A FRAMEWORK FOR THE USE OF M-COMMERCE BY BRICK-AND-MORTAR RETAIL STORES IN ANGOLA

by

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Thesis submitted in fulfilment of the requirements for the degree of

Doctor of Commerce in Marketing

in the Faculty of Business and Management Sciences

at the Cape Peninsula University of Technology

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District Six campus

October 2022

DECLARATION

I, **Mateus Vicente Justino, student number, 209111755,** declare that the contents of this thesis represent my own unaided work and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

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ABSTRACT

Brick-and-mortar retailers are physical structures for retail businesses, mostly recognised by the international community. They represent a mainstream solution to consumers' demands, changing behaviour, poverty, government revenue, and special interest. However, the rapid increase in the use of mobile commerce in recent years in developing countries may have great potential to support brick-and-mortar retailers. Conventional retailers expect mobile commerce to enable them to respond to continuous uncertainty and unpredictable changes in a dynamic business environment, accommodate new consumer experiences, boost sales of products/services and achieve competitive advantage.

Considering the above, the lack of a dependable framework for using mobile commerce to manage brick-and-mortar retailer stakeholders' priorities continues to be a concern for conventional business leaders, who continue to struggle to incorporate productivity-enhancing technologies into their businesses. Thus, to address this problem, this study aims to explore the use of a framework for mobile commerce in brick-and-mortar retailers. The main objective is to investigate the underlying factors that are requisite for the use of a framework for mobile commerce in brick-and-mortar retailers. Thus, the study integrated the Technology-Organisation-Environment framework and the Task-Technology Fit model. This integration led to the extension of the Technology-Organisation-Environment framework and the Task-Technology Fit model to a conceptual framework founded on three major contexts, namely 1) mobile commerce technological context, 2) retailer organisational context and 3) retailer environmental context, for a full exploration of the adoption and use of mobile commerce by brick-and-mortar retailers.

The study combined both the positivist and interpretive paradigms and followed a cross-sectional study design. Both the structured questionnaire and the semi-structured interview as survey instruments were considered appropriate for the collection of both qualitative and quantitative data from brick-and-mortar business managers/owners and mobile commerce business personnel, using the area or cluster sampling approach from the probability sampling strategy. Descriptive analysis, Structural Equation Modeling analysis and content analysis were performed. Thus, triangulation between qualitative data and quantitative data was used to ensure concurrent validity.

The test and analysis of the conceptual framework revealed that the task characteristics, Top Management Support, Technology Competence and Readiness for Mobile Distribution Systems constructs associated with retailer organisational context, lend significant support to the use of m-commerce. The results further show that the functionalities of m-commerce systems, Relative advantage and Data Security constructs associated with the m-commerce technological context also significantly support the use of m-commerce. Other variables are

associated with the external factors, which are financial support, managerial support and technical support that retailers expect from the support agencies. The general framework proposed by the study provides a comprehensive structural design within the alignment of brick-and-mortar retailer operations and mobile commerce practices. It may help conventional businesses to understand and identify the requisite factors in the adoption and use of m-commerce and assist business supporters in the process of technological innovation transfer. Furthermore, the proposed general framework offers sufficient theoretical grounds for explaining and evaluating the use of m-commerce in other contexts. General recommendations and suggestions for further research are made.

Keywords: Brick-and-mortar retailer, mobile commerce (m-commerce), mobile commerce application, mobile technology, retailer, retailing, Small and Medium Enterprises (SMEs), Technology-Organisation-Environment (TOE), Task-Technology Fit (TTF), Angola, Luanda.

ACKNOWLEDGEMENTS

To the everlasting God, Jehovah, God Almighty, thank you for Your love and leadership and the great source of strength, my Lord, Jesus Christ.

I wish to express my deep gratitude to my wife Toini Hinaumdafa Hetwali and my son Bryan, who had to ensure that this achievement is possible if we all shoulder its heavy burden. To my wife Toini, your exceptional support is worthy of notice. I would not complete this thesis without your unequivocal and continued support. Toini and Bryan, thank you for your love and patience.

I am deeply indebted to my supervisor, Professor Robertson Khan Tengeh and my co-supervisor, Dr Michael Twum-Darko, for their guidance from the inception of my academic research activities to the completion of this Doctoral thesis and for being always available for consultations and enthusiastic encouragement. I am profoundly grateful for all of your input.

I would also like to extend my sincere gratitude to:

- Professor Rodney Duffett, for his professional assistance and exceptional up-to-date information on a series of research programmes as well as Dr Norbert Haydam and Dr Pieter Steenkamp for their useful and constructive recommendations on my initial research proposal.
- Mrs Mandy Jones, for her departmental assistance and Mr Siseko Mtetwa for his great assistance.
- Dr Cheryl Thomson, for her wholehearted support and editing of this work.
- Dr Corrie Uys, for her assistance in the provision of resources, specially used for the data analysis, and Dr Samson Nambei Asoba, for his invaluable academic support.
- Mr. António Domingos Mateus, for his invaluable professional advice and support for access to m-commerce business personnel and brick-and-mortar business leaders. Jorge Mateus Caetano, for the role he played throughout this research and his willingness to give his invaluable time to facilitate the fieldwork.
- My parents for their love and support.
- My relatives and friends, António V Justino, João A António, Edson BJ Calenga, Akssana Tito, Esperança Borges Mateus, Laurinda Borges, Zandisile Mkubukile, Elizangela Narciso, Pascoal B Sebastião, Bernardino P Manuel, Fabrício Kanga, Marcelino Gomes, Jesus M Nogueira, Fausto A Marques, João F. Justino, Carla V Justino, Nazaré V Justino, Ana A Fonceca, Francisco Fernandes, Luiza J Francisco, for their enthusiasm and interest in this study and their sustained support.
- Dr João Mateus Domingos, Mr Dialungana Malungo, Mr Danilson SR Pedro, the business leaders, personnel and professionals, for their generous assistance, participation in this study and sharing their experiences.

DEDICATION

To my beloved mother, Francisca António Fernandes Vicente Justino “Mana Chica” (02/03/1953 – 27/06/2022), who cannot witness this achievement, and father, Joaquim Francisco Justino, I am forever indebted to you for your great love, supports and instructions.

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ABBREVIATIONS AND ACRONYMS

AF	Authorization Factor
AGFI	Adjusted Goodness-of-Fit Index
AMOS	Analysis of Moment Structures
APEC	Asia-Pacific Economic Cooperation
AVE	Average Variance Extracted
CF	Compatibility Factor
CFA	Confirmatory Factor analysis
CFI	Comparative Fit Index
CMF	Critical Mass Factor
CMIN/df	Chi-square to Degrees of Freedom
CPF	Competitive Pressure Factor
DOI	Diffusion of Innovation
EFTPOS	Electronic Funds Transfer at Point of Sale
EU	Ease of Use
FVM	Fit-Viability Model
GFI	Goodness-of-fit index/indices
GOF	Goodness-of-Fit
GPS	Global Positioning System
GSMA	Groupe Speciale Mobile Association
HR	Human Resources
IBAN	International Bank Account Number
ICT	Information and Communication Technology
IFI	Incremental Fit Index
INAPEM	Instituto National de Apoio as Micro, Pequenas e Médias Empresas
INE	Instituto Nacional de Estatística
IoT	Internet of Things

LF	Locatability Factor
MCU	Mobile Commerce Use
MDP	Mobile Data Processing
MDS	Mobile Distribution Systems
MIE	Mobile Information Exchange
MIS	Mobile Information Search
MNO	Mobile Notification
MPG	Mobile Payment Gateway
MSMEs	Micro, Small and Medium Enterprises
MT	Mobility Task
NPSTI	National Policy for Science, Technology and Innovation
OECD	Organisation for Economic Co-operation and Development
ON	Operator Network
P	Probability
PAR	Policies and Regulations
PCFI	Parsimony Comparative Fit Index
PGFI	Parsimony Goodness-of-fit index
PNFI	Parsimony Normed Fit Index
PT	Production Timeliness
QF	Quality Factor
R^2	Squared Multiple Correlations
RA	Relative Advantage
RF	Reliability Factor
RFI	Relative Fit Index
RMSEA	Roots Mean Square Error of Approximation
RU	Relationship with User
SEM	Structural Equation Modeling

SME(s)	Small and Medium Enterprise(s)
SPSS	Statistical Package for the Social Sciences
SRMR	Standardised Roots Mean Square Residual
STI	Science, Technology and Innovation
TAM	Technology Acceptance Model
TC	Time Criticality
TCI	Technological Cooperative Institutions
TCO	Technology Competence
TI	Task Interdependence
TIM	Technology Impact Model
TLI	Tucker-Lewis Index
TN	Task Non-routineness
TMS	Top Management Support
TOE	Technology-Organisational-Environmental
TPC	Technology-to-Performance Chain
TTF	Task-Technology Fit
UTAUT	Unified Theory of Acceptance and Use of Technology
VIF	Variance Inflation Factor
WLAN	Wireless Local Area Network

GLOSSARY

Brick-and-mortar retailer	A paradigm of business that sells goods to the final consumers within specific premises. It refers to the retailer that confines its operations in a physical facility providing face-to-face client experience and that has not deployed any form of e-commerce as the core of their business model or as an integral part of their business activities to sell to the public.
Mobile commerce (m-commerce)	The activities of buying and selling goods or services using digitalised mobile systems (Njenga et al., 2016:13).
Mobile commerce application	A mobile device program that enables transactions and provides details, and capture and process data/information related to customer and merchant (Varshney & Vetter, 2002:186).
Mobile technology (mobile cell phone, tablet or laptop computer devices)	Portable technological tools that are connected to the telephone system or Wi-Fi by radio signals and used to carry out various tasks (Zigurs et al., 1999).
Retailer	Any individual or paradigm of business that sells goods or services to the final consumer.
Retailing	All the coordinated activities that the retailer engages in for the sales of goods or services to the public.
Small and Medium Enterprises (SMEs)	To the Angolan economy is defined as those businesses employing more than 10 and up to 200 employees and/or having an annual gross turnover of USD 250 000 and equal to or less than USD 10 million (Angola, Diário da República, 2011a:4295).
Technology-Organisational-Environmental (TOE)	A structured framework that describes how the components of the business environment hold substantial sway on the business technology adoption decision-making (Tornatzky & Fleischer, 1990; Lippert & Govindarajulu, 2006:149; Baker, 2011).
Technology-to-Fit (TTF)	A model that enables the evaluation of whether technology and services in a given organisation are meeting user needs

(Goodhue & Thompson, 1995:213). It is broken down into multi-subsets such as task characteristic (a typical quality that makes a task different from other tasks), technology characteristic (what the technology is able to support and provide for the execution of a particular task characteristic), Task-Technology Fit (the consequence of the level of interactions between task and technology), use (the individual's behaviour of deploying the technology in completing tasks), and performance (the extent to which the users perceives technology impacted on their jobs performance).

