Actual System Use						

Taxi Entrepreneurs' Attitude Towards Use and Taxi Entrepreneurs' Perceived Ease of Use had less influence in predicting the Taxi Entrepreneurs' Behavioural Intention as depicted in Table 4.7-6 and Table 4.7-7.

Table 4.7-6: ANOVA Behavioural Intention

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	**Regression**	74,736	6	12,456	33,901	0.000[b]
	Residual	90,386	246	0,367		
	Total	165,122	252			
a. Dependent Variable: Taxi Entrepreneurs' Behavioural Intention						
b. Predictors: (Constant) Taxi Entrepreneurs' Attitude Towards Use, Taxi Entrepreneurs' Perceived Ease of Use						

Table 4.7-7: Coefficients Behavioural Intention

Coefficients[a]						
Model		**Unstandardised Coefficients**	**Standardised Coefficients**		**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	**(Constant)**	-2,828	0,523		-5,408	0,000
	Perceived Ease of Use	0,079	0,045	0,107	1,771	0,078
	Perceived Usefulness	-0,035	0,046	-0,047	-0,753	0,452
	Attitude Towards Use	2,011	0,156	0,639	12,891	0,000
	Perceived Safety	-0,027	0,047	-0,028	-0,584	0,559
	Perceived Convenience of Accessibility	0,014	0,042	0,016	0,342	0,733
	Perceived Customer's Trust	0,070	0,046	0,075	1,526	0,128
a. Dependent Variable: Behavioural Intention						

Taxi Entrepreneurs' Perceived Safety, Taxi Entrepreneurs' Perceived Convenience of Accessibility,

Taxi Entrepreneurs' Perceived Customer's Trust, Taxi Entrepreneurs' Perceived Ease of Use and Taxi Entrepreneurs' Perceived Usefulness had little influence on predicting Taxi Entrepreneurs' Attitude Towards Use as displayed in Table 4.7-8 and Table 4.7-9.

Table 4.7-8: ANOVA Attitude Towards Use

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	**Regression**	1,552	5	0,310	5,078	0.000[b]
	Residual	15,095	247	0,061		
	Total	16,647	252			
a. Dependent Variable: Taxi Entrepreneurs' Attitude Towards Use						
b. Predictors: (Constant), Taxi Entrepreneurs' Perceived Safety, Taxi Entrepreneurs' Perceived Convenience of Accessibility, Taxi Entrepreneurs' Perceived Customer's Trust, Taxi Entrepreneurs' Perceived Ease of Use, Taxi Entrepreneurs' Perceived Usefulness						

Table 4.7-9: Coefficients Attitude Towards Use

Coefficients[a]						
Model		**Unstandardised Coefficients**		**Standardised Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	**(Constant)**	2,895	0,108		26,912	0,000
	Taxi Entrepreneurs' Perceived Ease of Use	0,048	0,018	0,205	2,682	0,008
	Taxi Entrepreneurs' Perceived Usefulness	0,025	0,019	0,104	1,316	0,190
	Taxi Entrepreneurs' Perceived Customer's Trust	0,001	0,019	0,004	0,056	0,955
	Taxi Entrepreneurs' Perceived Convenience of Accessibility	0,010	0,017	0,037	0,596	0,552
	Taxi Entrepreneurs' Perceived Safety	0,023	0,019	0,076	1,231	0,220
a. Dependent Variable: Taxi Entrepreneurs' Attitude Towards Use						

4.7.5 Assessment of hypotheses

This section will discuss in detail the proposed hypothesised relationships between constructs that were tested. Both supported and unsupported hypotheses will be discussed.

The results supported that:

H2 – Taxi entrepreneurs' perceived ease of use (PEU) has a positive influence on attitude towards use (ATU) of the transport management systems.

The results did not support that:

H1 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on attitude towards use (ATU) of the transport management systems.

H4 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on attitude towards use (ATU)

of the transport management systems.
H5 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on attitude towards use (ATU) of the transport management systems.
H6 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on attitude towards use (ATU) of the transport management systems.
H8 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) of the transport management systems.

The regression ($R = 0.45$) is statistically significant for the dependent variable Taxi Entrepreneurs' Behavioural Intention ($F = 33,90$; $p < 0.05$), accounting for 45%, and Adjusted R Square = 0.49 of the variances as depicted in Table 4.6-2. No other variable indicates an exceptional contribution that is substantial for the prediction of Taxi Entrepreneurs' Behavioural Intention with regards to Taxi Entrepreneurs' Perceived Ease of Use of transport management systems.

The results supported that:
H13 – Taxi entrepreneurs' attitude towards use (ATU) has a positive influence on behavioural intention (BI) on the transport management systems.
H14 – Taxi entrepreneurs' behavioural intention (BI) has a positive influence on actual system use (ASU) of the transport management systems.

Taxi Entrepreneurs' Behavioural Intention revealed a significant relationship with Taxi Entrepreneurs' Attitude Towards Use ($r = 0.453$; $p < 0.05$), and Taxi Entrepreneurs' Perceived Ease of Use on Taxi Entrepreneurs' Attitude Towards Use ($r = 0.09$; $p < 0.05$) as shown in Table 4.6-2 and Table 4.6-3.

The results of a standard multiple regression analysis were presented with the constructs of Taxi Entrepreneurs' Perceived Usefulness, Taxi Entrepreneurs' Perceived Ease of Use, Taxi Entrepreneurs' Perceived Customer's Trust, Taxi Entrepreneurs' Perceived Safety, and Taxi Entrepreneurs' Perceived Convenience of Accessibility as independent variables. The three (3) constructs, Taxi Entrepreneurs' Attitude Towards Use, Taxi Entrepreneurs' Actual System Use and Taxi Entrepreneurs' Behavioural Intention were the dependent variables. In order to determine the causal effects and also to determine the relationships between the dependent and independent variables, the study's hypotheses, regression analysis was used. In addition, standard multiple regression analysis was also used to determine the

contribution of each independent variable to the overall connection.

The regression (R = 0.093) was statistically significant for the dependent variable Taxi Entrepreneurs' Attitude Towards Use (F = 5,09; $p < 0.05$) accounting for 9%, and Adjusted R Square = 0.08 of the variance as displayed in Table 4.6-3. No other constructs indicated an exceptional contribution that was substantial for the prediction of Taxi Entrepreneurs' Attitude Towards Use, not even Taxi Entrepreneurs' Perceived Usefulness, Taxi Entrepreneurs' Perceived Customer's Trust, Taxi Entrepreneurs' Perceived Safety and Taxi Entrepreneurs' Perceived Convenience of Accessibility.

The results did not support that:

H8 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) of the transport management systems.

In terms of the dependent variable, Taxi Entrepreneurs' Actual System Use, the regression (R = 0.45) was statistically significant (F = 134.36; $p < 0.05$) accounting for 45%, and Adjusted R Square = 0.346 of the variance as illustrated in Table 4.6-1. The behavioural intention of taxi entrepreneurs (t = 11,591; $p < 0.05$) indicated an exceptional contribution that was significant for the prediction of Taxi Entrepreneurs' Actual System Use of transport management systems.

4.8 THE FINAL RESEARCH MODEL

This study introduced a framework based on TAM, which was used to investigate factors that influence taxi entrepreneurs' intentions to adopt transport management systems in the South African taxi industry. The independent variables that affect the use of transport management systems were perceived ease of use (PEOU), attitude towards use (ATU), behavioural intention (BI) and actual system use (ASU). The relationships between the variables PEOU and ATU, ATU and BI, and BI and ASU were significant. On the other hand, the relationships between the variables PU, PP, PS, PCA, PCT and ATU; and PU, PP, PS, PCA, PCT and BI were not significant. The moderation roles of PEOU and ATU, ATU and BI, and BI and ASU were investigated. These hypotheses were positively significant and accepted. The relationship between BI and PEOU was found to be indirectly significant through ATU and was accepted. Table 4.8-1 summarises the hypotheses and states whether they are supported or not. This table shows that a total of fourteen hypotheses were tested.

Table 4.8-1: The Decision Made for Each Hypothesis.

Hypotheses	**P-Value**	**Decision**
H1 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on attitude towards the use (ATU) of the transport management systems.	0.190	Not supported
H2 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on attitude towards the use (ATU) of the transport management systems.	0.008	Supported
H3 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on attitude towards the use (ATU) of the transport management systems.	N/A (no p-value because the perceived pricing construct was excluded from further analysis because it had lower loadings, and eigenvalues less than 1.0)	Not supported
H4 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on attitude towards the use (ATU) of the transport management systems.	0.220	Not supported
H5 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on attitude towards the use (ATU) of the transport management systems.	0.552	Not supported
H6 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on attitude towards the use (ATU) of the transport management systems.	0.955	Not supported
H7 – Taxi entrepreneurs' perceived usefulness (PU) has	0.452	Not supported

Hypotheses	P-Value	Decision
a positive influence on behavioural intention (BI) towards the use of transport management systems.		
H8 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) towards the use of transport management systems.	0.078	Not supported
H9 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on behavioural intention (BI) towards the use of transport management systems.	N/A (no p-value because the perceived pricing construct was excluded from further analysis because it had lower loadings, and eigenvalues less than 1.0)	Not supported
H10 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on behavioural intention (BI) towards the use of transport management systems.	0.559	Not supported
H11 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on behavioural intention (BI) towards the use of transport management systems.	0.733	Not supported
H12 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on behavioural intention (BI) towards the use of transport management systems.	0.128	Not supported
H13 – Taxi entrepreneurs' attitude towards the use (ATU) has a positive influence on behavioural intention	0.000	Supported

Hypotheses	P-Value	Decision
(BI) towards the use of transport management systems.		
H14 – Taxi entrepreneurs' behavioural intention (BI) has a positive influence on actual system use (ASU) of the transport management systems.	0.000	Supported

The analysis in Table 4.8-1 shows that perceived usefulness (PU) has a positive influence on attitude towards the use (ATU) of the transport management systems (H1), with a p-value of 0.190, was not supported. This p-value was larger than 0.05, indicating that it was not substantial enough to be supported. Perceived ease of use (PEOU) has a positive influence on attitude towards the use (ATU) of the transport management systems (H2) and with a p-value of 0.008 was supported. This p-value was less than 0.05 indicating that it was significant enough to be supported. Perceived pricing (PP) has a positive influence on attitude towards the use (ATU) of the transport management systems (H3), had no p-value because the perceived pricing construct was excluded from further analysis as it had low loadings and eigenvalues less than 1.0. Therefore, this hypothesis was not supported. Perceived safety (PS) has a positive influence on attitude towards the use (ATU) of the transport management systems (H4) and with a p-value of 0.220 was not supported. This p-value was more than 0.05, indicating that it was not weighty enough to be supported. Perceived convenience of accessibility (PCA) has a positive influence on attitude towards the use (ATU) of the transport management systems (H5) and with a p-value of 0.552 was not supported. This p-value was larger than 0.05, indicating that it was not substantial enough to be supported. Perceived customers' trust (PCT) has a positive influence on attitude towards the use (ATU) of the transport management systems (H6) and with a p-value of 0.955 was not supported. This p-value was more than 0.05, indicating that it was not substantial enough to be supported. Perceived usefulness (PU) has a positive influence on behavioural intention (BI) towards the use of transport management systems (H7) and with a p-value of 0.452, was not supported. This p-value was bigger than 0.05, indicating that it was not substantial enough to be supported. Perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) towards the use of transport management systems (H8) and with a p-value of 0.078 was not supported. This p-value was more than 0.05, indicating that it was not weighty enough to be supported. Perceived pricing (PP) has a positive influence on behavioural intention (BI) towards the use of transport management systems (H9), had no p-value, like H3, because the perceived pricing construct was excluded from further analysis as it had low loadings and eigenvalues less than 1.0. Therefore, this hypothesis was not supported. Perceived

safety (PS) has a positive influence on behavioural intention (BI) towards the use of transport management systems (H10) with a p-value of 0.559 was not supported. This p-value was larger than 0.05, indicating that it was not substantial enough to be supported. Perceived convenience of accessibility (PCA) has a positive influence on behavioural intention (BI) towards the use of transport management systems (H11) and with a p-value of 0.733 was not supported. This p-value was bigger than 0.05, indicating that it was not weighty enough to be supported. Perceived customers' trust (PCT) has a positive influence on behavioural intention (BI) towards the use of transport management systems (H12) and with a p-value of 0.128 was not supported. This p-value was more than 0.05, indicating that it was not substantial enough to be supported. Attitude towards use (ATU) has a positive influence on behavioural intention (BI) towards the use of transport management systems (H13) and with a p-value of 0.000 was supported. This p-value was less than 0.05, indicating that it was significant enough to be supported. Behavioural intention (BI) has a positive influence on actual system use (ASU) of the transport management systems (H14) and with a p-value of 0.000 was supported. This p-value was less than 0.05, indicating that it was significant enough to be supported.