CHAPTER 1
INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

Brick-and-mortar retailers are one of the solutions to many social and economic problems faced by a country in general and a local community in particular. It is one of the ways of fighting poverty through job creation and self-employment in a local community and generating government revenue for economic development (EuroCommerce, 2017:3; United Nations, 2017:1). Brick-and-mortar retailers are one of the mainstream solutions to meet the final consumers' needs, demands and buying behaviour (Boysen et al., 2020:377; Finotto et al., 2020:11). However, despite being an acceptable solution to the above-mentioned economic problems, brick-and-mortar retailers are under external compulsion to use new electronic commerce (e-commerce) channels such as Web commerce and mobile commerce (m-commerce) as strategies to confront technological challenges, to face formidable competitors, to respond to continuous uncertainty and unpredictable changes in a dynamic business environment, and accommodate new consumer experiences (EY, 2015:12; Verhoef et al., 2015:174; Richter et al*.,* 2016; Kamble et al., 2019:154; Prasanna et al., 2019:1; Finotto et al., 2020:11). Putting the above external compulsion into perspective, brick-and-mortar retailers are hampered by the lack of a reliable framework for the use of m-commerce to manage their stakeholders' interests, as traditional business leaders continue to suffer from the inability to integrate productivity-enhancing technology into their businesses (Siwundla, 2013:vi; Verhoef et al., 2015:179; Muzima & Gallardo, 2017:14; Kamble et al., 2019:154; Singh et al., 2019). Therefore, the present study aims to explore the use of a framework for m-commerce in brick-and-mortar retailers. The study's main objective is to probe the underlying factors that are requisite for the use of m-commerce in brick-and-mortar retailers.

In this chapter, the rationale and the problem statement of the research are explained. The chapter provides a brief overview of the theories underpinning the study and introduces the conceptual framework, the research methodology and the rational course of action adopted for the collection of data and its analysis.

1.2 Rationale of the study

A few reasons can be advanced for studying the retail sector. Retail practices improve people's lives by making available the products or services they use daily and need to replace; they enable consumers to quickly purchase the things that embody their lifestyles and decide their quality of living, and they create job opportunities for individuals and the economy.

Historically, the retail industry has seen the advent of emerging e-commerce outlets such as online commerce and m-commerce since the 1990s. These digital outlets have brought

innovative shifts to the retail market and their rapid growth has been cited as one of the most disruptive changes to the brick-and-mortar retail business model (Pantano & Timmermans, 2014:101; EY, 2015:4; Hübner et al., 2016:287; Helm et al., 2018; Prasanna et al., 2019:1).

Records reveal that the different retail channels existing today are partly driven by retailers' careful consideration of public shopping facilities and consumers' behaviour (Guy, 1998:255; Culley, 2020:v), access to the market (Čater et al., 2018:192) and the establishment of competitive advantage (Lu et al., 2015:294). Thus, brick-and-mortar retailers have been compelled to consider the new e-commerce business channels and meet new consumers changing behaviour. Given the wide experience of using and switching across channels, consumers now frequently demand incremental changes in brick-and-mortar retailers' traditional sales channels to accommodate their new experience (Verhoef et al., 2015:174; Caro et al., 2020:51). Consumers are learning and experiencing new value-added features such as timeless shopping, the surroundings (i.e. the comfort of consumer buying at a place of their convenience), and affordable personalised and electronic transaction delivery services (Lamb et al., 2008:95; Picoto et al., 2014:573; Njenga et al., 2016:13; Goddard, 2020:4). Several of the factors contributing to the evolving consumer purchasing behaviour in today's markets include technological advances in the field of telecommunications (e.g. the Fifth Generation (5G) mobile communication system) that help promote the dissemination of information (Čater et al., 2018:192; Psyrris et al., 2020; Taheribakhsh et al., 2020), the rapid expansion of online retailers (Caro et al., 2020:52) and the COVID-19 pandemic that has triggered a dramatic surge in customer demands for contactless store pick-up and home delivery (Finotto et al., 2020:1; Gamser & Chenevix, 2020; Goddard et al., 2020:4). Thus, there is a need for the brick-and-mortar retail sectors to respond to a series of unique challenges imposed on them during COVID-19, such as adopting online channels to meet customer demands and adopting an electronic commerce distribution system strategy (or outsourcing it) to meet technological needs (Finotto et al., 2020:1; Goddard, 2020:4).

Therefore, this study seeks to explore the use of a framework for m-commerce in brick-and-mortar retailers in Angola. The use of m-commerce in brick-and-mortar retail stores can be understood as a strategic marketing approach to market penetration for achieving a sustainable competitive advantage in the contemporary market (Swilley et al., 2012:1). M-commerce is labelled as an enabler of business that rationalises and speeds up trade by transforming trade into digitalised mobile systems. Furthermore, m-commerce would provide traditional retailers with a more strategic approach to accede to customer demands, exchange goods and gain market share (Swilley et al., 2012:1; Verkijika, 2018:1665). It may enable a business to cultivate an image and relationships with customers, seize new business opportunities and generate economic value. It provides consumers with a seamless shopping experience (EY, 2015:8).

However, making effective and efficient use of m-commerce for electronic retailing requires a comprehensive understanding of the role of each underlying factor involved and of the existence of connections between those factors. It requires a detailed structural design within the level of alignment of brick-and-mortar retailer operations and m-commerce practices (EY, 2015:2; Verhoef et al., 2015:179; Chen, 2017:5793; Kamble et al., 2019:154). Records on the above reveal that traditional business leaders find it challenging to assemble all the aspects involved to deliver complex and scalable m-commerce systems (Siwundla, 2013:vi; Muzima & Gallardo, 2017:14; Singh et al., 2019). Traditional business leaders are to blame for the inefficiency in their responses against market challenges. Notably, in today's market environment businesses cannot make satisfactory progress by neglecting innovation and technology, or the use of m-commerce that has becoming integral in entrepreneurial activities. Brick-and-mortar retail SMEs in Angola have shown persistent weaknesses in Information and Communication Technology (ICT) adoption, business dynamism, and innovation capability (Shih, 2011:141; WEF, 2019:54; Almeida, 2019; Mwamba & Qutieshat, 2021). Although, the factors that impede the adoption and use of technologies by brick-and-mortar retail SMEs in Angola are many and not immediately obvious, the very slow progress of the promotion of technology transfer to Angola has been observed as a major factor (Shih, 2011:141; Almeida, 2019; Cossengue, 2020). Thus, understanding the linkages between the underlying factors involved in the use of m-commerce in brick-and-mortar retailers is a great concern for business audiences, Small and Medium Enterprise (SME) leaders, policymakers, professionals, academics, and international organisations (EY, 2015:2; Verhoef et al., 2015:179; The Earth Institute & Ericsson, 2016:8; Chen, 2017:5793; Kamble et al., 2019:154; Cossengue, 2020).

Verhoef et al. (2015:179) suggest further investigation into “how does the use of mobile channels within the store affect purchase behaviour and store performance”. Kamble et al. (2019:154) support that traditional retail firms should start “to re-design their marketing strategies to incorporate the changing consumer behaviour”. In dealing with the complexities surrounding businesses’ adoption and use of new technologies, the Technology-Organisation-Environment (TOE) framework and the Task-Technology Fit (TTF) model have been widely used as fundamental theories in different fields, including Information Systems and Marketing (Goodhue and Thompson 1995; Gebauer and Shaw 2004; Zhu and Kraemer 2005; Zhu et al. 2006a; Lu et al. 2015; Wang et al. 2016; Chatterjee et al. 2021). These theoretical models are further discussed in section 1.5 below and in Chapter Three. The research examined in Chapter Three suggests that these theoretical models should be used to investigate and understand the adoption and use of new technological infrastructure in other settings or industries (Shih & Chen, 2013:1019; Picoto et al., 2014:582; Chang & Dasgupta, 2015:26; Gatara, 2016:274; Wang et al., 2016:170). And that further study should focus on different stakeholders, such as users of m-commerce and non-adopters, and business leaders and employees (Gebauer et

al., 2010:269; Martín et al., 2012:959; Gangwar et al., 2015:107). In the light of the above discussions, this study fucuses on the view that adding contextual variables into a basic theoretical model or integrating two relevant models would better explain how brick-and-mortar retailers can adopt and use m-commerce (Dishaw & Strong, 1999:9; Shih and Chen 2013:1009; Gangwar et al. 2015; Lu et al., 2015:308; Wang et al. 2016; Prabowo et al., 2018:310). Thus, the study's results may also contribute to the promotion of business innovation and awareness of m-commerce usage in brick-and-mortar retail SMES in Angola where there has been little progress in the promotion of science, information and communication technology (ICT) and innovation.

1.3 Research problem

The lack of a dependable framework for using m-commerce to manage brick-and-mortar retailer stakeholders' priorities continues to be a concern for conventional business leaders who continue to struggle to incorporate productivity-enhancing technologies into their businesses in Angola (Muzima & Gallardo, 2017:14). A review of the related literature suggests that further research should be conducted to determine under what conditions and how the use of mobile channels in traditional retailers can give them a competitive advantage (Picoto et al., 2014:582; Verhoef et al., 2015:179; Chen, 2017:5793; Kamble et al., 2019:154). Even so, EY (2015:2) found that even though m-commerce has become a driver of "growth in consumer goods and retail, few retailers are confident about their ability to execute against it and maintain margins". Siwundla (2013:vi) suggests that initiatives should be taken for the promotion of awareness of m-commerce usage by traditional businesses.

Given the work of EY (2015:7), Verhoef et al. (2015:174), Hübner et al. (2016:290) and Shahzad et al. (2020:2), it can be argued that although many large brick-and-mortar retailers in developed and developing countries have adopted the e-commerce strategy, they are absent in multi-channel strategies (i.e. the click-and-mortar business model), neglecting the advantage of the virtual online marketplace. It has been observed that several large physical retailers frequently fail to fully consider new channels (e.g. web commerce and m-commerce) integration with traditional sales channel fulfilment (EY, 2015:17; Hübner et al., 2016:287). According to EY (2015:8), many large brick-and-mortar retailers struggle to technologically innovate their distribution systems.

In light of the above, this study recognises the importance of developing a framework for the adoption and use of m-commerce by brick-and-mortar retailers to enable traditional business leaders to have a competitive advantage in developing countries (Siwundla, 2013:vi; Muzima & Gallardo, 2017:14; Singh et al., 2019). This study proposes to explore the underlying factors that are requisite for the adoption and use of m-commerce in brick-and-mortar retailers in Angola.

Furthermore, the study intends to identify distinct problems in exploring the linkages between m-commerce and brick-and-mortar retailers and what components in the business environment would play a part in the use of m-commerce (Lee et al., 2007:109; Oldham & Fried, 2016:24).

1.4 Aim, research questions and research objectives

The aim of this study was to explore the use of a framework for m-commerce in brick-and-mortar retailers. The main objective was to investigate the underlying factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers. Table 1.1 illustrates the research objectives and the aligned research questions formulated to address the problem statement.

Table 1.1: Research questions and objectives

Research questions	Research objectives
Qs1. What different contexts of the use of m-commerce align with the brick-and-mortar retailer business lines and capabilities?	Ob1. To investigate the different contexts of interrelated components that create the right environment for the use of m-commerce by brick-and-mortar retailers.
Qs2. What is the nature of the new added value that aligns with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailers?	Ob2. To investigate the nature of the new added value that align with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailer.
Qs3. What are the required features and characteristics of m-commerce systems for brick-and-mortar retailers? Question Three has the following research sub-question:	Ob3. To determine the features and characteristics of m-commerce systems for brick-and-mortar retailers.
Qs3.1: How would online businesses deal with data security and privacy issues of trading over the Internet?	Ob3.1. To investigate the variables required for m-commerce systems data security and privacy.
Qs4. What factors within the brick-and-mortar retailer setup will impede the use of m-commerce?	Ob4. To determine the factors within the brick-and-mortar retailer setup that are impediments to the use of m-commerce.
Qs5. What support is required for the use of m-commerce by brick-and-mortar retailers?	Ob5. To determine the nature of support that is requisite for the use of m-commerce in brick-and-mortar retailers.

1.4.1 Proposition

This section pertains to the effects of antecedent theoretical constructs on dependent constructs (Goodhue & Thompson, 1995; Dishaw & Strong, 1999:13; Gebauer & Shaw, 2004; Zhu et al., 2006b:1564; Lee et al., 2007; Yen et al., 2010:913; Gatara & Cohen, 2014:324; Picoto et al., 2014; Gangwar et al., 2015:130; Lu et al., 2015:294; Wang et al., 2016;

Masihuddin et al., 2017:10; Chandra & Kumar, 2018:247; Chau & Deng, 2018a:6; Prabowo et al., 2018:307; Vongjaturapat, 2018:39; and Eze et al., 2019:11), the propositions that present a systematic framework for the use of m-commerce in brick-and-mortar retailers, for which an in-depth discussion is provided in Chapter 4.

P1. The perception of functionalities of m-commerce systems positively influences the task-technology tit.

P2. The perception of good task-technology fit is a requisite for the use of m-commerce in brick-and-mortar retailers.

P3. The perception of the relative advantage of m-commerce is a requisite for the use of m-commerce in brick-and-mortar retailers.

P4. Data security is a requisite for the use of m-commerce.

P5. Task characteristics positively affect the task-technology fit.

P6. Top management support is a requisite for the use of m-commerce.

P7. Business technology competence is a requisite for the use of m-commerce.

P8. Brick-and-mortar retailers' readiness for mobile distribution systems is a requisite for the use of m-commerce.

P9. The availability of policies and regulations is a requisite for the use of m-commerce by brick-and-mortar retailers.

P10. The availability of technological cooperative institutions is a requisite for the use of m-commerce by brick-and-mortar retailers.

P11. The availability of an adequate mobile operator network is a requisite for the use of m-commerce by brick-and-mortar retailers.

P12. The availability of critical mass is a requisite for the use of m-commerce by brick-and-mortar retailers.

P13. The availability of a mobile payment gateway is a requisite for the use of m-commerce by brick-and-mortar retailers.

P14. The availability of competitive pressure is a requisite for the use of m-commerce in brick-and-mortar retailers.

1.5 Theoretical perspective

To deal with the complexities surrounding the use of m-commerce in brick-and-mortar retailers, this study used the Task-Technology Fit (TTF) model and the Technology-organization-environment (TOE) framework (Tornatzky & Fleischer, 1990:153; and Goodhue & Thompson, 1995:220).

The TTF model is based on the guiding premise that the success impact of a specific technology results from the task-technology fit, i.e. the correspondence between the technology characteristics and task requirements, and the use of the technology (Goodhue & Thompson, 1995:216; Dishaw & Strong, 1999; Gebauer et al., 2010; Abbas et al., 2018; Vongjaturapat, 2018). The TTF model supports that the technology will be utilised by a business worker if, and only if, its embedded functionalities fit the business-related tasks (Dishaw & Strong, 1999:11). Comparatively, the TOE framework explains the technology adoption in the context of a business. It casts light on how the components of the business environment hold substantial sway on the business technology adoption decision-making (Tornatzky & Fleischer, 1990; Lippert & Govindarajulu, 2006:149; Baker, 2011). The TOE divides the business environment into three fundamental components of technology adoption decision-making, which are the organisational context (i.e. considering the characteristics of the firm and its resources), the technological context (i.e. taking into consideration the potential technologies that are available in the market for the business and the existent technology at the business) and the environmental context (i.e. gives attention to the business' external environment and stresses the elements in this setting that affect a business' technology adoption decision-making (Lippert & Govindarajulu, 2006:149; Wang et al., 2016:163; Matikiti et al., 2018; Eze et al., 2019).

Analysing the theoretical perspective of the proposed conceptual models, the study assumes that the integration of the TTF model with the TOE framework will serve as a lens through which to understand the use of m-commerce by brick-and-mortar retailers in the Angolan context. They may serve as the theoretical support to explore the underlying factors that are requisite for the adoption and use of mobile channels because of the combined relationship of their constructs, i.e. the task characteristics, technology characteristics and task-technology fit (from the TTF model), the organisational context, the technological context, environmental context and the m-commerce use (from the TOE theoretical model).

This study assumes that these constructs may act as the lens to better explore the magnitude of this research problem for the following reasons. Firstly, the task construct may be used to effectively explore the nature of task-related m-commerce to be performed by brick-and-mortar retailers in the integration process. Secondly, the technology characteristics (i.e. for the TTF model) and the technological context (i.e. for the TOE framework) can be adapted to explore

the technological features of m-commerce that are requisite for the use of mobile channels by brick-and-mortar retailers. Thirdly, the task-technology fit construct is suggested to understand and assess whether m-commerce application fits brick-and-mortar retailers' tasks and the underlying value-added features or synergetic power between them. Fourthly, the organizational context may be adapted to determine the factors in brick-and-mortar retailers' internal environment that are requisite for the use of m-commerce, and lastly, the environmental context is proposed to determine the elements within the business' external environment that are requisite for the adoption and use of m-commerce by brick-and-mortar retailers.

1.5.1 Conceptual framework

Given the discussions above, specifically on the theoretical models underpinning this study, a conceptual framework to enable the exploration and explanation of the underlying factors that are requisite for the adoption and use of m-commerce by brick-and-mortar retailers is proposed (see Figure 1.1). By integrating the TTF model with the TOE theoretical model (Tornatzky & Fleischer, 1990; Goodhue & Thompson, 1995), the study proposes to examine the constructs that are bound up in the following contexts (as shown in Figure 1.1): environmental context, organisational context, technological context, and m-commerce use.

Analysing the theoretical perspective of the proposed conceptual framework, the study assumes that the availability of the proposed constructs of the environmental context should have a positive influence on the use of m-commerce by brick-and-mortar retailers (Picoto et al., 2014:582; Gangwar et al., 2015:130; Lu et al., 2015:294; Wang et al., 2016:171; Chau & Deng, 2018a:8; Prabowo et al., 2018:310; Kamble et al., 2019:165). Regarding the technological context, the study posits that all its proposed constructs, except the technology characteristics, should positively influence the use of m-commerce (Goodhue & Thompson, 1995; Gebauer & Shaw, 2004; Yen et al., 2010:912; Lu et al., 2015:294; Wang et al., 2016:165; Chandra & Kumar, 2018:247). Furthermore, the study posits that the functionalities of m-commerce systems should have a positive effect on the task-technology fit (Dishaw & Strong, 1999:13; Yen et al., 2010:913; Prabowo et al., 2018:307). This study also proposes that all constructs of the organisational context, except the task characteristics, should positively influence the use of m-commerce in brick-and-mortar retailers (Lu et al., 2015:294; Wang et al., 2016:171; Caro et al., 2020:52), and that the business-related task characteristics should have a positive effect on the task-technology fit (Goodhue & Thompson, 1995; Gebauer & Shaw, 2004; Lee et al., 2007; Yen et al., 2010:913). The study assumes that a strong presence of the proposed constructs is requisite for the adoption and use of m-commerce by brick-and-mortar retailers. The linkage between m-commerce and brick-and-mortar retailers is assumed to be achieved through the alignment between the constructs of the environmental context, organisational context, technological context, and m-commerce use. Thus, these constructs

and associated factors shall exist in the business environment for a retailer to adopt and use m-commerce.

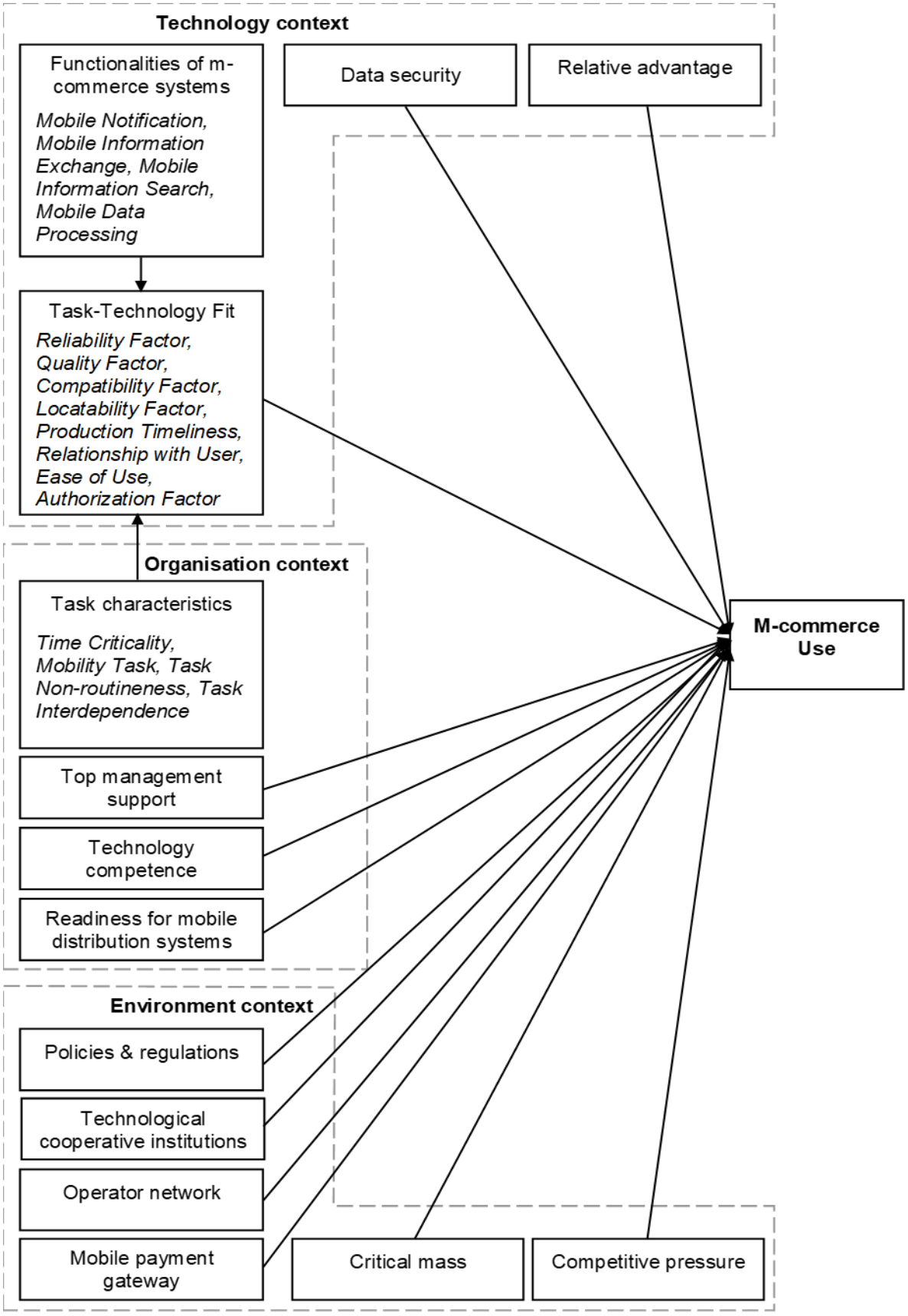

Figure 1.1: Conceptual framework

1.6 Research paradigm, methods and methodologies

1.6.1 Research paradigm

In social research, it is necessary to explain the research paradigm to indicate the philosophical perspective of a researcher's stance on dealing with reality and presenting data. A research philosophical perspective can either be a positivist perspective, an interpretive perspective, or a combination of both perspectives (Marvasti, 2004; Cohen et al., 2007; Bhattacherjee, 2012:8). In this study, both perspectives, i.e. a triangulation paradigm, were utilised to ensure validity and give the study strength and conformability.

1.6.2 Research approach

Bless et al. (2013) argue that a research study can be classified by the methodology used. However, the philosophical perspective of a researcher's stance (i.e. positivist perspective or interpretive perspective) on dealing with the social reality gives direction to the efficient selection of the research study methodology. Three main research methods are identified, being the qualitative research method, quantitative research method, and mixed-method research (the use of both qualitative and quantitative research methods). This study has applied the mixed-method research approach so that a broader perspective of the research problem and research questions is addressed.