4.9 CHAPTER SUMMARY

This chapter discussed the results of the statistical analysis. The research objectives and the constructs; Taxi Entrepreneurs' Perceived Usefulness (PU), Taxi Entrepreneurs' Perceived Ease of Use (PEOU), Taxi Entrepreneurs' Perceived Customer's Trust (PCT), Taxi Entrepreneurs' Perceived Safety (PS), Taxi Entrepreneurs' Perceived Convenience of Accessibility (PCA), Taxi Entrepreneurs' Behavioural Intention (BI), Taxi Entrepreneurs' Actual System Use (ASU) and Taxi Entrepreneurs' Attitude Towards Use (ATU) and how they correlate with each other were examined. The correlation between the constructs was discussed. The relationships between Taxi Entrepreneurs' Perceived Usefulness, Taxi Entrepreneurs' Perceived Ease of Use, Taxi Entrepreneurs' Perceived Customer's Trust, Taxi Entrepreneurs' Perceived Safety, Taxi Entrepreneurs' Perceived Convenience of Accessibility, Taxi Entrepreneurs' Behavioural Intention, Taxi Entrepreneurs' Actual System Use and Taxi Entrepreneurs' Attitude Towards Use were deliberated. Overall findings on the above decision variables showed that the individual influence of Taxi Entrepreneurs' Behavioural Intention on Taxi Entrepreneurs' Actual System Use was high. Moreover, the individual influence of Taxi Entrepreneurs' Attitude Towards Use on Taxi Entrepreneurs' Behavioural Intention was medium. The individual influence of Taxi Entrepreneurs' Perceived Ease of Use on Taxi Entrepreneurs' Attitude Towards Use was found to be low.

The discussion in the next chapter is based on the statistical analysis and results that were reported in Chapter 4. In Chapter 5, conclusions are drawn from the constructs Taxi Entrepreneurs' Perceived Usefulness, Taxi Entrepreneurs' Perceived Ease of Use, Taxi Entrepreneurs' Perceived Customer's Trust, Taxi Entrepreneurs' Perceived Safety, Taxi Entrepreneurs' Perceived Convenience of Accessibility, Taxi Entrepreneurs' Behavioural Intention, Taxi Entrepreneurs' Actual System Use and Taxi Entrepreneurs' Attitude Towards Use which forms the final research model as well as the accepted hypotheses.

CHAPTER 5 – DISCUSSION, INTERPRETATION, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter discusses the findings of this study and answers the research questions, providing recommendations and concluding remarks. The main research question that leads this discussion is:

What are the underlying factors that will influence taxi entrepreneurs' intentions to adopt transport management systems in the South African taxi industry?

This research question was investigated through the following hypotheses:

H1 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on attitude towards the use (ATU) of the transport management systems.

H2 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on attitude towards the use (ATU) of the transport management systems.

H3 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on attitude towards the use (ATU) of the transport management systems.

H4 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on attitude towards the use (ATU) of the transport management systems.

H5 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on attitude towards the use (ATU) of the transport management systems.

H6 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on attitude towards the use (ATU) of the transport management systems.

H7 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on behavioural intention (BI) towards the use of transport management systems.

H8 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) towards the use of transport management systems.

H9 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on behavioural intention (BI) towards the use of transport management systems.

H10 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on behavioural intention (BI) towards the use of transport management systems.

H11 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on

behavioural intention (BI) towards the use of transport management systems.
H12 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on behavioural intention (BI) towards the use of transport management systems.
H13 – Taxi entrepreneurs' attitude towards use (ATU) has a positive influence on behavioural intention (BI) towards the use of transport management systems.
H14 – Taxi entrepreneurs' behavioural intention (BI) has a positive influence on actual system use (ASU) of the transport management systems.

The research questions and study objectives are addressed in Sections 5.2 to 5.3. The theoretical and practical contribution of the study is covered in Section 5.4. Section 5.5 discusses the study's limitations and potential research directions while Section 6.6 concludes the chapter with a summary of the findings.

5.2 DISCUSSION AND IMPLICATION OF THE FINDINGS BASED ON RESEARCH QUESTIONS

This section will discuss and explain the findings of the research, based on the research hypotheses.

5.2.1 Perceived ease of use of technology towards the acceptance of transport management systems in the South African taxi industry by taxi entrepreneurs

To understand the taxi entrepreneurs' perceived ease of use of the transport management systems in the South African taxi industry, two hypotheses H2 and H8 were tested and the findings are now discussed.

H2 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on attitude towards the use (ATU) of the transport management systems.

The study confirmed that taxi entrepreneurs' perceived ease of use has a positive effect on their attitude towards the use of transport management systems. In this study, hypothesis H2 was supported. As hypothesised in the conceptual model, perceived usability has a positive influence on taxi entrepreneurs' attitude towards the use (ATU) of transport management systems. This finding is consistent with TAM because users' adoption of information technology is determined by perceived usefulness (PU) and perceived ease of use (PEOU) and thus assumed to determine a person's attitude towards using the technology (Davis, 1985). It can be argued that if transport management

systems are perceived as easy to use by taxi entrepreneurs in South Africa, it is likely that they will adopt one.

The findings of this study are consistent with those of Liu (2015) who found that taxi entrepreneurs' perceived ease of use influences their attitude towards the use of transport management systems. Liu (2015) confirmed that taxi entrepreneurs' perceived ease of use influences how users perceive a taxi-hailing app's usefulness. The results of this study are in line with those of Mbara (2016) who found that the *tuk-tuk* transport management system was perceived as being easy to use. According to Thaba and Jacobs (2017), because of its ease of use and its usefulness, the *tuk-tuk* transport management system has been adopted by many taxi entrepreneurs who have many clients, most of whom are university students. Therefore, the results of this study reveal that if South African taxi entrepreneurs perceive transport management systems as easy to use, they will adopt and use them in their businesses.

H8 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) towards the use of transport management systems.

The findings of this study did not confirm that the taxi entrepreneurs' perceived ease of use had an effect on the taxi entrepreneurs' behavioural intention (BI) towards the use of transport management systems. This hypothesis was not supported. However, it can be argued that taxi entrepreneurs' perceived ease of use (PEOU) of the transport management systems has an indirect positive influence on taxi entrepreneurs' behavioural intention (BI) towards the use of transport management systems, based on the taxi entrepreneurs' attitude towards the use (ATU) of the transport management systems. This means that if transport management systems are easy to use it will have a positive effect on their attitude towards the use of transport management systems which will, in turn, influence their behavioural intention to use transport management systems. It can therefore be argued that if the transport management systems are easy to use, it will indirectly have a positive effect on taxi entrepreneurs' behavioural intention towards the use of transport management systems.

The findings of this study are consistent with Liu (2015) who showed that TAM variables, perceived ease of use and behavioural intention do not influence each other (Liu, 2015). These findings also show that the way users perceive a taxi-hailing app as being easy to use does not influence behavioural intention to use the taxi-hailing app (Liu, 2015). In South Africa, *tuk-tuks* (which are a form of

transport) are perceived as being easy to use, hence a lot of students use this mode of transport system (Mbara, 2016). *Tuk-tuks* are managed via a transport management system where most university students who stay off-campus make a phone call to access them via a *tuk-tuk* switchboard (Thaba & Jacobs, 2017) and some students phone the driver directly (Thaba & Jacobs, 2017).

5.2.2 Taxi entrepreneurs' behavioural intention towards the use of transport management systems in the South African taxi industry

To understand taxi entrepreneurs' behavioural intention towards the use of transport management systems in the South African taxi industry, the findings for H14, below are now discussed.

H14 – Taxi entrepreneurs' behavioural intention (BI) has a positive influence on the actual use (ASU) of the transport management systems.

The findings of this study confirm that the taxi entrepreneurs' behavioural intention towards the use of transport management systems has a positive effect on the actual use, therefore this hypothesis was supported. As hypothesised in H14, BI has a positive influence on the use of transport management systems. Individuals' behavioural intention to use plays a crucial role in the actual use of new technology (Davis, 1985). The findings confirm the prediction of the research model presented in this study which is consistent with the proposition of TAM. The results suggest that if South African taxi entrepreneurs have a positive behavioural intention towards the use of transport management systems they would adopt and use the transport management system.

The findings of this study are in line with Liu (2015) who explored the behavioural intention of users concerning taxi-hailing apps in a metropolitan setting. The study establishes that users who intend to use the taxi-hailing app eventually end up using the taxi-hailing apps, thereby showing that behavioural intention to use indeed has an influence on actual system use. The findings are also consistent with Tanus (2017) who was able to predict that the users' intention to use Go-Jek, a transport management system, influences the actual use of Go-Jek.

5.2.3 Taxi entrepreneurs' perceived usefulness of transport management systems in the South African taxi industry

To explore the perceived usefulness of transport management systems by the taxi entrepreneurs in the

South African taxi industry, two hypotheses H1 and H7 were tested and the results are now discussed.

H1 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on attitude towards the use (ATU) of the transport management systems.

The findings of this study did not confirm that the taxi entrepreneurs' perceived usefulness of the transport management systems has a positive effect on taxi entrepreneurs' attitude towards their use in the South African taxi industry. TAM states that perceived usefulness has a positive effect on attitude towards use (Davis, 1985), thus the findings contradict TAM as hypothesis H1 was not supported. While these findings contradict TAM's prediction which states that perceived usefulness has a positive effect on attitude towards use, they provide evidence for the difference in acceptance of transport management systems by taxi entrepreneurs versus Uber (Taschler, 2015). The rejection of the hypothesis means that the usefulness of transport management systems does not have an influence on attitude towards the use of transport management systems. However, according to TAM, perceived usefulness (PU) has a positive influence on attitude towards use (ATU) (Dwivedi et al., 2011). The findings of this study are inconsistent with the research model. Thus, even if the taxi entrepreneurs find the transport management systems useful that may not change their attitude towards adopting and using them.

The findings of this study contradict Liu (2015) who found that perceived usefulness positively influenced the attitude to use taxi-hailing apps in a metropolitan setting. Albeit in a different setting to this research, the findings of this research contradict Keong (2016) whose study found a significantly positive connection between passengers' attitude towards technology adoption of mobile taxi ordering (MTO) apps and their beliefs about their perceived usefulness.

H7 – Taxi entrepreneurs' perceived usefulness (PU) has a positive influence on behavioural intention (BI) towards the use of transport management systems.

The findings of this study did not confirm that the taxi entrepreneurs' perceived usefulness has a positive effect on the behavioural intention towards the use of transport management systems. Therefore, the hypothesis was not supported. Thus, if transport management systems are useful, that will not have a positive effect on taxi entrepreneurs' behavioural intention towards the use of transport

management systems. However, this finding is inconsistent with TAM by Davis (1985) who indicated that perceived usefulness has a positive influence on behavioural intention.

The findings of this study are also in contradiction with Liu (2015) who investigated how perceived usefulness would positively influence users' behavioural intention to use taxi-hailing apps in a metropolitan setting. The results of the study show that these TAM variables (perceived usefulness and behavioural intention) have a large influence on each other. Based on these findings by Liu (2015), it is evident that the way the users perceive a taxi-hailing app as being useful influences the user's intention to use it.