1.6.3 Research design

According to Flick (2007:36), the research design reflects the detailed scientific steps taken in the testing of a research question, proposition or hypothesis of a study. As the use of m-commerce denotes a technological innovation process for the traditional retailers, and first-hand knowledge about the underlying factors that are requisite for the use of the channel is limited, this study is classified as a cross-sectional study. A cross-sectional study refers to one which investigates a phenomenon that is new or relatively unknown, for better scrutinising, understanding and producing evidence about it at a particular point in time (Cohen et al., 2007:213). Considering the above, this study followed a cross-sectional study design to acquire knowledge about the underlying factors that are requisite for the adoption and use of m-commerce by brick-and-mortar retailers and to gain a clear understanding of the propositions to be tested.

1.6.4 Demarcation/delimitation of the study

The study was set to explore the use of a framework for m-commerce in brick-and-mortar retailers. The study does not seek to study retailers in general, it focuses essentially on the physical building, food retailing and general merchandise retailers. Geographically, the study was delimited by investigating traditional retail stores' owners or managers, and m-commerce

businesses owners or managers and employees in the Luanda province of Angola. The retail stores must be small or medium-sized businesses. Furthermore, the other delimitation is that the study focused on investigating the use of m-commerce, specifically the activities of buying and selling goods or services using digitalised mobile systems.

1.6.5 Research method/process

1.6.5.1 Population

A population can be seen as the entire mass of observations or a multitude of similar things from which a sample is to be formed (Singh, 2006). The population for this study comprises the owners/managers of traditional retail stores and the managers and employees of m-commerce businesses in the Luanda province of Angola. There are 1,867 formal, registered Small and Medium Enterprises (SMEs) in effective operation in Luanda, which translates to 59.33% of all SMEs registered and operating in Angola (Instituto Nacional de Apoio as Micro, Pequenas e Médias Empresas [INAPEM], 2018). As the study population is located within this agglomeration of SMEs, this concentration of SMEs provided the study with a significant proportion of the selected target population.

1.6.5.2 Sample method/techniques and sample size

Probability or random sampling is when the probability of including each potential participant as a representative of the population exists, while non-probability sampling is when the probability of including each potential participant in a sample is unknown (Bless et al., 2013). Owing to the lack of precise information (names) related to the entire population (Ritchie & Lewis, 2003), the probability sampling strategy was selected, and the area or cluster sampling approach was used to select owners/managers who operate retail stores and employees of m-commerce businesses in each of the seven districts (Luanda, Viana, Cacuacu, Cazenga, Belas, Icole-e-Bengo and Kilambakiaxi) of Luanda in Angola. Area sampling is a multi-stage sampling technique applied in a geographical area that involves stratifying the research area progressively into smaller and more concrete areas (Sarantakos, 1998; Gravetter & Forzano, 2009). For the current study, initially, five streets from each of the seven districts were chosen and the businesses operating on each of the chosen streets were identified. The study also adopted a non-probability sampling strategy and used purposive sampling techniques for the qualitative research. The purposive sampling techniques are deployed to approach the m-commerce businesses' owners/managers, who possess valuable knowledge about the research problem. However, the guiding principle of theoretical saturation, i.e. the point reached when the researcher is not discovering new responses about categories, was utilised for the sample size in quantitative research (Bernard, 2006:501). Considering the population of the study (1,867 formal, registered SMEs in Luanda province) and the type of data to be analyzed, the minimum sample size for the quantitative research was estimated at 224

respondents (Bartlett et al., 2001:48). However, with an expected return of 65% (as suggested by Bartlett et al., 2001:47), the final sample size adjusted for the response rate was 345 participants.

1.6.5.3 Data collection instruments

A data collection instrument is a pre-established researcher's tool for collecting data (Yin, 2011). As this study utilises a mixed-method approach, both semi-structured interview guides (see Appendices F and G) and structured questionnaire data collection instruments (see Appendices B and D) were deployed. The use of a mixed method in a single study may enable a researcher to utilise the acquired results of one method to develop or apprise the other method (Greener, 2008:36) or to triangulate the results of quantitative data and those of qualitative data to strengthen the interpretation of data and give an overall picture of the phenomenon (Cohen et al., 2007:141; Greener, 2008:80). Therefore, this study used the methodological triangulation of semi-structured interviews and structured questionnaire data. The semi-structured interview was utilised so that deeper knowledge of the research problem could be discovered. Taking into consideration the social distancing due to COVID-19, both telephone interviews and face-to-face interviews with managers were conducted by using specific electronic media (online and offline) that enabled the researcher to keep a record of interviews and a notebook. The questionnaire instrument was used to assess statistical evidence and precise data for construct validity (Greener, 2008:89). The structured questionnaire included varied closed-ended probing questions to measure the proposed variables on a 7-point Likert scale, where 1 = strongly disagree and 7 = strongly agree.

1.6.5.4 Data collection/fieldwork

Primary data were collected under the researcher's administration. The questionnaire data collection instrument, as delineated above, was distributed to the retail stores' owners or managers who own or manage SMEs and the m-commerce business personnel in Luanda province. The Luanda geographical region was stratified by districts, then by distinctive areas, and then by streets; the retail stores' owners or managers operating on the chosen streets were approached at their business premises (Sarantakos, 1998; Gravetter & Forzano, 2009). Because eligible, potential respondents were widely spread geographically, the researcher needed assistant fieldworkers to help with the distribution of the questionnaires. Furthermore, both telephone semi-structured interviews and face-to-face interviews (per interviewees' wishes) with m-commerce business owners/managers in Luanda were conducted by the researcher and assistant fieldworker to investigate the underlying factors that are requisite for the adoption and use of m-commerce in brick-and-mortar retailers.

1.7 Reliability and validity

The test of the measurement model helped to assess the measurement model fit and assess the construct measures internal consistency reliability and construct validity.

1.7.1 Reliability

The research instrument is deemed reliable if it consistently produces the same or similar outcomes within a population (Kothari, 2004). For any particular instrument designed for research, the measures contained in the instrument should ensure stability or consistency and self-reliance (Cohen et al., 2007). Great consistency of measurement in a particular instrument should lead to great reliability. Therefore, the internal consistency of each construct measure must be assessed for internal consistency reliability of the research instrument (Cohen et al., 2007). In other words, measures from a particular construct should produce similar measurements. This study carried out the assessment of internal consistency reliability using the data generated by the questionnaire administered to the m-commerce business personnel. However, more detail or statistical evidence of the internal consistency reliability is provided in Appendix H.

1.7.2 Validity

Once the construct measures are designed, their adequacy needs to be evaluated. The validity in relation to measurement procedures reflects the ability of an instrument to measure accurately what it is designed to measure (Bernard, 2006; Kumar, 2011; Yin, 2011). Using the data generated by the questionnaire administered to the m-commerce business personnel, the assessment of construct validity was done. To establish the construct validity, the tests of the convergent validity and discriminant validity were assessed. In assessing the convergent validity of the research constructs, the researcher could shift from a wide range of options to more compatible construct measures. It provided the researcher with conditions to move precisely towards the action plan for achieving the research goals (Bernard, 2006; Yin, 2011). Discriminate validity was also assessed to identify whether the construct being measured is different from other constructs that might denote some similarity. Statistics evidence on the assessment of convergent validity and discriminant validity is provided in Appendices H and I.

In addition to the above, triangulation was also found suitable for concurrent validity. That is, triangulation between qualitative and quantitative methods was employed for data collection and data analysis.

1.8 Data coding and analysis

Data analysis entails examining or interpreting how properties of things are related to or depend upon one another (Bernard, 2006). As the study sought to use open-ended and closed-

ended items of measurement for qualitative and quantitative respectively, the parallel mixed analysis was appropriate for the study (Yin, 2011:292; Almalki, 2016:291). To analyze the primary data, the descriptive analysis approach using the Statistical Package for the Social Sciences (SPSS) and the Structural Equation Modeling (SEM) analysis using Analysis of Moment Structures (AMOS) was used for the quantitative data analysis. The study sought to use statistical multiple regression equations to understand the nature of interconnection between variables. The test of the structural model helped to discover the direct or total effects of the independent variables (i.e. functionalities of m-commerce systems, task-technology fit, Relative Advantage, Data Security, task characteristics, Top Management Support, Technology Competence, Readiness for Mobile Distribution Systems, Policies and Regulations, Technological Cooperative Institutions, Operator Network, Mobile Payment Gateway, Competitive Pressure and Critical Mass Factor) on the dependent variables (task-technology fit and M-commerce Use). These tests enabled the researcher to find the strength of a large array of correlations and effectively analyze the results (Bradlet, 2007; Spiegel & Stephens, 2011; Rumsey, 2018). The qualitative data collected from the interviews were transcribed. Initial coding and content analysis were performed to present data under specific questions, analyze the data and interpret the findings. The frequency of words and similar responses was considered, grouped and coded into categories that align with the quantitative data (Yin, 2011:198).

1.9 Ethical considerations

Ethics can be defined as “a matter of principled sensitivity to the rights of others” and articulation of the truth behind the research (Cohen et al., 2007:58). Ethical practices considered by the researcher in the current study included requesting permission to conduct the research from the Research Ethics Review Committee of the Cape Peninsula University of Technology and obtaining an ethical clearance certificate (see Appendix A); informing the respondents that their participation in the survey is purely voluntary; allowing respondents to have freedom of choice in filling out the questionnaire; being interviewed or not; preventing invasion of potential participants’ privacy; informing respondents that they would suffer no risk or any harm should they decide not to participate in the survey; maintaining privacy and strict confidentiality and treating participants with the utmost respect; and not coercing potential participants to participate (Cohen et al., 2007:55). Therefore, an informed consent form was annexed to the survey instrument (see Appendices B1, C1 and D1), and consent letters and permission to conduct interviews were obtained from the prospective participants so that participants were aware of the expected mode of their participation in the study.

1.10 Significance of the study

Exploring the use of a framework for m-commerce in brick-and-mortar retailers may stimulate the application of new technology, particularly in developing countries where there has been little progress in the promotion of science, information and communication technology (ICT) and innovation. The examination of the linkage between m-commerce and brick-and-mortar retailers would inform technological cooperative institutions, policy-making and entrepreneurs about the requisite factors and actions to be taken for the integration of mobile electronic retailing into traditional businesses in Angola. Furthermore, the study may foster the adoption and use of new technology that has become an essential driver of the growth of businesses.

To the SMEs support institutions, agencies and policy-making, the framework may assist in the process of technological innovation transfer to small and medium-sized retail stores. Also, the framework may serve to strengthen the brick-and-mortar retailers for full participation in the digital ecosystem.

Although multiple discourses amongst academics, policy-makers and practitioners have been raised about the problems brick-and-mortar retailers face, as well as discourses on relevant approaches to their viability worldwide, hitherto small and medium-sized retailers are still in the throes of great difficulties and risks in doing business in the market. Considering how this study would contribute to the body of knowledge, it seeks to explore and integrate different constructs of relevant models of technological innovation use/adoption in businesses to provide information on the linkage between the underlying determinants of m-commerce usage in small and medium-sized retailers and on consistent patterns that are aligned with overall retailer stakeholders' interests. As the study sought to explore and inform relevant practitioners on the mechanism through which m-commerce plays a role and is implemented in brick-and-mortar retailers, the proposed framework could further be used for supporting the evaluation of the role of m-commerce in brick-and-mortar retailers and the success of its implementation in contextual problem-solving situations.

Finally, to the targeted industry and its people, this study sought to develop a support framework for the use of m-commerce in brick-and-mortar retailers. The support framework may be an integral solution for a bridge between brick-and-mortar retailers and electronic retailing. Such support structures would encourage or stimulate the application of new technology in business processes for the attractiveness of new or changed customers and boost sales of products or services. Furthermore, it seeks to shed light on the creation of an electronic retailing business, foster entrepreneurship, and facilitate self-employment and the creation of new jobs. Lastly, the study also seeks to focus on determinants and solutions of m-commerce usage which ought to be viable and affordable within the small and medium-sized stores' boundaries.

1.11 Limitations of the research

Due to time and financial constraints, and the difficulty to get ahold of certain participants, the sample size has been affected. Thus, the selected research areas were limited to the Luanda province. Furthermore, due to COVID-19, the data collection process was negatively affected to a lesser extent because of bans on travelling and pessimism over contact during the distribution of the questionnaires. Many potential participants approached for interviews were unwilling to participate in the research. This could be because many potential respondents were not familiar with scientific research interviews.

1.12 Outline of the thesis

Chapter 1: This chapter introduces the study and provides the rationale for the study. The background and the problem statement are explained. It also explains the possible consequences of the research to the relevant practitioners (e.g. body of knowledge, business audience), the research boundaries, methodology and the rational course of action adopted for the collection of data and its analysis.

Chapter 2: The chapter reviews literature pertaining to m-commerce and brick-and-mortar retail stores' activities. It draws attention to different m-commerce usage perspectives, support services and typical impediments involved in the use of m-commerce in business. Finally, it reviews literature relevant to the privacy and legal issues surrounding the use of m-commerce in brick-and-mortar retailers and the expected benefits from operating m-commerce.

Chapter 3: In this chapter, an in-depth literature review was undertaken on existing models/theories that were previously used in the technological innovation adoption context.

Chapter 4: Chapter 4 proposes a conceptual framework that is based on Chapters 2 and 3, i.e. general literature reviewed and relevant theoretical support models/frameworks, respectively. It provides a critical review of the proposed framework constructs, identifies the relationship among them and develops the proposition that presents a systematic model of the phenomenon under investigation.

Chapter 5: Chapter 5 discusses and explains the research strategy/design and methodology underpinning the current study. The chapter delineates the nature of scientific methods adopted for the study. Furthermore, this chapter discusses and develops measures for the survey questionnaire and a design for the semi-structured interview guide.

Chapter 6: In this chapter, the data collected from the survey questionnaire and semi-structured interview were presented and analyzed. The data were discussed and analyzed using the descriptive analysis method, statistical multiple regression equations and coding of

data and content analysis techniques. The chapter reviews the theoretical conceptual framework proposed in Chapter 4 and presents the empirical results of the framework. The results are interpreted and the findings are consolidated.

Chapter 7: Chapter 7 concludes the study. The chapter summarises all the chapters, makes recommendations and suggests directions for further research.

1.13 Conclusion

Before introducing the research questions and objectives, this chapter discussed the rationale and outlined the problem statement of the study. A brief overview of the study's underpinning theories was provided. The conceptual framework, the research methodology and the rational course of action adopted for the collection of data and its analysis were introduced. Furthermore, the chapter addressed the underlying consequences of the research to the relevant practitioners (body of knowledge, business audience).

The following chapter, Chapter 2, provides an overview of brick-and-mortar retailers and a literature review of the different conditions and use of m-commerce.

CHAPTER 2
BRICK-AND-MORTAR RETAILERS AND MOBILE COMMERCE USE

2.1 Introduction

Chapter 1 discussed the themes on which this study is grounded. It provided a rational explanation of the main objectives of the study. Additionally, it presented the research design paradigm that was adopted for this study and considered all the direct and indirect effects of the research on relevant practitioners.

This chapter, Chapter 2, focuses on underlying factors involved in the use of m-commerce in business. It seeks to explore the nature of brick-and-mortar retail stores and activities, the different contexts of the use of m-commerce by organisations, the benefits of using m-commerce, the factors preventing the use of m-commerce and support services for m-commerce.

2.2 An overview of brick-and-mortar retailers

This section defines brick-and-mortar retailers and provides an overview of their classifications and practices.

'Brick-and-mortar retailer' is terminology that has a concrete meaning. This terminology comprises two elements, brick-and-mortar and retailer, two terms that are widely used by marketing scholars. The term brick-and-mortar is used as a metaphor for a physical building, a visible structured unit within an economy, established as an investment. It is a paradigm of business that operates on specific premises and provides face-to-face client experience. As a paradigm of business, brick-and-mortar ought to perform several coordinated activities to create, deliver and appropriate value in a physical facility (Berglund & Sandström, 2013:176).

Regarding the term 'retailer', Lucas et al. (1994:2) assert that any business that generates more than half of its revenue from retailing should be considered a retailer. Then again, what is retailing, for a business to derive its revenue from it? Some divergence between authors' definitions of retailing can be noted. According to Lucas et al. (1994:2), retailing encompasses all activities related to the "marketing" of end products or services directly to the final consumer. According to Blem (2007:208), retailing refers to "all activities directly related to the sale of goods and services to the ultimate consumer for personal, non-business use or consumption". In other words, those definitions provide that retailing can either be activities pertaining to the marketing or the sale of goods/services to ultimate consumers. Given the above views, retailing is a term that describes a concrete operation and can be defined as all the coordinated activities that one engages in for the sales of goods or services to the public (Lamb et al., 2008:279; Caro et al., 2020:47).

However, a retailer can reflect any individual or paradigm of business that sells goods or services to the final consumer. A retailer can be viewed as a business model that revolves around the provision of goods that support different final consumers' lifestyles (Wachter, 2016). Regarding the concept of a brick-and-mortar retailer, it has also been described by marketing scholars as a shop, retail outlet, or retail store (Guy, 1998:255; Lamb et al., 2008:282), or a traditional retailer (Yamagata-Lynch et al., 2015). They all represent a “building from which retailing is carried out” (Guy, 1998:255).

In this study, a brick-and-mortar retailer reflects the paradigm of a business that sells goods or services to final consumers within specific premises. It refers to a business that confines its sales operations in a physical facility and that has not deployed any form of e-commerce as the core of its business model or as an integral part of its business activities to sell to the public (Yamagata-Lynch et al., 2015).

2.2.1 Classifications of brick-and-mortar retail store

Several factors are taken into consideration for the classification of brick-and-mortar retail stores (Guy, 1998:255; Lamb et al., 2008:279; Culley, 2020:v). Some of the factors are analyzed based on the physical characteristics, the size of the store and trip purpose (Guy, 1998:255). Other factors are discussed in terms of ownership, the kind of merchandise sold (Lamb et al., 2008:279) and the market area (Culley, 2020:v).

Physical characteristics - based on their physical characteristics, brick-and-mortar retailers can be categorised as free-standing stores, which refers to a single building occupied by one retailer or a single building occupied by several retailers, i.e. a shopping mall. Other categories of a single building occupied by several retailers include speciality, factory outlet centre and festival retail. Brick-and-mortar retailers are further characterised by groups of buildings where all shops are small (these groups are also called factory outlet centre, festival retail) or large (e.g. retail park), or combined, one large and some small (e.g. focused centre) (Guy, 1998:261).

Size of the store and trip purpose – Table 2.1. below shows an example of brick-and-mortar retailers classified by store size and trip purpose (convenience shopping, household shopping, and personal or fashion shopping) (Guy, 1998:255).

Table 2.1: Retail stores classified by trip purpose and size

Sales area (m^2)	Convenience shopping	Household shopping	Personal/fashion shopping
Under 250	Convenience store Butcher Pharmacy		Fashion boutique Shoe shop
250 - 1000	Small supermarket	Hardware store Video hire	Bookshop Sports goods shop
1000 - 2500	Large supermarket	Retail warehouse Fachmarket	
Over 2500	Hypermarket	Retail warehouse	Department store

(Guy, 1998:255)

Store ownership - classification of the retailer based on the nature of ownership encompasses family-owned shops (Wachter, 2016), independent retailers (i.e. owns one store), multiple outlets (i.e. owns several stores, chain stores or branches), shops owned by the State, and shops owned by manufacturers (Lamb et al., 2008:279).

Merchandise sold - an example of classification based on the nature of merchandise sold is shown in Table 2.2 below, in which retailers are classified into two groups: food-related and general merchandise retailers (Lamb et al., 2008:279). For food-related retailers, convenience stores are food-oriented shops that mostly sell impulse goods and hold limited offers. They are often located within residential areas, in easily accessible high-traffic areas. Although their prices are higher than a supermarket, consumers normally use them for small emergency goods (Lamb et al., 2008:280). Supermarkets are large shops, low-margin retailers and operate on self-service. They sell a wide range of food as well as a limited number of non-food items. Hypermarkets are mostly located in decentralised areas, offering a wide variety of food and an extensive range of non-food items. Furthermore, food-related retail can also be divided into other distinct categories, including grocery and restaurant (Wachter, 2016).

For general merchandise, speciality shops carry well-defined and narrow merchandise lines. The merchandise offered is combined with a high level of service. In general, the typical products sold by speciality shops include clothing, jewellery, shoes, toys, furniture, books, and music items. Department stores are big retail outlets that offer a wide assortment of products, divided into departments and a selection of speciality shops (Lamb et al., 2008:282). General merchandise can further be organised into hard-line categories such as appliances, furniture, machinery and hard materials, and soft line categories, i.e. apparel, linens and soft materials (Wachter, 2016).

Table 2.2: Classification of food-related and general merchandise retailers

Food-related merchandise	General merchandise
Convenience stores	Speciality stores
Supermarkets	Department shops
Superstores	Discount stores
Hypermarkets	Catalogue showrooms
Warehouse shops	Factory shops
Box shops	

(Lamb et al., 2008:282)

2.2.2 Nature of brick-and-mortar retailer activity

In general, the operational decisions in a brick-and-mortar retail store are based on point of sales data (Caro, 2020:51) to satisfy the needs of customers and the objectives of the organisation (Botha & Musengi, 2013:83). Brick-and-mortar retailers are supposed to use a single channel of sales, whereby the flow of products is generally linear, to fulfil the traditional sales channel strategy (Hübner et al., 2016:290). They operate under a structured, well-designed process that strictly supports their activities. Most of their activities take place in a physical store, such as the creation of value (e.g. stocking, displaying and services), and the execution of transactions (exchange of value). Other activities are associated with the acquisition of processed products (i.e. supply chain) and the handling of complex interactions between an organisation's departments and trading partners (Lucas et al., 1994:12). Brick-and-mortar retailers undertake a series of planned and coordinated activities to provide products and services to the community. In general, the activities in an organisation are carried out by different business functions to ensure the smooth running of the store (Strydom, 2011; Nieuwenhuizen, 2015). These activities are aligned to the strategic goals and objectives of the organisation and represent a broad interaction process. Activities are interrelated, each function liaises with other business functions and establishes rules for them, to ensure viability of the store (Badenhost et al., 2005; Nieuwenhuizen, 2015). Furthermore, brick-and-mortar retailers' supply chain activities are limited to the delivery of goods, obtained from suppliers or intermediaries to the retailers' warehouses and stores (Martins et al., 2017).

2.2.3 Section summary

In this section, it was reappraised that the brick-and-mortar retailer is a metaphor for a paradigm of a business that sells goods or services within a building specifically to the final consumer. It was identified that brick-and-mortar retail stores can be classified by their physical

characteristics, the size of the store, trip purpose, store ownership and merchandise sold. Moreover, the section also discussed the nature of brick-and-mortar retailer activity. Given the above discussions of the typical nature of brick-and-mortar retailers underpinning this study, the next section outlines the use of m-commerce. It discusses the patterns of interrelated components that can influence the use of m-commerce by businesses.