Wu, et al. (2016) were not in line with the findings of this research. The study indicates that the way a system is perceived as being useful influences the behavioural intention of using the system. The findings of the study by Wu, et al. (2016) indicate that if a system is used for a longer period of time, more users will intend to use it since the usefulness of the system will be evident. This is similar to the situation in South Africa, where more users perceive Uber to be useful since it has been in the market for a long time which, in turn, influences users' behavioural intention to use it (Labson et al., 2016; Juma, 2016). In Estonia, Taxify competes well with Uber and other conventional taxi services because Taxify has been operating there for a longer time than in South Africa, which has increased its PU and users' behavioural intention (BI) to use it (Hagtvedt, 2016).

5.2.4 Taxi entrepreneurs' attitude towards the behavioural intention to use transport management systems in the South African taxi industry

To examine the attitude towards the behavioural intention to use transport management systems by the taxi entrepreneurs in the South African taxi industry, hypothesis H13 was tested and the results are discussed below.

H13 – Taxi entrepreneurs' attitude towards use (ATU) has a positive influence on behavioural intention (BI) towards the use of transport management systems.

The findings in this study confirmed that taxi entrepreneurs' attitude towards the use of the transport management systems has a positive effect on the taxi entrepreneurs' behavioural intention to its use. This hypothesis was supported. TAM states that attitude towards use has a positive effect on

behavioural intention (Davis, 1985), thus the finding is consistent with the TAM model. The results suggest that if South African taxi entrepreneurs' attitude towards the use of the transport management systems are positive, that will have a positive effect on taxi entrepreneurs' behavioural intention towards the use of transport management systems.

This observation relates to Tanus (2017) who investigated factors affecting behavioural intention to use Go-Jek, a form of internet-based transport in Surabaya, Indonesia. That study deduced that attitude towards the use of Go-Jek influences the behavioural intention to use it (Tanus, 2017). However, those findings contradict Mohamad, Fuad, Shahib, Azmi, Kamal and Abdullah (2016) who found that other factors (perceived pricing and perceived safety) influence the behavioural intention to use Uber. Similarly, Liu (2015) described how attitude towards taxi-hailing apps would positively influence users' BI to use taxi-hailing apps in a metropolitan setting. In his study, Keong (2016) showed that the attitude towards using a system, not behavioural intention, plays a big role in the way a system is perceived as being useful or easy to use.

5.2.5 Taxi entrepreneurs' perceived view on the pricing, safety convenience of the accessibility of transport management systems in the South African taxi industry

To evaluate the perceived pricing, safety and convenience of the accessibility of transport management systems to taxi entrepreneurs in the South African taxi industry, hypotheses H3, H4, H5, H9, H10 and H11 were tested and the findings are discussed below.

H3 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on attitude towards the use (ATU) of the transport management systems.

The findings in this study revealed that perceived pricing does not have a significantly positive effect on taxi entrepreneurs' attitude towards the use of transport management systems. This hypothesis was not supported. TAM suggests that external variables indirectly affect individuals' attitude towards technology acceptance by influencing perceived usefulness and perceived ease of use (Zhang et al., 2017). This finding suggests that even if the taxi entrepreneurs in South Africa perceive transport management systems to be cheap in terms of their pricing, that will not have a positive effect on taxi entrepreneurs' attitude towards the use of transport management systems.

The findings of this study further confirm previous research by Keong (2016) who found a significantly favourable connection between users' attitude towards mobile taxi ordering (MTO) apps technology adoption and their beliefs about its perceived ease of use and perceived usefulness rather than perceived pricing. The results from Keong (2016) showed that TAM variables other than perceived pricing play a valuable role in the attitude towards the use of mobile taxi ordering (MTO) apps.

Conversely, Taschler (2015) found that the perceived pricing of Uber transport management systems has a positive effect on the attitude towards the use of Uber. Likewise, Juma (2016) found that the price of Uber transport management systems had a positive effect on the attitude towards its use, as it boosts the business of taxi owners who use Uber. The results of the present study contradict the findings of both Taschler (2015) and Juma (2016).

H4 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on attitude towards the use (ATU) of the transport management systems.

The findings in this study did not confirm that the taxi entrepreneurs' perceived safety on the use of transport management systems has a significant positive effect on attitude towards the use of transport management systems. Therefore, the hypothesis was not supported. This means that if the transport management systems are perceived as safe to use, that perception will not have a positive effect on taxi entrepreneurs' attitude towards the use of the transport management systems. Transport management systems are perceived as safe since they cater for cashless transactions (Juma, 2016). Taxi entrepreneurs who use taxi management systems do not carry large sums of money like traditional metered taxi entrepreneurs who are at risk of being robbed of this money (Palmér, 2017).

Ahmed (1999) indicated that there is a lot of violence in the South African taxi industry due to inter-association competition. As a result, rival taxi associations may become violent towards each other due to disagreements on what taxi routes to take, making kombi taxis unsafe (Ingle, 2009). Taxi entrepreneurs perceive transport management systems as safe to use since they pick up customers via requests made through the transport management systems, meaning that they do not have to take unsafe routes looking for customers (Salnikov et al., 2015). This result implies that perceived safety affects taxi entrepreneurs' attitude towards the use of transport management systems positively, since they perceive transport management systems as being safer to use in operating their businesses, compared to

kombis and metered taxis. Nevertheless, that perception is not in line with the findings of this research.

In a study by Salnikov et al. (2015), it was observed that Uber's benefits are disrupting the traditional transportation industry in South Africa and according to Palmér (2017), this has led to conflict between Uber and the traditional taxi, making it unsafe for Uber to operate. This implies that perceived safety of transport management systems (Uber) affects attitude towards the use of transport management systems, in contradiction with the findings of the research. Henama and Sifolo (2017) also found that in South Africa, meter taxi drivers have been fighting with Uber drivers to force the latter to comply with their rules and regulations. Unfortunately, Uber drivers are victims of crime all over the world and they are being attacked, hijacked or having their cars torched (Juma, 2016). It was therefore established by Henama and Sifolo (2017) that these attacks have caused taxi entrepreneurs to perceive transport management systems as being unsafe, thereby affecting their attitude towards the use of transport management systems. It is worthwhile noting that all those findings are in contradiction with the findings of this research since they are in support of the hypothesis, as perceived safety then affects the taxi entrepreneurs' attitude towards the use of transport management systems positively because they view them as being safer.

H5 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on attitude towards the use (ATU) of the transport management systems.

The study shows that taxi entrepreneurs' perceived convenience of the accessibility of the transport management systems does not have a positive effect on their attitude towards the use of transport management systems. This hypothesis was not supported. Perceived Convenience of Accessibility was not a construct of the original TAM model. Therefore, the results of this study suggest that if the transport management systems are perceived as being convenient and accessible, that will not have a positive effect on taxi entrepreneurs' attitude towards the use of the transport management system.

Taxi entrepreneurs perceive transport management systems as convenient and accessible since they pick up customers within a short waiting time frame through requests made via the transport management systems (Salnikov et al., 2015). In South Africa, there are now dedicated Uber drop off and pick up zones that are indicated on these transport management systems, making Uber convenient and easy to access; this has positively influenced taxi entrepreneurs' attitude towards using Uber, a taxi

management system (Henama & Sifolo, 2017). This study is in contradiction with Juma (2016), who indicated that the Uber platform has proven to be convenient and accessible since it allows taxi booking to be done using a smartphone from any location. As a result, this has positively influenced taxi entrepreneurs' attitude to using Uber (Juma, 2016).

A previous study by Mbara (2016) stated that *tuk-tuks* play a big part in fulfilling the transport gap as they also transport commuters to and from other modes of public transport and since they have no set routes, they are easily accessible and convenient. *Tuk-tuks* use phone call technology as their transport management systems, adding to their accessibility and convenience (Mbara, 2016). Their perceived convenience of accessibility has positively affected attitude towards their use. That nonetheless contradicts the findings of this study which state that perceived convenience of accessibility does not affect attitude towards use. The findings of this research are also not consistent with Santervás Garrido, (2017) who indicated that Uber and Taxify are convenient and accessible because users pay with cash or through their applications, thereby positively influencing the users' attitude towards their use (Santervás Garrido, 2017).

H9 – Taxi entrepreneurs' perceived pricing (PP) has a positive influence on behavioural intention (BI) on the transport management systems.

The findings of this study revealed that taxi entrepreneurs' perceived pricing does not have a noteworthy positive effect on the behavioural intention towards the use of transport management systems in the South African taxi industry (H9). This hypothesis was not supported. The findings suggest that although the taxi entrepreneurs in South Africa perceive the transport management systems as cheap in terms of their pricing, that will not have a positive effect on the taxi entrepreneurs' behavioural intention towards the use of a transport management system.

The researcher of this study could not find studies that focused on taxi entrepreneurs only, however, studies that focused on taxi users (Mohamad et al., 2016) discussed the properties that have an impact on users' behavioural intention to select the Uber app instead of the traditional taxi. Mohammed et al. (2016) further revealed that the behavioural intention of users to make use of the Uber service contrasted to the traditional taxi service is influenced by perceived price. The findings of this research contradict Mohamad et al. (2016) who found that, if users perceive Uber to be cheaper to use, their

intention to use it is high. In a similar study, Taschler (2015) found Uber transport management systems to be cheaper and more efficient than traditional taxi transport, which has a significant positive effect on the taxi entrepreneurs' behavioural intention towards the use of transport management systems.

H10 – Taxi entrepreneurs' perceived safety (PS) has a positive influence on behavioural intention (BI) towards the use of transport management systems.

The perceived safety of taxi entrepreneurs did not have a substantially positive effect on behavioural intention towards the use of transport management systems. This hypothesis was not supported. This means that if the transport management systems are perceived as safe, that will not have a positive effect on taxi entrepreneurs' behavioural intention (BI) towards the use of transport management systems. Taxi management systems are perceived as safe by taxi entrepreneurs because a driver will not be able to pick customers at random when they have not placed a request via a transport management system. This means that when the driver picks up a customer, they know exactly who they are picking up, reducing the risk of being robbed or highjacked. Subsequent findings from Ingle (2009) and Ahmed (1999) indicated that there is a lot of violence in the taxi industry. Some of these taxi drivers even get robbed of the money that they had made from transportations. The findings of the current research expand on the results of previous research by Henama and Sifolo (2017) who found that in South Africa, meter taxi drivers have been fighting with Uber drivers to enforce compliance with their rules and regulations, making it unsafe for Uber drivers to operate. However, since transport management systems allow users to operate cashlessly it is safer since there is no risk of losing cash through theft, unlike the traditional metered taxi operators who move around with cash. The findings of this research highlighted that although taxi entrepreneurs' perceived transport management systems as being safe since it is a cashless business, this still does not have a noteworthy positive effect on the taxi entrepreneurs' behavioural intention towards the use of transport management systems.

H11 – Taxi entrepreneurs' perceived convenience of accessibility (PCA) has a positive influence on behavioural intention (BI) on the transport management systems.

The taxi entrepreneurs' perceived convenience of accessibility of the transport management systems does not have a substantial positive effect on the behavioural intention towards the use of transport management systems. This hypothesis was not supported. That means that even if transport

management systems are perceived as being convenient and accessible, they will not have a positive effect on taxi entrepreneurs' behavioural intention towards their use.

The findings of this research were not in line with Henama and Sifolo (2017) who found that perceived convenience of accessibility of the transport management systems had a positive influence on the taxi entrepreneurs' behavioural intention towards the use of transport management systems. Their study found Uber (a taxi management system) to be easily accessible and convenient, thereby influencing users' behavioural intention to use it.

The findings of this research did not concur with Juma (2016) who found that although the Uber platform had proven to be convenient and accessible as it allowed taxi booking to be done using a smartphone from any location, it still did not influence users' behavioural intention to use it. The findings of this research are also not consistent with Wan et al. (2016) who indicated that the waiting times for kombi taxis to arrive in order to board one or waiting times for them to depart from a taxi rank are usually long, which may not be suitable if one is in a rush to get somewhere. As a result, transport management systems were perceived as being inconvenient which negatively influenced users' behavioural intention to use them. Wan et al. (2016) therefore illustrated that the perceived convenience of accessibility of the transport management systems influences taxi entrepreneurs' behavioural intention towards their use.