2.3 The use of mobile commerce

The contexts of the use of m-commerce by an organisation are differentiated and approached from different perspectives. It is often complicated for business leadership and researchers to align the existing patterns with meaningful prioritisation and categorisation to deal effectively with them. As a result, in Chapter 1, the following research question was formulated: What different contexts of the use of m-commerce align with the brick-and-mortar retailer business lines and capabilities? (Question 1 [Qs1]). The objective of this question is to investigate the different contexts of interrelated components that create the right environment for the use of m-commerce by brick-and-mortar retailers (Objective 1 [Ob1]). Therefore, this section discusses the use of m-commerce by businesses. It discusses the patterns of interrelated components that can create the right m-commerce environment reported in the information systems and marketing literature. However, before embarking on this discussion, it is imperative to clarify the concept of m-commerce.

2.3.1 Definition of mobile commerce

This section provides an overview of the term m-commerce. There are many distinctive views of this term. The term m-commerce can be understood as the sales of products or services via mobile technologies. Researchers in setting forth the definition of m-commerce refer to m-commerce as transactions performed by using a wireless telecommunications network (Yang, 2005:257), electronic business transactions through mobile phone or tablet (Liang & Wei, 2004:7), the sales of products and services to customers using wireless Internet (Frolick & Chen, 2004:55), freedom to perform commerce-related tasks anywhere anytime (Liang et al., 2007:1155). Furthermore, the term ‘m-commerce’ is viewed by Clarke (2001:133) as:

> The ability to purchase goods anywhere through a wireless Internet-enabled device. M-commerce refers to any transaction with monetary value that is conducted via a mobile network. It will allow users to purchase products over the Internet without the use of a PC.

Some divergence between views of m-commerce are noted below. M-commerce has been analyzed as an enabler of businesses that provides businesses with wireless avenues to deliver vital information to workers and a platform to sell products/services any time (Frolick & Chen, 2004:55). With regard to vital information, m-commerce should convey to the business stakeholders, Njenga et al. (2016:13) emphasise that m-commerce is an activity that must be conducted in a way that delivers trusted transactions, and interdependent services, including

reports about transaction status between customers and the involved organisations over a wireless telecommunications environment.

Furthermore, m-commerce has been discussed as a business model or simply as a channel that enables businesses to perform transactions, attract new or changed customers and perform distinctive commerce-related tasks through mobile technology (Frolick & Chen, 2004:53; Liang & Wei, 2004:7; Yang, 2005:257; Liang et al., 2007:1155; Berglund & Sandström, 2013:276). In the m-commerce business model, employees and customers are not held in confinement for all the time they are at work and shopping. M-commerce is categorised as a subset of e-commerce. Electronic commerce refers to stationary systems of making transactions over the Internet. M-commerce provides businesses with the means to eliminate the confines of certain activities that were previously localised, by providing businesses with virtual work conditions and the opportunity to sell, out of the constraint of time and physical structure. While allowing workers to work away from their habitual geographical boundary, customers are provided with the comfort of placing orders, making payments, and obtaining the product from their place of convenience; no use of wire for Internet connectivity or physical contact with the shop (Frolick & Chen, 2004:55).

2.3.2 The use of mobile commerce from an organisational perspective

The organisational use of m-commerce has been observed from different perspectives. Masihuddin et al. (2017:10), in exploring the use of m-commerce from an electronic payment gateway system perspective, observed that a payment gateway plays a central role in the interaction between the stakeholders involved in the system. In their study, stakeholders such as merchants, online clients, the payment gateway and banks (i.e. merchant banks and online client banks) were categorised as elements of the payment gateway systems. Another investigation into the use of m-commerce systems-based third-party mobile payment schemes suggested that the payment gateway should act as the intermediary between the online mobile customer (the user), the merchant, the issuing bank and the acquirer bank, and the transport company (delivery) (Yang & Lin, 2018). However, in certain developing countries such as Angola, electronic commerce businesses receive electronic payments without payment gateway involvement in the transactions (Savita, 2020). Thus, the electronic transaction system is set up between merchant and consumers or merchant, consumers and bank. Customers are instructed to either make an electronic payment using a prepaid card, Internet banking transfers (commonly made by using the merchant's International Bank Account Number [IBAN)], mobile banking payment and ATM, or by using Electronic Funds Transfer at Point of Sale (EFTPOS) and cash on delivery (Savita, 2020).

Other studies have highlighted that, before the adoption of m-commerce, businesses are required to evaluate the national mobile operators' network quality, whether they can overcome

the long distances by providing timely access to mobile services for both mobile cell phone and mobile broadband subscribers (Maritz, 2014; Poulson, 2014; Groupe Speciale Mobile Association [GSMA], 2015). Suggesting that there should be at least a nationwide public mobile operator available. Furthermore, businesses are required to evaluate their market segments, i.e. the groups of potential customers, if they are mobile broadband subscribers or Internet users, and are willing to shop online. However, the discussion above has primarily focussed on the use of m-commerce from a business stakeholder perspective.

Other authors suggest that for the use of m-commerce in business, different entities' servers (i.e. merchant servers, payment gateway servers) (Kalbande, 2019:421), m-commerce systems, positioning systems, merchant systems (Banerjee et al., 2011), m-commerce applications (Varshney & Vetter, 2002:186; Ngai & Gunasekaran, 2007:7; Tang, 2019:10) and electronic payment system are required (Bezovski, 2016:129; Naeem et al., 2020:4). However, it can be observed that the above views of the use of m-commerce are limited to the analysis of the technological components of an m-commence system. In other words, these authors elaborated on patterns of m-commerce from a technological perspective.

Other researchers focus more on patterns that impact the use of m-commerce from a business capabilities perspective. These researchers reported that for an organisation to adopt and use m-commerce it must get support from senior leaders (top management) (EY, 2015:7; Jokonya, 2019:97), have in-house skills (such as Information Technology (IT) personnel) (Jokonya, 2019:103) and finance or ICT infrastructure (EY, 2015:7). The organisation should assert its readiness to engage in m-commerce distribution systems (EY, 2015:7; Song et al., 2019:541; Caro et al., 2020:52). It has "to create new distribution systems to serve customers through multiple channels" (Hübner et al., 2016:255). These views are corroborated by Cao and Li (2018:1) who investigated cross-channel integration in retailers in the United States, to assess the determinants of channels implementation in multi-channel businesses. They reported cross-channel integration could be influenced by the firms' ICT capability, provision of products under private label, and financial resources factors (Cao & Li, 2018:1). Thus, Cao and Li (2018:12) support that further study should be conducted to determine "retail managers' expectations of cross-channel integration" in the commodities market.

It has been reported that organisation management is expected to have multi-channel management skills and be equipped to share resources between business channels (Wiener et al., 2018:15), integrate qualities into the multi-channel management approaches (Hossain et al., 2019:154), automatization of data, centralisation of data storage, and integration of the third part's supply chain information systems (Mirzabeiki & Saghiri, 2020:9-10). Management should also be equipped to manage the technological and telecommunications systems, m-

commerce transactions, warehousing, inventory management, order, delivery and other client services (Hübner et al., 2016:290; Caro et al., 2020:52).

2.3.2.1 Multi-channel management

Selling goods or services to the final consumer through two or more channels requires multi-channel integration and management skills. Wiener et al. (2018:15) investigated the synergies between online and offline business channels and the tensions that arise from the two channels' integration and the influential factors of such synergies and tensions. They emphasise that in cross-channel integration, a manager can integrate support functions (e.g. marketing staff, human resources [HR]), and share resources between business models. The structure of the business should be more centralised to avoid conflicts and process inefficiencies (Wiener et al., 2018:15).

Hossain et al. (2019) conducted a study to determine the dimensions of and impediments to multi-channel integration quality in Australia. The following dimensions of multi-channel integration quality were analyzed: "channel-service configuration, information consistency, process consistency, channel reciprocity, and assurance quality" (Hossain et al., 2019:160). In subsuming the proposed integration qualities into the multi-channel management approaches, Hossain et al. (2019:154) postulate that business leaders would be able to develop multi-channel systems that enable the engagement of customers and meet their seamless experiences. Thus, they call for further research to investigate the strategies multi-channel retailers can develop to deal with inventory management, distribution systems and privacy and security issues (Hossain et al., 2019:161).

Saghiri et al. (2017:53) on their configuration approach to omni-channel systems, state that in integration, the channel stages, i.e. pre-purchase, payment, delivery and return, should be integrated among themselves (See Figure 2.1 below). The authors further claim that the total integration among the configuration dimensions (i.e. channel stage, channel type and channel agents) would exist when direct links between the functions such as the transaction systems, the services, order fulfilment and reverse logistics are well-balanced and coordinated throughout the dimensions (Saghiri et al., 2017:62). However, their study has several limitations, including the failure to consider issues of organisational structure and financial resources. Empirical evidence of these issues that are based on cross-channel integration is lacking. Saghiri et al. (2017:64) suggest that further studies should explore the operational implications of channels integration in a more analytical approach, and factors concerning channels integration, leadership and performance.

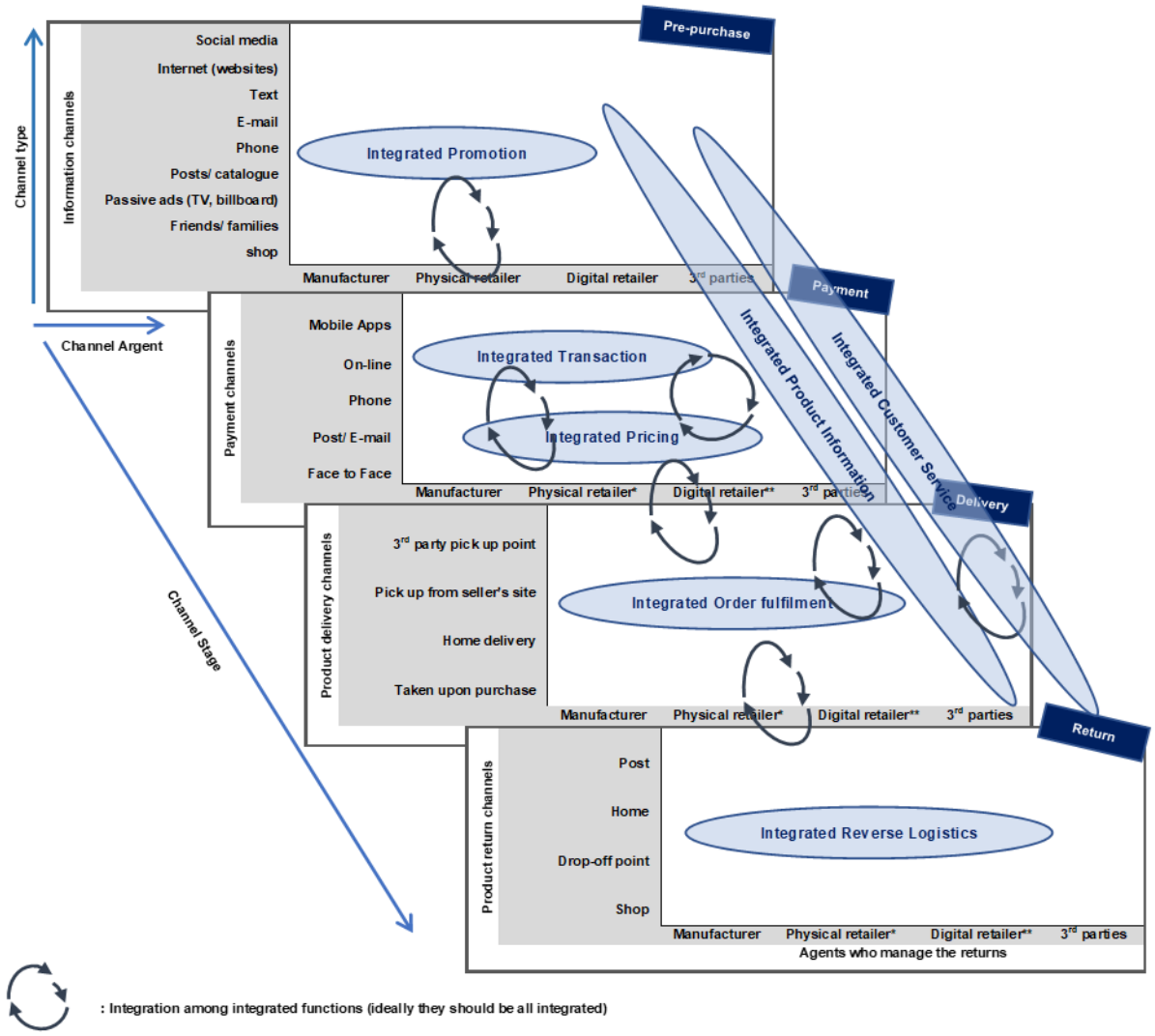

Figure 2.1: The omni-channel systems - an integration implication

(Saghiri et al., 2017:62)