5.2.6 Taxi entrepreneurs' perceived views about transport management systems in the South African taxi industry as being trustworthy to customers

To determine the impact of perceived customers' trust on transport management systems to taxi entrepreneurs in the South African taxi industry, hypotheses H6 and H12 were tested and those findings are now discussed.

H6 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on attitude towards the use (ATU) of the transport management systems.

The taxi entrepreneurs' perceived customers' trust did not have a positive effect on attitude towards the use of the transport management systems. This hypothesis was not supported. That suggests that if transport management systems are perceived as being trustworthy by customers it will not have a

positive effect on taxi entrepreneurs' attitude towards the use of the transport management systems.

A study carried out by Zhang et al. (2016) indicated that the attitude towards the use of a system is influenced by the customers' trust in the system. The findings of this research are thus contradicting the study of Zhang et al. (2016). Furthermore, Zhang et al. (2017) conducted another study that indicated that a customer's trust plays a big role in a user recommending a system since it influences the attitude towards the use of the system.

H12 – Taxi entrepreneurs' perceived customers' trust (PCT) has a positive influence on behavioural intention (BI) towards the use of transport management systems.

The taxi entrepreneurs' perceived customers' trust does not have a positive effect on the behavioural intention towards the use of transport management systems. This hypothesis was not supported. From this finding, it can be suggested that if transport management systems are perceived as being trustworthy by customers, that will not have a positive effect on taxi entrepreneurs' behavioural intention towards the use of transport management systems. In their study, Zhang et al. (2017) indicated that the behavioural intention to use a system is influenced by customers' trust in the system. The findings of this research are therefore in contradiction with the study by Zhang et al. (2017) because the research suggests that taxi entrepreneurs' perceived customers' trust does not have a positive effect on the behavioural intention towards the use of transport management systems.

5.3 DISCUSSION OF THE MAIN RESEARCH QUESTION

The main research question was:

What are the underlying factors that will influence taxi entrepreneurs' intentions to adopt transport management systems in the South African taxi industry?

The factors that influence taxi entrepreneurs' adoption to transport management systems were driven from hypotheses that were not falsified:

H2 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on attitude towards use (ATU) of the transport management systems.

H13 – Taxi entrepreneurs' attitude towards use (ATU) has a positive influence on behavioural intention (BI) on the transport management systems.
H14 – Taxi entrepreneurs' behavioural intention (BI) has a positive influence on actual system use (ASU) of the transport management systems.

The following hypothesis was indirectly supported:
H8 – Taxi entrepreneurs' perceived ease of use (PEOU) has a positive influence on behavioural intention (BI) on the transport management systems.

Based on the supported hypotheses, the underlying factors that influence taxi entrepreneurs' adoption of the use of transport management systems in the South African taxi industry are taxi entrepreneurs' perceived ease of use (PEOU), taxi entrepreneurs' attitude towards use (ATU), taxi entrepreneurs' behavioural intention (BI) and taxi entrepreneurs' actual system use (ASU).

Taxi entrepreneurs' behavioural intention towards the use of transport management systems is influenced by the taxi entrepreneurs' attitude towards the use of transport management systems. Furthermore, taxi entrepreneurs' behavioural intention towards the use of transport management systems is indirectly influenced by taxi entrepreneurs' perceived ease of use of transport management systems. This is through taxi entrepreneurs' attitude towards the use of taxi management systems. On the other hand, taxi entrepreneurs' actual system use of transport management systems is influenced by taxi entrepreneurs' behavioural intention towards the use of transport management systems. This means that if the taxi entrepreneurs' attitude towards the use of transport management systems are positive, the taxi entrepreneurs' behavioural intention to use transport management systems is positively affected. This, in turn, has a positive influence on the taxi entrepreneurs' actual system use of transport management systems.

5.4 RESEARCH CONTRIBUTIONS

Research contributions consist of theoretical and practical contributions as shown in the following subsections.

5.4.1 Theoretical contributions

The contribution of this study towards theory is that it merges the appropriate information systems (IS)

literature in order to improve the knowledge of technology adoption from the taxi entrepreneurs' perspectives. This means that the study incorporated previous research findings to develop a comprehensive and coherent picture of the technology adoption research conducted in the IS field. The study contributed to a theoretical improvement of the current level of knowledge on the existing literature on the behavioural intention towards the use of transport management systems, achieved by testing empirically taxi entrepreneurs' behavioural intention in the South African taxi industry.

This study supplies empirical evidence concerning the significance of the effects of the model's selected factors on taxi entrepreneurs' intentions to use transport management systems. In addition, this study recognised the degree of influence these factors have in the South African taxi industry. The research adapted the technology acceptance model (TAM) by introducing new variables, resulting in the development of a new conceptual framework.

5.4.2 Practical contribution

The research revealed the benefits of successfully using transport management systems in the South African taxi industry. These benefits include the safety of taxi entrepreneurs. Taxi management systems provide safety because a driver will not be able to pick customers at random if they have not placed a request via a transport management system. This means that when the driver picks up a customer, they know exactly who they are picking up, reducing the risk of being robbed or highjacked. Transport management systems make transportation convenient and accessible from anywhere. In addition, these systems provide the price of the trip before the trip is started, so there is transparency for both the customer and the driver on how much needs to be paid. Payments can easily be made through cash or bank card, making it convenient. In addition, payments made via bank card are safer for drivers because they do not move around with cash, so they are not at risk of being robbed of the money they make from the trips. The findings of this study will therefore be important for the South African taxi industry as it provides the platform for the development of a new research framework. This theoretical framework acts as a standard guideline for the use of the appropriate transport management systems aimed at increasing the profitability and safety of operations in the South African taxi industry.

5.5 LIMITATION OF THE STUDY

The first drawback of the study was that it was limited to Sandton in Gauteng Province, South Africa, hence the findings of this study could not be conclusive. Further research would need to be carried out

in other provinces of South Africa. There could be differences with the taxi industry used in a study population in other provinces of South Africa. In addition, the dataset used in this study was acquired at a single point in time (cross-sectional survey only). Furthermore, because the study was conducted in a developing country environment, it did not fully reflect all developing countries, which was the study's second weakness. Therefore, the findings of this research may not apply to all developing countries.

5.5.1 Future research directions

Future research can be done on how minibus/kombi taxis in South Africa can make use of technology to enhance their business since there is no evidence that these minibus/kombi taxis use technology for transport in South Africa.

5.6 CONCLUSION

This study aimed to investigate taxi entrepreneurs' adoption of transport management systems in the South African taxi industry, using the study model. To examine and answer the research question, a framework based on TAM was conceptualised. A questionnaire was distributed within the South African taxi industry in order to identify the relationships between the TAM variables. To test the fourteen theorised hypotheses in this study, IBM *SPSS* was used for data analysis. The theoretical framework of the study together with the results of this study suggested that taxi entrepreneurs' behavioural intention on the transport management systems has a causal relationship with the taxi entrepreneurs' use of transport management systems. The evidence supplied by this study suggests that taxi entrepreneurs' perceived ease of use of the transport management systems has an indirect effect on the taxi entrepreneurs' behavioural intention on the transport management systems. The results of the multiple regression analysis tests done to test the relationship between the taxi entrepreneurs' attitude towards use and taxi entrepreneurs' behavioural intention showed that taxi entrepreneurs' attitude towards use was the most dominant factor influencing the taxi entrepreneurs' behavioural intention to use transport management systems. This reiterated the importance of both constructs as critical success factors. Gaining an understanding of the influences on these factors would therefore contribute to the taxi industry and assist other researchers to focus on the most significant factors so that they can be better understood and applied in the taxi industry.

Based on the evidence drawn from the findings of this research it can be proposed that policies would have to be designed and implemented in other provinces to encourage the use of transport management

systems. The findings of this study suggest that taxi associations must design an environment that enables taxi entrepreneurs and taxi drivers to embrace a taxi association approach. Taxi entrepreneurs' attitude as well as their behavioural intention on transport management systems were found to be the main factors influencing the use of transport management systems in the South African taxi industry. Based on the investigations that had been conducted through exploratory factor analysis (EFA) and Cronbach's alpha, the research questions were considered valid and reliable.

In conclusion, the objectives, hypotheses and research questions were addressed. The findings of this study could help to promote greater success in the use of transport management systems in the South African taxi industry. This can be directed through encouraging efficient and effective use of transport management systems guidelines.

REFERENCES

Adero, N., & Aligula, E. (2012). Challenges Facing Transport Infrastructure In The East African Community. In *African Research and Resource Forum, Research Networking and Regional Development Policy-Making in the East Africa Community (EAC)* (pp. 90–113).

Agbiboa, D. E. (2020). How informal transport systems drive African cities. *Current History*, *119*(817), 175–181. https://doi.org/10.1525/curh.2020.119.817.175

Ahmed, Y. (1999). Public Transport Microenterprises–Formalisation Experiences in South Africa. *The World Bank*, *9852*.

Ajzen, I. (2006). Behavioral interventions based on the theory of planned behavior.

Alshamaila, Y., Papagiannidis, S., & Li, F. (2013). Cloud computing adoption by SMEs in the north east of England: A multi-perspective framework. *Journal of Enterprise Information Management*, *26*(3), 260–275. https://doi.org/10.1108/17410391311325225

Alzahrani, L., Al-Karaghouli, W., & Weerakkody, V. (2017). Analysing the critical factors influencing trust in e-government adoption from citizens' perspective: A systematic review and a conceptual framework. *International Business Review*, *26*, 164–175.

Anbalagan, C., & Kanagaraj, K. (2014). A Study on Problems and Prospects of Transport in Ethiopia-Special Reference with Auto Rickshaw's (Bajaj) in Hawassa City, SNNPRS, East Africa. *IFSMRC AIJRM*, *2*(3).

Averweg, U. R. (2008). Information technology acceptance in South Africa: An investigation of perceived usefulness, perceived ease of use, and actual system use constructs. *The African Journal of Information Systems*, *1*(1), 4.

Bhattacherjee, A. (2012). Social science research: Principles, methods, and practices. 2nd ed. University of South Florida.

Bick, G. (2019). Uber SA: disruption of the local taxi industry? *Emerald Emerging Markets Case Studies*, *9*(2), 1–9. https://doi.org/10.1108/EEMCS-05-2019-0099

Boduszek, D. (2016). Chi-square test of independence & McNemar test. *Verkregen op*, 18-06.

Bokopane, L., Kusakana, K., & Vermaark, H. J. (2014). Hybrid System Configurations and Charging Strategies for Isolated Electric Tuk-Tuk Charging Station in South Africa. *World Academy of Science, Engineering and Technology, International Journal of Electrical, Computer, Energetic, Electronic and Communication Engineering*, *8*(11), 1664–1669.

Brereton, P., Kitchenham, B. A., Budgen, D., Turner, M., & Khalil, M. (2007). Lessons from

applying the systematic literature review process within the software engineering domain. *Journal of systems and software*, *80*(4), 571-583.

Brown, I. T. (2002). Individual and technological factors affecting perceived ease of use of web-based learning technologies in a developing country. *The Electronic Journal of Information Systems in Developing Countries*, *9*(1), 1-15.

Calitz, A. P., Cullen, M. D. M., & Greyling, J. H. (2015). South African Alumni Perceptions of the Industry ICT Skills Requirements. *Proceedings of the SACLA 2015 Conference*, 25–26.

Chan-Olmsted, S., Rim, H., & Zerba, A. (2013). Mobile news adoption among young adults: Examining the roles of perceptions, news consumption, and media usage. *Journalism & Mass Communication Quarterly*, *90*(1), 126–147. https://doi.org/10.1177/1077699012468742

Chang, M. K. (1998). Predicting unethical behavior: a comparison of the theory of reasoned action and the theory of planned behavior. *Journal of Business Ethics*, *17*(16), 1825–1834. https://doi.org/10.1007/978-94-007-4126-3

Chaouali, W., & El Hedhli, K. (2019). Toward a contagion-based model of mobile banking adoption. *International Journal of Bank Marketing*.