Mirzabeiki and Saghiri's (2020) study on channel integration conducted from a data management perspective in the United Kingdom, found some inconsistencies in or barriers to the integration of multi-channel data among companies. In their results, critical elements that decrease the inconsistencies were analyzed as automatization of data for both capturing and sharing methods, data storage centralisation, and integration of the third party's supply chain information systems. They suggest that further study should investigate the inter-organisational issues concerning the implementation of an integrated seamless channel with a traditional sales channel (Mirzabeiki & Saghiri, 2020:9-10).

EY (2015) conducted a survey to assess a global perspective on the nature of the supply chain for the consumer commodities and retail omni-channel. The findings of the survey suggest that three factors should be taken into consideration when the decision to integrate cross-channel

with brick-and-mortar retail shops is made; m-commerce should be embedded in the overall business strategy; the business should develop an agile and responsive m-commerce distribution system and integrate it with the traditional channel; and finally, the business should integrate IT systems capabilities to make provision of seamless data visibility. Researchers posit that the optimisation of mobile distribution systems becomes a prerequisite for brick-and-mortar retailers that intend to adopt m-commerce strategies (EY, 2015:4; Caro et al., 2020:52).

Hübner et al. (2016:290) and Caro et al. (2020:52) concur that brick-and-mortar retailers should take into consideration the various activities that are performed and managed as an integrated whole within mobile channel distribution systems. These activities include managing the technological and telecommunications systems, m-commerce transactions, warehousing, inventory management, order, delivery and other client services.

Song et al. (2019:527) investigated cross-channel integration from a logistic perspective in China and found that in retail channels integration, the main preoccupation is managing personnel and the organisation. The complexity surrounding logistics integration among channels is that the retailer has to build m-commerce capability and transform its supply chain to dispatch various parcels to multiple destination points simultaneously (EY, 2015:2). Song et al. found that the integration of information capability with the organisation capability would positively affect supply chain systems implementation. Thus, they call for further studies to investigate the required supply chain workers' skills for the success of cross-channel integration (Song et al., 2019:541).

Hübner et al. (2016:255) suggest a framework for configuring forward distribution and backward distribution systems for retailers that are considering using m-commerce strategies. For the forward distribution systems, they identified five elements—the supplier distribution centre, brick-and-mortar retailer distance distribution centre, and brick-and-mortar retailer (as sources), and home and store (customer as destinations). Under this distribution system there are store pickup, home delivery and store delivery options available to an online shopper. They report that most direct-to-customer dispatch should be performed by a central retail distribution centre. For that, a further argument is that when a distribution centre supplies directly to home and store, the retailer store tends to gain economies of scale, and manage the right level of inventory (EY, 2015; Hübner et al., 2016:290).

Based on the Hübner et al. (2016) study's results, the backward distribution systems (for the return processes) involve similar elements to forward distribution but the starting point is at home and store (i.e. the customers as sources), and destination points are store, distribution centre and return centre (See Figure 2.2 below) (Hübner et al., 2016:255). Figure 2.2 indicates that a customer can return a product personally to the store or send it by courier to the distribution centre or return centre. Stores can receive returned products that will be processed

only at the store or at the distribution centre and return centre. The return centre can receive products that will be processed only at its centre or at the distribution centre.

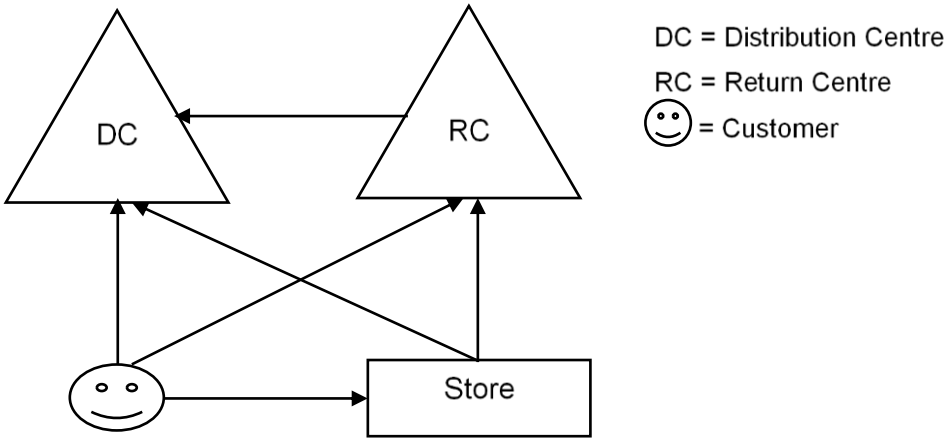

Figure 2.2: Backward distribution systems

(Adapted from Hübner et al., 2016:255)

2.3.3 Section summary

Various definitions of m-commerce were provided in this section. It was identified that most prior research is based on the term “wireless transaction” for the conceptualisation of m-commerce. Furthermore, mobility is another characteristic of m-commerce used to differentiate it from stationary systems. The section further discussed the use of m-commerce from a business perspective. It discussed the different patterns of pertinent factors involved in the use of m-commerce from the business stakeholders, technological and business capability perspectives. The factors identified in this section are depicted in Figure 2.3 below. The schematic outline is presented in four themes of the critical evaluation of previously reported factors of the use of m-commerce. Such themes are m-commerce stakeholders, business capability, management factors, and subsets of the m-commerce system.

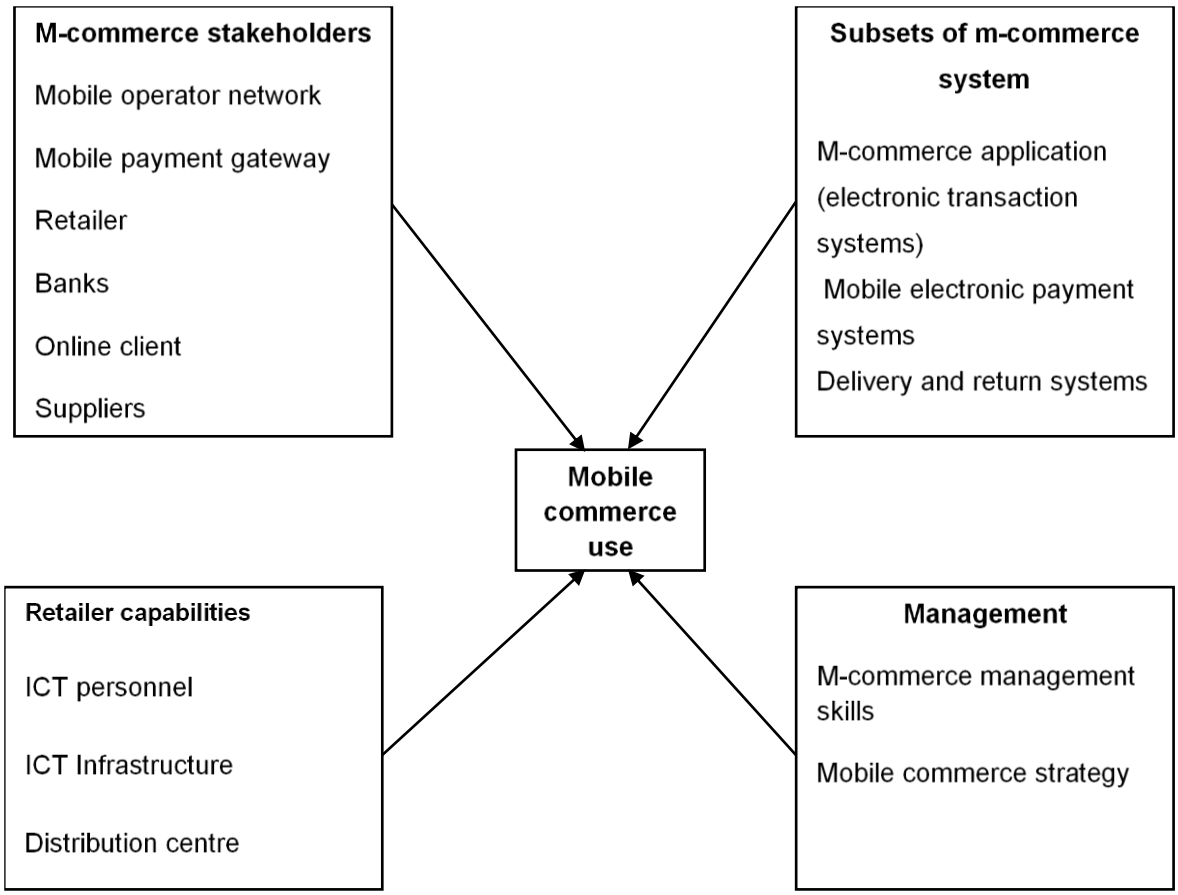

Figure 2.3: Previously reported factors of mobile commerce usage

The following section discusses the expected benefits of operating m-commerce.

2.4 Benefits of using mobile commerce

This section reviews prior studies that may provide the answer to the following research question: What is the nature of the new added value that aligns with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailers? (Question 2 [Qs2]). The objective of this question is to investigate the nature of the new added value that aligns with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailers (Ob2). This section reviews a prior study's report on m-commerce value. It further discusses the mobile communication software that could be deployed to support the use of m-commerce.

One of the earlier studies on m-commerce value for organisations was conducted by Clarke (2001). Clarke (2001:137) suggested four added value propositions of m-commerce (i.e. ubiquity, convenience, localisation and personalization) as businesses leap at the opportunity to use this technological innovation. The ubiquity of mobile phones emanates from the fact that they are always alongside people and people can be found everywhere in the world (Quade & Leimstoll, 2015:290). With regards to the ubiquity's added value to a business, Clarke

(2001:137) opines that ubiquity is concerned with the value offerings that an organisation can provide to potential buyers everywhere simultaneously. He maintains that mobile devices offer organisations the ability to perform transactions or transmit and receive information “from virtually any location on a real-time basis” (Clarke, 2001:137). Therefore, organisations adopting m-commerce could have a real-time everywhere presence.

Furthermore, the study reports that m-commerce would make the buying process more convenient for customers. A special comfort may emanate from the fact that customers are doing online shopping, buying at the place of their convenience (Clarke, 2001:137; Seegolam et al., 2015:2). Such comfort could imply an improved quality of life and time-saving (Clarke, 2001:137).