Chen, & Adams, C. (2005). User acceptance of mobile payments: a theoretical model for mobile payments. *Proceedings of the Fifth International Conference on Electronic Business (ICEB)*, 619–624.

Chen, Y., Salmanian, W., & Akram, A. (2017). User Acceptance In Sharing Economy - A Study Of Transportation Network Companies In China. *The 11th Mediterranean Conference on Information Systems*.

Chuttur, M. Y. (2009). Overview of the technology acceptance model: Origins, developments and future directions. *Working Papers on Information Systems*, *9*(37), 2–22. https://doi.org/10.1021/jf001443p

Cloete, E., Courtney, S., & Fintz, J. (2002). Small Businesses' Acceptance and Adoption of e-Commerce in the Western-Cape Province of South Africa. *The Electronic Journal Information Systems in Developing Countries*, *10*(4), 1–13. https://doi.org/10.1002/j.1681-4835.2002.tb00062.x

Conner, M., & Norman, P. (2005). *Predicting health behaviour*. McGraw-Hill Education. https://doi.org/10.1016/S0925-7535(97)81483-X

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). SAGE Publications.

Čulík, K., Kalašová, A., & Otahálová, Z. (2020). Alternative Taxi Services and their Cost Analysis. *Transportation Research Procedia*, *44*(2019), 240–247. https://doi.org/10.1016/j.trpro.2020.02.047

Davis, F. D. (1985). *A technology acceptance model for empirically testing new end-user information systems: Theory and results*. Massachusetts Institute of Technology.

DeVellis, R. F., Lewis, M. A., & Sterba, K. R. (2003). Interpersonal emotional processes in adjustment to chronic illness. *Social Psychological Foundations of Health and Illness*, 256–287.

Dwivedi, Y. K., Wade, M. R., & Schneberger, S. L. (2011). *Information Systems Theory: Explaining and Predicting Our Digital Society* (Volume 1). Springer Science & Business Media.

Fishbein, M., & Ajzen, I. (1974). Attitudes towards objects as predictors of single and multiple behavioral criteria. *Psychological Review*, *81*(1).

Folorunso, O., Vincent, R. O., Adekoya, A. F., & Ogunde, A. O. (2010). Diffusion of innovation in social networking sites among university students. *International Journal of Computer Science and Security*, *4*(3), 361–372. http://www.cscjournals.org/manuscript/Journals/IJCSS/Volume4/Issue3/IJCSS-281.pdf

Fu, X. mei. (2020). Does heavy ICT usage contribute to the adoption of ride-hailing app? *Travel Behaviour and Society*, *21*(April), 101–108. https://doi.org/10.1016/j.tbs.2020.06.005

Geissinger, A., Laurell, C., & Sandström, C. (2020). Digital Disruption beyond Uber and Airbnb—Tracking the long tail of the sharing economy. *Technological Forecasting and Social Change*, *155*(June 2018), 119323. https://doi.org/10.1016/j.techfore.2018.06.012

Göktürk, E. (2005). *What is "paradigm"?*

Gray, L. E. (2018). Listening low-cost: Ethnography, the city, and the tourist ear. *The Routledge Companion to the Study of Local Musicking*, *Finnegan 2007*, 417–428. https://doi.org/10.4324/9781315687353

Grosskopf, B., & Pearce, G. (2020). Do You Mind Me Paying Less? Measuring Other-Regarding Preferences in the Market for Taxis. *Management Science*, *June*. https://doi.org/10.1287/mnsc.2019.3483

Haba, H. F., & Dastane, O. (2018). An empirical investigation on taxi hailing mobile app adoption: A structural equation modelling. *Business Management and Strategy*, *9*(2).

Hagtvedt, L. (2016). *Uber: a case study of the effects of legalizing ridesharing platforms* (Master's

thesis, Norwegian University of Life Sciences, Ås).

Hart, S. A., & Laher, S. (2015). Perceived usefulness and culture as predictors of teachers attitudes towards educational technology in South Africa. *South African Journal of Education*, *35*(4), 1–13. https://doi.org/10.15700/saje.v35n4a1180

Hartung, J., & Knapp, G. (2005). Multivariate multiple regression. *Encyclopedia of statistics in behavioral science*.

Hazen, B. T., Overstreet, R. E., & Wang, Y. (2015). Predicting public bicycle adoption using the technology acceptance model. *Sustainability*, *7*(11), 14558-14573.

Henama, U. S., & Sifolo, P. P. S. (2017). Uber: The South Africa Experience. *African Journal of Hospitality, Tourism and Leisure*, *6*(2).

Hill, B. D. (2011). *The sequential Kaiser-Meyer-Olkin procedure as an alternative for determining the number of factors in common-factor analysis: A Monte Carlo simulation*. Oklahoma State University.

Huynh, T. L. D., Vo, A. K. H., Nguyen, T. H. H., Le Nguyen, V. B., Ho, N. N. H., & Do, N. B. (2020). What makes us use the shared mobility model? Evidence from Vietnam. *Economic analysis and policy*, *66*, 1-13.

Ibrahim, M. N., & Alhassan, H. M. (2020). Influence of unscheduled stop and dwell time of minibus public transport on transit time in Kano Metropolis. *Nigerian Journal of Technology*, *39*(1), 113–120. https://doi.org/10.4314/njt.v39i1.12

Ingle, M. (2009). *An historical overview of problems associated with the formalization of the South African minibus taxi industry.* 71–87. North-West University.

Jang, J., Ko, Y., Shin, W. S., & Han, I. (2021). Augmented Reality and Virtual Reality for Learning: An Examination Using an Extended Technology Acceptance Model. *IEEE Access*, *9*, 6798-6809.

Ilsøe, A., & Jesnes, K. (2020). Collective agreements for platforms and workers–two cases from the Nordic countries. *Platform work in the Nordic models: Issues, cases and responses, Copenhagen: Nordic Council of Ministers*, 57-67.

Jing, P., Du, L., Chen, Y., Shi, Y., Zhan, F., & Xie, J. (2021). Factors that influence parents' intentions of using autonomous vehicles to transport children to and from school. *Accident Analysis and Prevention*, *152*(December 2020), 105991. https://doi.org/10.1016/j.aap.2021.105991

Juma, J. O. (2016). *E-hailing applications adoption and competitiveness of App-based taxi*

operators in Nairobi, Kenya (Doctoral dissertation, University of Nairobi).

Jupp, V. (2006). *The Sage dictionary of social research methods*. SAGE Publications.

Kamal, S. A., Shafiq, M., & Kakria, P. (2020). Investigating acceptance of telemedicine services through an extended technology acceptance model (TAM). *Technology in Society*, *60*(March 2019), 101212. https://doi.org/10.1016/j.techsoc.2019.101212

Kane, L. A. (2006). Transport problem associated with poverty in South Africa. *National Household Travel Survey Seminar: Understanding Travel Habits and Transport Conditions in Southern Africa.*, 1–21.

Keong, W. E. Y. (2016). Factors Influencing Passengers' Attitude and Adoption Intention of Mobile Taxi Booking Application. *The Social Sciences*, *11*(11), 2769–2776.

Kesharwani, A., & Singh Bisht, S. (2012). The impact of trust and perceived risk on internet banking adoption in India: An extension of technology acceptance model. *International Journal of Bank Marketing*, *30*(4), 303–322. https://doi.org/10.1108/02652321211236923

Keskin, D., Brezet, H., & Diehl, J. C. (2009). Commercializing sustainable innovations in the market through entrepreneurship. *Proceedings of the 19th CIRP Design Conference– Competitive Design*, *April*.

Keszey, T. (2020). Behavioural intention to use autonomous vehicles: Systematic review and empirical extension. *Transportation research part C: emerging technologies*, *119*, 102732.

Kumar, A., & Barrett, F. (2008). Stuck in traffic: Urban transport in Africa. *Africa Infrastructure Country Diagnostic, 44980*.

Labson, S., Madiba, T., & Roberts, S. (2016). Quarterly Competition Review.

Lakemann, T., & Lay, J. (2019). Africa Digital Platforms in Africa: the „ Uberisation " of Informal Work. *GIGA Focus*, *7*, 0–10.

Lane, D. M. (2013). The problem of too many statistical tests: Subgroup analyses in a study comparing the effectiveness of online and live lectures. *Numeracy*, *6*(1).

Lee, Y., Kozar, K. A., & Larsen, K. R. T. (2003). The technology acceptance model: Past, present, and future. *Communications of the Association for Information Systems*, *12*(1), 752–780.

Lippert, S. K., & Govindrajulu, C. (2006). Technological, organizational, and environmental antecedents to web services adoption. *Communications of the IIMA*, *6*(1), 146–158. https://doi.org/10.1017/CBO9781107415324.004

Liu, Z. Y. (2015). *An Analysis of Technology Acceptance Model-Exploring user acceptance and intension of taxi-hailing app in Shanghai.* Gothenburg University.

Lowitt, S. (2006). *The job-creating potential of the metered taxi industry in South Africa's urban areas: some preliminary findings.*

Malhotra, N., & Birks, D. (2007). *Instructor's Manual*. Pearson Education.

Mallenius, S., Rossi, M., & Tuunainen, V. K. (2007). Factors affecting the adoption and use of mobile devices and services by elderly people–results from a pilot study. *6th Annual Global Mobility Roundtable*, *31*, 12.

Manis, K. T., & Choi, D. (2019). The virtual reality hardware acceptance model (VR-HAM): Extending and individuating the technology acceptance model (TAM) for virtual reality hardware. *Journal of Business Research*, *100*(August 2018), 503–513. https://doi.org/10.1016/j.jbusres.2018.10.021

Martin, C. J. (2016). The sharing economy: A pathway to sustainability or a nightmarish form of neoliberal capitalism? *Ecological Economics*, *121*, 149–159. https://doi.org/10.1016/j.ecolecon.2015.11.027

Mawela, T., Twinomurinzi, H., Msweli, N., & Tau, V. Digital Skills Colloquium 2020: Enhancing Human Capacity for Digital Transformation.

Mazzochi, F. (2008). Complexity in biology. *EMBO*, *9*, 10–14.

Mbara, T. C. (2016). Tuk-tuk, 'new kid on the block' in Johannesburg: operational and user travel characteristics, competition and impacts. *Journal of Transport and Supply Chain Management*, *10*(1), 1–9.

Mohamad, W. N. A. A. B. W., Fuad, A. F. M., Shahib, N. S., Azmi, A., Kamal, S. B. M., & Abdullah, D. (2016). A Framework of Customer's Intention to use Uber Service in Tourism Destination. *International Academic Research Journal of Business and Technology*, *2*(2), 102–106.

Moorthy, K., Ling, C. S., Fatt, Y. W., Yee, C. M., Yin, E. C. K., Yee, K. S., & Wei, L. K. (2017). Barriers of mobile commerce adoption intention: perceptions of generation X in Malaysia. *Journal of theoretical and applied electronic commerce research*, *12*(2), 37-53.

Mutekanga, D., Havugimana, J., & Katamba, P. (2020). Influence of Motorcycle (Boda Boda) Rider ' S Practices on Road Safety in Kampala, Uganda Influence of Motorcycle (Boda Boda) Rider ' S Practices on Road Safety in. *Asian Journal of Science and Technology*, *4*(1), 10871–10879. http://www.journalajst.com

Mutiso, W., & Behrens, R. (2011). 'Boda Boda'bicycle taxis and their role in urban transport systems: case studies of Kisumu and Nakura, Kenya. *30th Southern African Transport*

Conference (SATC 2011), July, 430–444.

Nasri, W. (2012). An exploration of facebook.com adoption in Tunisia using technology acceptance model (TAM) and theory of reasoned action (TRA). *Interdisciplinary Journal Of Contemporary Research In Business*, *4*(5), 948–968.

Neuman, W. L. (2013). *Social Research Methods: Qualitative and Quantitative Approaches* (7th ed.). Pearson Education.

Okeke-Uzodike, A. O. & U., & Olaniyan, A. (2018). Conflict Studies Quarterly. *Conflict Studies Quarterly*, *10*, 27–40.

Oliveira, T., & Martins, M. (2011). Literature review of information technology adoption models at firm level. *The Electronic Journal Information Systems Evaluation*, *14*(1), 110 – 121. https://doi.org/1566 - 6379

Oppegaard, S. M. N., Ilsoe, A., Jesnes, K., Rolandsson, B., & Saloniemi, A. (2019). Uber in the Nordic countries: Challenges and adjustments. *Fafo*, *March*, 1–4.

Pal, D., & Vanijja, V. (2020). Perceived usability evaluation of Microsoft Teams as an online learning platform during COVID-19 using system usability scale and technology acceptance model in India. *Children and Youth Services Review*, *119*(July), 105535. https://doi.org/10.1016/j.childyouth.2020.105535

Pallant, J. (2013). *SPSS survival manual*. McGraw-hill education (UK).

Palmér, G. (2017). *Why do regulatory practices towards Uber diverge in the globalized economy?: Comparing regulatory responses and attitudes towards Uber in the US and Sweden.* Stockholms University.

Peng, L., Wang, H., He, X., Guo, D., & Lin, Y. (2014). Exploring Factors Affecting the User Adoption of Call-taxi App. *25th Australasian Conference on Information Systems*.

Permana, A. S., & Petchsasithon, A. (2019). Assessing the Seamlessness of Bangkok Metropolitan Public Transport by using Modified Quantitative Gap Analysis. *International Journal of Built Environment and Sustainability*, *7*(1), 81–97. https://doi.org/10.11113/ijbes.v7.n1.440

Plewa, C., Troshani, I., Francis, A., & Rampersad, G. (2012). Technology adoption and performance impact in innovation domains. *Industrial Management & Data Systems*, *112*(5), 748–765. https://doi.org/10.1108/02635571211232316

Pramana, E. (2018). Determinants of the adoption of mobile learning systems among university students in Indonesia. *Journal of Information Technology Education: Research*, *17*, 365-398.

Rafique, H., Almagrabi, A. O., Shamim, A., Anwar, F., & Bashir, A. K. (2020). Investigating the

acceptance of mobile library applications with an extended technology acceptance model (TAM). *Computers & Education*, *145*, 103732.

Rahayu, R., & Day, J. (2015). Determinant factors of e-commerce adoption by SMEs in developing country: evidence from Indonesia. *Procedia-Social and Behavioral Sciences*, *195*, 142–150. https://doi.org/10.1016/j.sbspro.2015.06.423

Rayle, L., Shaheen, S., Chan, N., Dai, D., & Cervero, R. (2014). App-based, on-demand ride services: Comparing taxi and ridesourcing trips and user characteristics in San Francisco university of california transportation center (uctc). *UCTC-FR-2014-08., November*.

Riasanow, T., Galic, G., & Böhm, M. (2017). Digital Transformation In The Automotive Industry: Towards A Generic Value Network. *Twenty-Fifth European Conference on Information Systems (ECIS 2017)*.

Rohani, J. M., Yusof, S. M., & Mohamad, I. (2009). The relationship between statistical process control critical success factors and performance: A structural equation modeling approach. *IEEE International Conference on Industrial Engineering and Engineering Management*, 1352–1356.

Ruangkanjanases, A., & Techapoolphol, C. (2018). Adoption of E-hailing applications: A comparative study between female and male users in Thailand. *Journal of Telecommunication, Electronic and Computer Engineering (JTEC)*, *10*(1-10), 43-48.

Saddier, S., McLachlan, N., & Dass, D. (2019). Measuring the evolution of passenger satisfaction following the introduction of scheduled services: The case of the 7th Avenue minibus-taxi association in Mitchells Plain. Southern African Transport Conference. University of Pretoria.

Salim, S., Salman, M. A. H., & Salman, M. N. (2021). Profiling of Passengers by E-Hailing Services in Malaysia. *Multidisciplinary Applied Research and Innovation*, *2*(2), 60-69.

Salkind, N. J. (2010). Encyclopledia of Research Design. In *Encyclopedia of Research Design*. Sage Publications.

Salnikov, V., Lambiotte, R., Noulas, A., & Mascolo, C. (2015). OpenStreetCab: exploiting taxi mobility patterns in New York City to reduce commuter costs. *ArXiv Preprint ArXiv:1503.03021*, 1–3.

Santervás Garrido, A. C. (2017). *Business plan for the introduction of a smartphone application of transport in the latvian market*. Riga Technical University.

Santos, D. O., & Xavier, E. C. (2013). Dynamic Taxi and Ridesharing: A Framework and Heuristics for the Optimization Problem. *IJCAI*, *13*, 2885–2891.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for business students* (6th ed.). Prentice Hall.

Ščeulovs, D., & Gaile-Sarkane, E. (2011). E-Marketing for a company: external and internal influence. *Economics and Management*, *16*, 947–953.

Schalekamp, H., & Klopp, J. M. (2018). Beyond BRT: Innovation in Minibus-taxi Reform in South African Cities. *37th South African Transport Conference*, *July*, 978–979.

Scheer, P. A. (2015). *Should Established Industries Fear Platforms Entering Their Markets?* Erasmus University.

Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers and Education*, *128*(0317), 13–35. https://doi.org/10.1016/j.compedu.2018.09.009

Schlüter, J., Frewer, M., Sörensen, L., & Coetzee, J. (2020). A stochastic prediction of minibus taxi driver behaviour in South Africa. *Humanities and Social Sciences Communications*, *7*(1), 1–12. https://doi.org/10.1057/s41599-020-0508-2

Scott, J. E. (2007). An e-transformation study using the technology-organization-environment framework. *BLED 2007 Proceedings*, 50–61.

Sun, S., Lee, P. C., Law, R., & Hyun, S. S. (2020). An investigation of the moderating effects of current job position level and hotel work experience between technology readiness and technology acceptance. *International Journal of Hospitality Management*, *90*(July), 102633. https://doi.org/10.1016/j.ijhm.2020.102633

Tanus, V. V. (2017). *Analysis (sic)the impact of eTrust, perceived ease of use, perceived usefulness, attitude toward use, and intention to use Go-Jek mobile application in Surabaya (Doctoral dissertation, Widya Mandala Catholic University Surabaya).*

Taschler, E. (2015). A crumbling monopoly: the rise of Uber and the Taxi Industry's struggle to survive. *Chicago: Institute for Consumer Antitrust Studies.*, 1–8.

Task Force. (2020). *Report of the Taxi Medallion Task Force*. *January*.

Taylor, D., Bury, M., Campling, N., Carter, S., Garfield, S., Newbould, J., & Rennie, T. (2006). A Review of the use of the Health Belief Model (HBM), the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB) and the Trans-Theoretical Model (TTM) to study and predict health related behaviour change. *London, UK: National Institute for Health and Clinical Excellence*, *June*, 1–215.

Thaba, S. C., & Jacobs, L. (2017). Current status of cycling lanes at University of Johannesburg. *International Conference on Industrial Engineering and Operations Management*.

Thanasegaran, G. (2009). Reliability and Validity Issues in Research. *Integration & Dissemination*, *4*.

Tshambula, A. (2017). *Factors impacting the adoption of an electronic payment solution in the South African taxi industry: A study of taxi owners in the Johannesburg metropolitan area* (Doctoral dissertation). University of the Witwatersrand.

Twinomurinzi, H., Mawela, T., Rampa, K., & Ismail, M. (2018). *Digital Re-imagination Colloquium 2018: Preparing South Africa for a Digital Future through e-Skills*.

Venter, P., van Rensburg, M. J., & Davis, A. (2012). Drivers of learning management system use in a South African open and distance learning institution. *Australasian Journal of Educational Technology*, *28*(2), 183–198.

Virkus, H. (2017). *Ridesharing Companies' Best Practices For Global Expansion*. Tallinn University of Technology.

Wallsten, S. (2015). The competitive effects of the sharing economy: how is Uber changing taxis. *Technology Policy Institute*, *22*.

Wan, W. N. A. A. B., Mohamad, A. F. M. F., Shahib, N. S., Azmi, A., Kamal, S. B. M., & Abdullah, D. (2016). A Framework of Customer's Intention to use Uber Service in Tourism Destination. *International Academic Research Journal of Business and Technology*, *2*(2), 102–106.

Wang, Y., Gu, J., Wang, S., & Wang, J. (2019). Understanding consumers' willingness to use ride-sharing services: The roles of perceived value and perceived risk. *Transportation Research Part C: Emerging Technologies*, *105*, 504-519.

Widanengsih, E. (2021). *Technology Acceptance Model To Measure Customer's Interest To Use Mobile Banking*. *2*(1), 73–82.

Wu, J., Huang, L., & Lin, L. (2016). *Predicting User Intention To Accept Mobile Payment Service: What We Have Learned From WeChat Payment In China*. Fudan University.

Wu, J., Liu, L., & Huang, L. (2016). Exploring User Acceptance Of Innovative Mobile Payment Service In Emerging Market: The Moderating Effect Of Diffusion Stages Of WeChat Payment In China. *Pacific Asia Conference on Information Systems 2016 Proceedings*.

Yaghoubi, N. M., & Bahmani, E. (2010). Factors affecting the adoption of online banking: An integration of technology acceptance model and theory of planned behavior. *International*

journal of business and management, *5*(9), 159-165.

Yang, L., Bian, Y., Zhao, X., Liu, X., & Yao, X. (2021). Drivers' acceptance of mobile navigation applications: An extended technology acceptance model considering drivers' sense of direction, navigation application affinity and distraction perception. *International Journal of Human-Computer Studies*, *145*, 102507.

Yong, A. G., & Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in Quantitative Methods for Psychology*, *9*(2), 79–94.

Zhang, G., Ma, L., Yang, Y., & Bian, R. (2016). Understanding Customers' Continued Use Behavior of Taxi-hailing Apps: An Empirical Study in China. *Journal of Residuals Science & Technology*, *13*(8).

Zhang, G., Ma, L., & Zhang, X. (2017). Understanding Users' Recommendation Intention of Taxi-hailing Apps: An Internal Perception Perspective. In *Wuhan International Conference on E-Business. 2017 Procedings 43*.

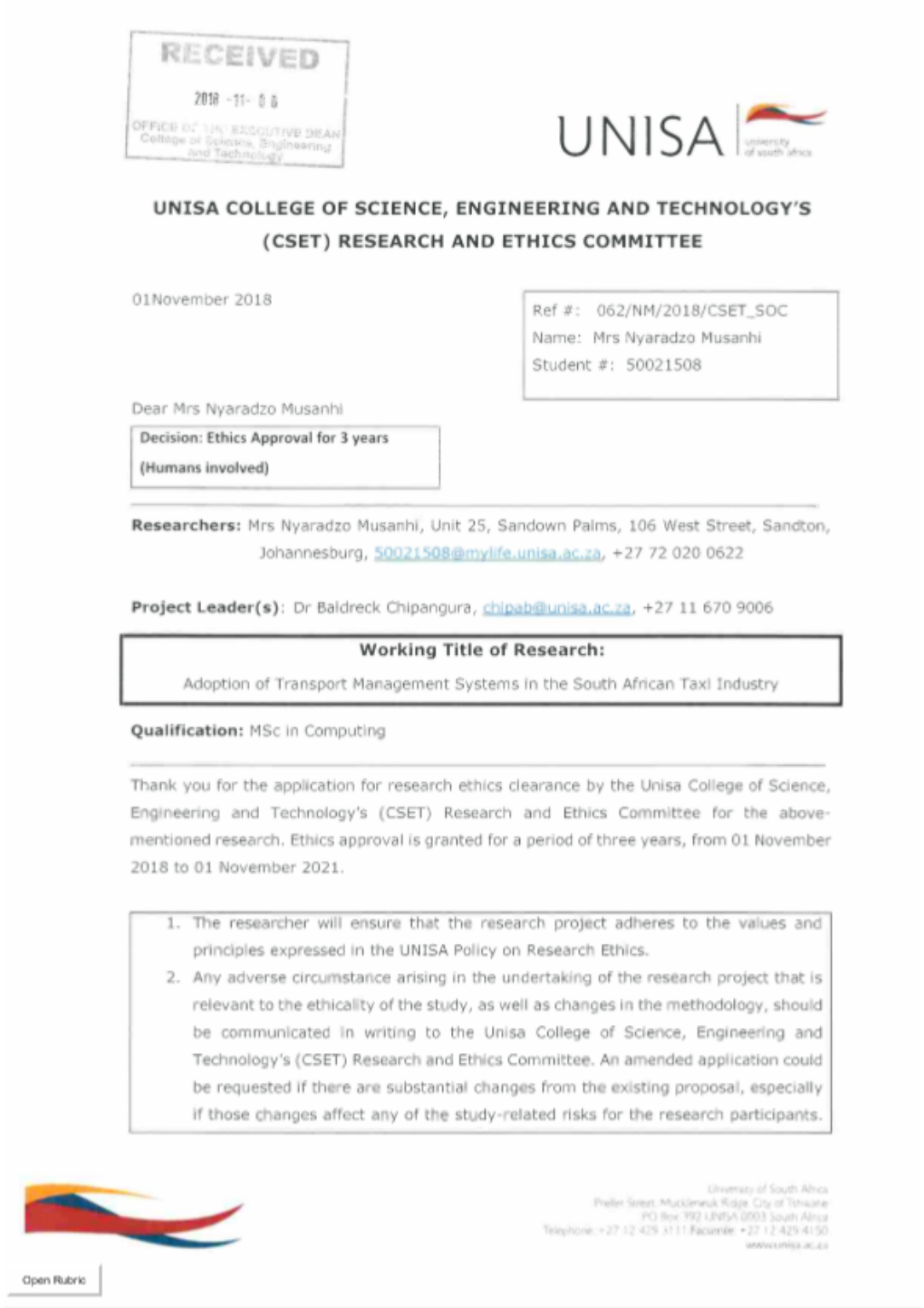
Zhao, X.-Y., & Su, Q. (2019). *Existing Issues of Ride Sharing Company Operation and Sharing Economy in China: Uber Case Analysis*. *87*(Icmesd), 348–352. https://doi.org/10.2991/icmesd-19.2019.51

Zheng, J., & Li, S. (2020). What drives students' intention to use tablet computers: An extended technology acceptance model. *International Journal of Educational Research*, *102*, 101612.

Zmud, J. P., & Sener, I. N. (2017). Towards an understanding of the travel behavior impact of autonomous vehicles. *Transportation research procedia*, *25*, 2500-2519.

APPENDICES

APPENDIX 1: ETHICAL CLEARANCE CERTIFICATE



RECEIVED
2018 -11- 0 8
OFFICE OF THE EXECUTIVE DEAN
College of Science, Engineering and Technology

UNISA

UNISA COLLEGE OF SCIENCE, ENGINEERING AND TECHNOLOGY'S (CSET) RESEARCH AND ETHICS COMMITTEE

01November 2018

Ref #: 062/NM/2018/CSET_SOC
Name: Mrs Nyaradzo Musanhi
Student #: 50021508

Dear Mrs Nyaradzo Musanhi

Decision: Ethics Approval for 3 years
(Humans involved)

Researchers: Mrs Nyaradzo Musanhi, Unit 25, Sandown Palms, 106 West Street, Sandton, Johannesburg, 50021508@mylife.unisa.ac.za, +27 72 020 0622

Project Leader(s): Dr Baldreck Chipangura, chipab@unisa.ac.za, +27 11 670 9006

Working Title of Research:
Adoption of Transport Management Systems in the South African Taxi Industry

Qualification: MSc in Computing

Thank you for the application for research ethics clearance by the Unisa College of Science, Engineering and Technology's (CSET) Research and Ethics Committee for the above-mentioned research. Ethics approval is granted for a period of three years, from 01 November 2018 to 01 November 2021.

1. The researcher will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the Unisa College of Science, Engineering and Technology's (CSET) Research and Ethics Committee. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

Open Rubric

The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.

3. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
4. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
5. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.
6. No field work activities may continue after the expiry date (01 November 2021). Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.
7. Field work activities may only commence from the date on this ethics certificate.

Note:

The reference number 062/NM/2018/CSET_SOC *should be clearly indicated on all forms of communication with the intended research participants, as well as with the Unisa College of Science, Engineering and Technology's (CSET) Research and Ethics Committee.*

Yours sincerely

Dr. B Chimbo
Chair: Ethics Sub-Committee SoC, College of Science, Engineering and Technology (CSET)

Prof I. Osunmakinde
Director: School of Computing, CSET

Prof B. Mamba
Executive Dean: CSET

Approved - decision template – updated Aug 2016

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

APPENDIX 2: PARTICIPANT INFORMATION SHEET

UNISA university of south africa

PARTICIPANT INFORMATION SHEET

Ethics clearance reference number:
Research permission reference number (if applicable):

25 September 2018

Title: Adoption of Transport Management Systems in the South African Taxi Industry

Dear Prospective Participant

My name is Nyaradzo Musanhi and I am doing research with Dr. Baldreck Chipangura, a senior lecturer in the Department of Computing towards a Master of Science in Computing degree at the University of South Africa. We are inviting you to participate in a study entitled **Adoption of Transport Management Systems in the South African Taxi Industry**.

WHAT IS THE PURPOSE OF THE STUDY?

I am conducting this research to find out how the small to medium taxi entrepreneurs' attitudes towards technology is affecting their acceptance of transport management systems in the South African taxi industry.

WHY AM I BEING INVITED TO PARTICIPATE?

Since you are a taxi entrepreneur, your participation will greatly assist in this research. You have been selected randomly, from a population of entrepreneurs. The total number of participants that will take part in this research is 100.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

The study involves surveys. Questions related to how the attitude of entrepreneurs towards technology affects their adoption of transport management systems in the South African taxi industry be asked in the survey. The survey will take about 20 minutes to complete.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

Participating in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

No monetary gifts or any other gifts will be given for taking party in this study. However, as a participant, you will learn a lot on technology use in the South African taxi industry.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

If you have a very busy schedule, time to participate may be the only problem, but as stated before, the survey will only take 20 minutes to complete.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

Your name will not be recorded anywhere and your participation in this research will be kept private by the researcher. No one will be able to connect you to the answers you give. Your answers will be given a code number or a pseudonym and you will be referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings.

Your anonymous data may be used for other purposes, such as a research report, journal articles and/or conference proceedings. Privacy will be protected in any publication of the information as you will not be identifiable in such a report.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Hard copies of your answers will be stored by the researcher for a minimum period of five years in a locked cupboard/filing cabinet for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

be subject to further Research Ethics Review and approval if applicable. Hard copies will be shredded and/or electronic copies will be permanently deleted from the hard drive of the computer.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

There will be no payment or incentives offered for participant, though you will gain valuable knowledge in participating. Participation is voluntary. No costs will be incurred by you.

HAS THE STUDY RECEIVED ETHICS APPROVAL

This study has received written approval from the Research Ethics Review Committee of the School of Computing, Unisa. A copy of the approval letter can be obtained from the researcher if you so wish.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

If you would like to be informed of the final research findings, please contact Nyaradzo Musanhi on 0720200622 or 50021508@mylife.unisa.ac.za. The findings are accessible for 1 year.

Should you require any further information or want to contact the researcher about any aspect of this study, please contact Nyaradzo Musanhi on 0720200622 or 50021508@mylife.unisa.ac.za.

Should you have concerns about the way in which the research has been conducted, you may contact Dr. Baldreck Chipangura on 0116709106 or chipab@unisa.ac.za. Contact the research ethics chairperson of the School of Computing, Unisa, if you have any ethical concerns.

Thank you for taking time to read this information sheet and for participating in this study.
Thank you.

_____

Nyaradzo Musanhi

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

APPENDIX 3: CONSENT TO PARTICIPATE

UNISA university of south africa

CONSENT TO PARTICIPATE IN THIS STUDY

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I agree to the recording of the survey data collection method.

I have received a signed copy of the informed consent agreement.

Participant Name & Surname..... (please print)

Participant Signature.....Date.....

Researcher's Name & Surname.....NYARADZO MUSANHI.....(please print)

Researcher's signature..... .....Date.....25/09/2018.....

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

APPENDIX 4: SURVEY COVER LETTER

UNISA university of south africa

Ethical clearance #: 062/NM/2018/CSET_SOC

Research permission #: N/A

COVER LETTER TO A SURVEY

Dear Prospective participant,

You are invited to participate in a survey conducted by Nyaradzo Musanhi under the supervision of Dr. Baldreck Chipangura, a senior lecturer in the Department of Computing towards an MSc in Computing degree at the University of South Africa.

The survey you have received has been designed to study the adoption of transport management systems in the South African taxi industry. You were selected to participate in this survey because you are a taxi entrepreneur and so, your participation will greatly assist in this research. You will not be eligible to complete the survey if you are younger than 18 years. By completing this survey, you agree that the information you provide may be used for research purposes, including dissemination through peer-reviewed publications and conference proceedings.

It is anticipated that the information we gain from this survey will help us to find out how the small to medium taxi entrepreneurs' attitudes towards technology is affecting their acceptance of transport management systems in the South African taxi industry. You are, however, under no obligation to complete the survey and you can withdraw from the study prior to submitting the survey. The survey is developed to be anonymous, meaning that we will have no way of connecting the information that you provide to you personally. If you choose to participate in this survey it will take up no more than 20 minutes of your time. Possible benefits for you as the participant is that you will learn a lot on technology use in the South African taxi industry. We foresee the following consequences in completing the survey; If you have a very busy schedule, time to participate may be the only problem, but as stated before, the survey will only take 20 minutes to complete. The researcher undertakes to keep any information provided herein confidential, not to let it out of our possession and to report on the findings from the perspective of the participating group and not from the perspective of an individual.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

The records will be kept for five years for audit purposes where after it will be permanently destroyed. Hard copies will be shredded and electronic versions will be permanently deleted from the hard drive of the computer. You will not be reimbursed or receive any incentives for your participation in the survey.

The research was reviewed and approved by the School of Computing Ethics Review Committee. The primary researcher, Nyaradzo Musanhi, can be contacted during office hours at 50021508@mylife.unisa.ac.za or 0720200622. The study leader, Dr. Baldreck Chipangura, can be contacted during office hours at chipab@unisa.ac.za or 0116709106. Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson of the School of Computing Ethics Review Committee. Alternatively, you can report any serious unethical behaviour at the University's Toll Free Hotline 0800 86 96 93.

You are making a decision whether or not to participate by continuing to the next page. You are free to withdraw from the study at any time.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

APPENDIX 5: SURVEY QUESTIONNAIRE

Questionnaire on Adoption of Transport Management Systems in the South African Taxi Industry

Section A: Biographical Information

Please select the applicable by placing an X in the box next to it.

1. What is your gender?

Gender	X
a) Male	
b) Female	

2. How old are you?

Age	X
a) Less than 25 years	
b) 25 – 30 years	
c) 31 – 40 years	
d) 41 – 50 years	
e) More than 50 years	

3. What is your highest level of education?

Qualifications	X
a) Matric (Grade 12)	
b) Certificate (1-2 years)	
c) Diploma/Degree	
d) Post graduate degree	
e) Other	

4. How long have you been a taxi entrepreneur?

Taxi Entrepreneurial Experience	X
a) Less than one year	
b) 1 - 3 years	
c) Between 3 and 10 years	
d) More than 10 years	

5. Where is the business located?

Context	X
a) City	
b) Large town	
c) Small town	
d) Rural setting	

6. How would you describe your experience level of using the following technologies?

Technology	**Novice**	**Competent**	**Expert**
a) Mobile cell phone			
b) Tablet Computer (e.g.iPad)			
c) Google Maps			
d) Shared Economy (e.g Uber, Taxify)			
e) GPS			
f) SMS			
g) Electronic mail (E-mail)			
h) Phone calls			

Section B: Information on taxi entrepreneurs' perceived usefulness

1. Please select the most appropriate statement by placing an X in the box.
Consider the following categories:

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5= Strongly Agree.

Statement	1	2	3	4	5
a) I find transport management systems to be useful.					
b) I find that the level of usefulness when operating using transport management systems affects my attitude.					
c) I find that the level of usefulness when operating using transport management systems affects my intention.					

Section C: Information on taxi entrepreneurs' perceived ease of use

2. Please select the most appropriate statement by placing an X in the box.
Consider the following categories:

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5= Strongly Agree.

Statement	1	2	3	4	5
a) I find transport management systems to be easy to use.					
b) I find that the level of ease of use when operating using transport management systems affects my attitude.					
c) I find that the level of ease of use when operating using transport management systems affects my intention.					

Section D: Information on taxi entrepreneurs' perceived pricing

3. Please select the most appropriate statement by placing an X in the box.
Consider the following categories:

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5= Strongly Agree.

Statement	1	2	3	4	5
a) I find that the taxi business is profitable when operating using transport management systems.					
b) I find that the price of mobile data affects my attitude.					
c) I find that the price of mobile data affects my intention.					
d) I find that the pricing of taxi fares when using transport management systems affects my attitude.					
e) I find that the pricing of taxi fares when using transport management systems affects my intention.					

Section D: Information on taxi entrepreneurs' perceived safety

4. Please select the most appropriate statement by placing an X in the box.
Consider the following categories:

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5= Strongly Agree.

Statement	1	2	3	4	5
a) I find that it is safe to transport customers when using transport management systems.					
b) I find that there is high level of safety when transporting my customers when using transport management systems and that affects my attitude.					
c) I find that I am not an easy target to thieves when using transport management systems since transactions are mainly cashless.					
d) I find that there is high level of safety when transporting my customers when using transport management systems and that affects my intention.					

Section E: Information on taxi entrepreneurs' perceived convenience and accessibility

5. Please select the most appropriate statement by placing an X in the box.
Consider the following categories:

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5= Strongly Agree.

Statement	1	2	3	4	5
a) I find it convenient to get customers when operating using transport management systems.					
b) I find customers to be accessible when operating using transport management systems.					
c) I find that operating using transport management systems affects my intention as it offers high level of convenience to my customers.					
d) I find that operating using transport management systems affects my attitude as it offers high level of convenience to my customers.					
e) I find that operating using transport management systems affects my attitude as it offers high level of accessibility.					
f) I find that operating using transport management systems affects my intention as it offers high level of accessibility.					

Section F: Information on taxi entrepreneurs' perceived customers' trust

6. Please select the most appropriate statement by placing an X in the box.
Consider the following categories:

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5= Strongly Agree.

Statement	1	2	3	4	5
a) I find that customers trust taxis when the taxis operate using transport management systems.					
b) I find that the level of customers' trust towards taxis that operate using transport management systems affects my intention.					
c) I find that the level of customers' trust towards taxis that operate using transport management systems affects my attitude.					

Section G: Information on taxi entrepreneurs' attitude towards use

7. Please select the most appropriate statement by placing an X in the box.
Consider the following categories:

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5= Strongly Agree.

Statement	1	2	3	4	5
a) I find that my attitude towards the use of transport management systems is positive.					
b) I find that my attitude towards the use of transport management systems affects my intention.					

Section H: Information on taxi entrepreneurs' behavioral intention

8. Please select the most appropriate statement by placing an X in the box.
Consider the following categories:

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5= Strongly Agree.

Statement	1	2	3	4	5
a) I intend on using transport management systems to operate my taxi business.					
b) I find that my intention to use of transport management systems affects my actual use of the systems.					

APPENDIX 6: CERTIFICATE OF EDITING

First submission

Certificate of Editing

ADOPTION OF TRANSPORT MANAGEMENT SYSTEMS IN THE SOUTH AFRICAN TAXI INDUSTRY

By:

NYARADZO MUSANHI

Edited for English language usage

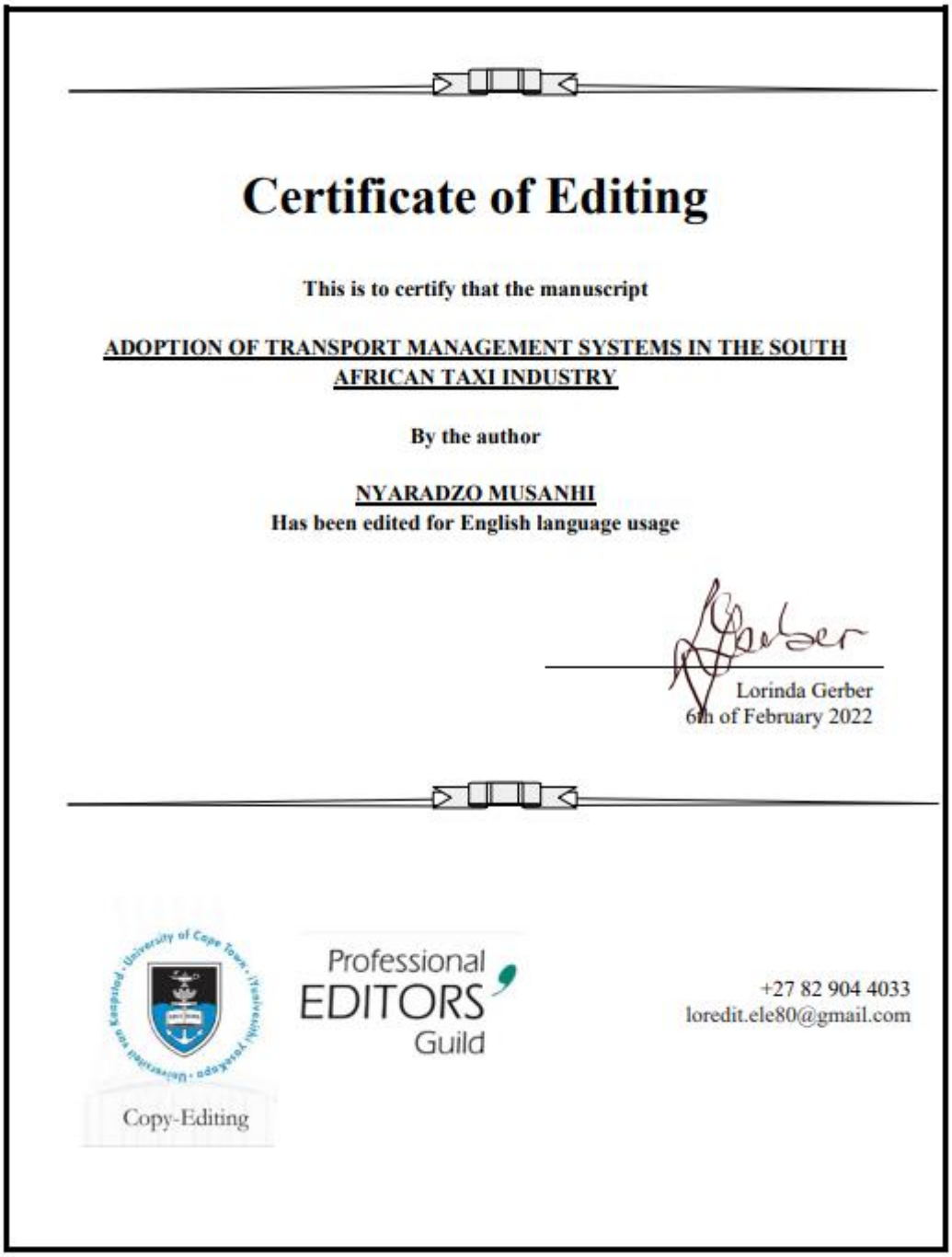
Lorinda Gerber
23rd of October 2021

Copy-Editing

Professional EDITORS Guild

+27 82 904 4033
loredit.ele80@gmail.com

Second submission after corrections



Certificate of Editing

This is to certify that the manuscript

ADOPTION OF TRANSPORT MANAGEMENT SYSTEMS IN THE SOUTH AFRICAN TAXI INDUSTRY

By the author

NYARADZO MUSANHI
Has been edited for English language usage

Lorinda Gerber
6th of February 2022

Copy-Editing

Professional EDITORS Guild

+27 82 904 4033
loredit.ele80@gmail.com

APPENDIX 7: TURNITIN REPORT

First submission

Congratulations - your submission is complete! This is your digital receipt. You can print a copy of this receipt from within the Document Viewer.

Author:
Nyaradzo MUSANHI

Assignment title:
Revision 3

Submission title:
Final Dissertation Nyaradzo

File name:
Final_Dissertation Computing_DFCOM92_Nyaradzo Musanhi.doc

File size:
3.83M

Page count:
146

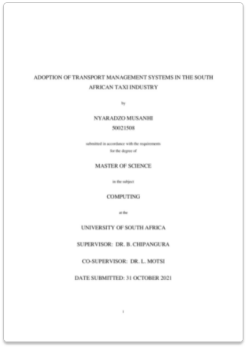
Word count:
35089

Character count:
200618

Submission date:
27-Oct-2021 11:12AM (UTC+0200)

Submission ID:
1685463582

« Page 1 »



ADOPTION OF TRANSPORT MANAGEMENT SYSTEMS IN THE SOUTH AFRICAN TAXI INDUSTRY

by

NYARADZO MUSANHI

50021508

submitted in accordance with the requirements for the degree of

MASTER OF SCIENCE

in the subject

COMPUTING

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: DR. B. CHIPANGURA

CO-SUPERVISOR: DR. L. MOTSI

DATE SUBMITTED: 31 OCTOBER 2021

Final Dissertation Nyaradzo

ORIGINALITY REPORT

23%	20%	10%	8%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	uir.unisa.ac.za Internet Source	1%
2	Submitted to Tshwane University of Technology Student Paper	1%
3	www.tandfonline.com Internet Source	1%
4	wiredspace.wits.ac.za Internet Source	1%
5	eldorado.tu-dortmund.de Internet Source	1%
6	Submitted to University of Warwick Student Paper	<1%
7	scholarworks.waldenu.edu Internet Source	<1%
8	Ibrahim Akman, Alok Mishra. "Factors influencing consumer intention in social commerce adoption", Information Technology & People, 2017 Publication	<1%

Second submission after corrections

Congratulations - your submission is complete! This is your digital receipt. You can print a copy of this receipt from within the Document Viewer.

Author:
Nyaradzo MUSANHI

Assignment title:
Revision 1

Submission title:
Final Dissertation after corrections

File name:
8Feb2022FINAL_Dissertation Computing_DFCOM92_Nyaradzo Musanhi.pdf

File size:
3.09M

Page count:
141

Word count:
36322

Character count:
217155

Submission date:
08-Feb-2022 12:08PM (UTC+0200)

Submission ID:
1757635979

« Page 1 »

ADOPTION OF TRANSPORT MANAGEMENT SYSTEMS IN THE SOUTH AFRICAN TAXI INDUSTRY

by

NYARADZO MUSANHI

submitted in accordance with the requirements for the degree of

MASTER OF SCIENCE

in the subject

COMPUTING

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: DR. B. CHIPANGURA

CO-SUPERVISOR: DR. L. MOTSI

DATE SUBMITTED: 19 NOVEMBER 2021

DATE RE-SUBMITTED: 8 FEBRUARY 2022

Final Dissertation after corrections

ORIGINALITY REPORT

23%	20%	11%	8%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Tshwane University of Technology Student Paper	1%
2	uir.unisa.ac.za Internet Source	1%
3	www.tandfonline.com Internet Source	1%
4	hdl.handle.net Internet Source	1%
5	hj.diva-portal.org Internet Source	1%
6	wiredspace.wits.ac.za Internet Source	1%
7	etd.uum.edu.my Internet Source	<1%
8	eldorado.tu-dortmund.de Internet Source	<1%
9	eprints.lincoln.ac.uk Internet Source	<1%