Since mobile technology is used by a sole individual, it is eventually suitable for the provision of personalized and localised services (Camponovo & Pigneur, 2003:174; Picoto et al., 2014:573). Therefore, Clarke (2001:137) postulates that the personalisation value-added feature of m-commerce can apply to database development, business advertising, knowledge management systems and other marketing-related features, such as coupons. It enables a business to tailor services or messages that meet the consumer’s personal needs or requirements (Cousins & Robey, 2015:46). The localisation value-added feature of m-commerce is that it provides businesses with the opportunity to handle consumers’ specific locations and be of service to them even if they change locations frequently (Pousttchi & Thurnher, 2007:283). Location-related information is needed for the execution of various business-related tasks, like m-commerce distribution systems management, job dispatching and emergency services (Clarke, 2001:140; Zheng, 2007:71).

Recent research, notably, the EY’s (2015:6) report on consumer goods and retail’s new channels supply chain found that new channels may enable a retailer to “yield a range of benefits”, such as “improved consumer insight, expanded or differentiated consumer base, strengthened consumer loyalty, increased sales and competitive differentiation”.

Huang et al. (2016) investigated the integration of a web channel with m-commerce and the possibility of an increase in sales because of the adoption of the new channel. They found that with m-commerce, transactions on the web channel were cannibalised but there was an overall increase in sales which resulted in a positive synergy that far outweighed the cannibalisation (Huang et al., 2016:265). By the same token, Gauri et al. (2020:8) and Pozzi (2013:569) opine that the integration of online channels into brick-and-mortar stores can be profitable.

Tang (2019:10) analyzed the m-commerce benefits based on users’ satisfaction and loyalty to the organisation and word-of-mouth recommendations. Tang observed that the use of m-commerce could bring the analyzed benefits to an organisation and its business partners.

Previous researchers have identified that managerial decisions to use m-commerce in their traditional businesses are associated with the following strategic goals: incorporate the changing consumer behaviour; enrich sales channels; increase sales (Utami et al., 2019). Moreover, m-commerce would assist an organisation to pursue a range of functional goals and look after the interests of groups or individuals that directly or indirectly hold a stake in the organisation.

Kalaivani (2020:5938) investigated the benefits of m-commerce and its influence on customers' purchases. Kalaivani found that the mobile technology channel influences customer loyalty and customer loyalty significantly affects customer satisfaction (Kalaivani, 2020:5947).

Based on the literature reviewed, the researcher compiled Table 2.3 below which summarises the possible impact of m-commerce on business operations.

Table 2.3: Possible added value of m-commerce to business and customer

Critical for the business operations	**Impact on organisation functions**	**Author(s)**
Marketing	Products/services offering anywhere and simultaneously, expand consumer base, strengthen consumer loyalty, improvement of customer satisfaction and consumer insight, increased competitive differentiation.	Clarke (2001:137); EY (2015); Tang (2019:10); Kalaivani (2020:5947)
Sales	Enrichment of sales channels, replacement of traditional paper-based systems, convenient buying process for customer, personalised services to customers, increased sales.	Clarke (2001:137); Pozzi (2013:569); EY (2015); Huang et al. (2016:265); Gauri et al. (2020:8)
Logistics	location-awareness facilitation and track recording,	Clarke (2001:137)
Research & Development	Database development	Clarke (2001:137)
Critical for the business customer	**Impact on customers**	**Author(s)**
Customer	Convenient buying process, personalised services, improved customer satisfaction, uptake of seamless experience.	Clarke (2001:137); Tang (2019:10); Kalaivani (2020:5947)

2.4.1 The use of mobile communication software

Prior research observed that the extensive richness of mobile technology attributes prompts many organisations to use the mobile device to capitalise on its advantage to the business.

With the significant growth of mobile communication software, businesses have become increasingly reliant on mobile technology for interaction with stakeholders and accomplishment of tasks that are mobile technology-enabled (Humphrey et al., 2007; Grant et al., 2009). Mobile technology can provide businesses with platforms to make new connections, deepen interaction with workers and business partners, support online meetings, facilitate project management, and make their products or services available to the world (Laudon & Laudon, 2016). Furthermore, businesses may use mobile technology to keep open the flow of information if any situation impacts established procedures, business obligations or commitments.

There are some forms of mobile communication software available for businesses, which could enable brick-and-mortar retailers to capitalise on the richness of mobile technology to better support their m-commerce. Such forms of communication software include mobile electronic mail (e-mail) communication, telephony communication, instant messaging, text messaging, social networking messaging and commenting, voicemail, groupware, and blog (Ferreira & Groenewald, 2016). In general, they are Internet-based platforms that are available to be used on both mobile devices and desktop computers. Mobile communication software may enable individuals, groups, and organisations to connect with those of similar interests. It can provide organisation with different modes of communication for sending and accessing information (such as text messages, graphics, videos or audio files containing data) through the Internet. It can also be deployed to share contacts, conduct trade and track customer opinions on their products/services or brands (Lin, 2016:1084).

2.4.2 Section summary

In this section, the value of the use of m-commerce and the typical mobile communication software available to support the use of m-commerce is discussed. A summary of possible added value of m-commerce to businesses and customers was provided in Table 2.3. The factors preventing the successful deployment of m-commerce in traditional businesses are discussed in the next section.

2.5 Factors preventing the use of mobile commerce

The discussion in the previous section covered the value of m-commerce to the organisation and its customers. This section gives an overview of the causative factors preventing the successful deployment of new technologies in an economy in general and businesses in particular. It focuses on factors that inhibit the use of m-commerce in traditional businesses. The purpose of this section is to address the following research question: What factors within the brick-and-mortar retailer setup will impede the use of m-commerce? (Question 4 [Qs4]).

The objective of this question is to determine the factors within the brick-and-mortar retailer setup that are an impediment to the use of m-commerce (Objective 4 [Ob4]).

Causes of traditional retailers not using m-commerce are many and fragmented and although they exist, they are not immediately obvious. Businesses engaging in m-commerce could be completely or partially affected by varied underlying hurdles/barriers that need to be thoroughly and systematically explored and addressed. However, previous researchers have strived to investigate the business environmental conditions systematically to assess barriers to the use of technology.

It has been observed that barriers to the adoption and use of technology in traditional businesses can vary according to country (e.g. developing country or developed country) (Kapurubandara & Lawson, 2006; Rahman, 2013) or potential adopter perspective on the technology (e.g. merchant or customer) (Mallat & Tuunainen, 2008; Khan et al., 2015; Moorthy et al., 2017). Some divergence between barriers can also be detected at all levels of the business environment, i.e. at a macro level, a business market level and an organisational level. Barriers to adoption can further be analyzed as internal barriers or external barriers (Kapurubandara & Lawson, 2006). Kapurubandara and Lawson (2006) explain that internal barriers are found within the business and can be resolved by the business itself, while external barriers are found in the business' external environment and must be removed through regulatory bodies' intervention or collaboration between the businesses in the market. Several barriers have been noted as the result of individual characteristics (e.g. manager), business characteristics and innovation/technology characteristics (Chang & Dasgupta, 2015; Jokonya, 2019).

To many traditional retailers in both developing and developed countries, the use of electronic commerce, particularly m-commerce, was never tried before and is understood as a new and challenging innovation. Čater et al. (2018:189) confirm that for brick-and-mortar retailers, the emergence of online retailers was understood as a direct threat. More recently, online retailing has been welcomed as a growth opportunity for traditional businesses and vice versa.

2.5.1 Business failure to use from a macro environment perspective

At a macro level, barriers to the integration of electronic commerce into business are analyzed in prior research based on the absence of concrete government policies and regulations, the shortage of trained personnel or cost-efficient programmers/web designers, and the increase in invasion of privacy, surveillance and cybersecurity issues (The Earth Institute & Ericsson, 2016:10; Kamble et al., 2019:165; Singh et al., 2019; GSMA, 2020b:5). Policymakers have been entrusted to implement mobile-related policies to drive investments and reduce consumers' lack of trust in electronic commerce (GSMA, 2020b:5). According to Chang and

Dasgupta (2015:32), merchants' concerns are that most online activities are not regulated by law, and if consumer data used online are protected by law, one must be careful about unprotected server risk and online transfer risks.

Other barriers to electronic commerce adoption and use, particularly in developing countries, have been identified as mobile operator infrastructure issues, which many researchers have found to be lacking (Maritz, 2014; Poulson, 2014; The Earth Institute & Ericsson, 2016:10; Kamble et al., 2019:165). Issues such as slow connection and poor coverage of networks have been assessed and noted to be barriers to adoption (Khan et al., 2015:74). Thus, Kamble et al. (2019:165) suggest that further study should be conducted to frame strategies that can help reduce the effects of these barriers on technology adoption. Furthermore, the use of m-commerce by retailers in developing countries has been claimed to be inhibited by the limitations of digital payment methods (GSMA, 2015:26) or payment gateway to deal efficiently with wireless electronic transaction systems, privacy and security architecture in the region (Masihuddin et al., 2017:10; Kalbande, 2019:421).

Traditional businesses' failure to use electronic commerce has also been analyzed based on the availability of government and/or non-government technological cooperative institutions in the economy. It has been reported that their failure to use could be caused by limitations of institutions that subsidise the IT or m-commerce infrastructure and training of personnel of the business and/or promote science, technology and innovation (Siwundla, 2013:vi; The Earth Institute and Ericsson, 2016:10). Chang and Dasgupta (2015:32) report the absence of general guidance on the digital business models is a barrier.

2.5.2 An overview of the market environment

However, from the perspective of a business market level, the cause of failure of the adoption and use has been associated with low competitive pressure (Lu et al., 2015:294). Furthermore, the cause of failure to use is also analyzed based on limitations of m-commerce popularity, i.e. lack of demand (Kapurubandara & Lawson, 2006; Mallat & Tuunainen, 2008:45) and e-commerce-related partners that are business-critical. However, addressing these factors and assessing the new, unobserved factors inhibiting the use of online commerce, particularly m-commerce, in an economy is necessary to make certain the new risks and threats are managed. These actions can enable full utilisation of m-commerce and foster entrepreneurship in the market (Siwundla, 2013:vi; The Earth Institute and Ericsson, 2016:10; Singh et al., 2019).

2.5.3 The failure to use from a business capability perspective

Barriers to m-commerce integration into traditional businesses have been analyzed based on several business-related factors.

2.5.3.1 Resistance to the use

The GSMA's (2020a:32) report (*Global Mobile Trends 2021: Navigating Covid-19 and beyond*) reveals that the adoption of the Internet of Things (IoT) is still a challenge among enterprises. One of the challenges pertains to employee/internal resistance to the integration of new technology. However, resistance to use could be influenced by some underlying but interrelated factors of failure to use. By the same token, it could be influenced by the lack of in-house technological skills (GSMA, 2020a:32) or the lack of interest in m-commerce. According to Kapurubandara and Lawson (2006), extending education and training to managers could help overcome their lack of preparedness for adoption and use. The GSMA report emphasises that increasing senior management awareness of the value-added features of the technology may reduce resistance to its use (GSMA, 2020a:32).

2.5.3.2 Senior management support

Researchers have observed that a lack of senior management support could be a barrier to use (EY, 2015:7; Jokonya, 2019:97). Since most traditional SMEs are highly dependent on owners/managers, obviously the deployment of technology may be avoided if they lack the ability or have no vision around the new technology. Top management support has been observed as a factor required for the integration of technology into a business (Gangwar et al., 2015:120; Wang et al., 2016:171), in that with senior management support the inflow of resources that are lacking in the business becomes easier (Gangwar et al., 2015:120).

2.5.3.3 Awareness of the technology

Low awareness of m-commerce and its benefits could be a potential barrier to adoption and use. Previous researchers have analyzed business leaders' low level of awareness of return on investment as a measurement of a barrier to technology use (Kapurubandara & Lawson, 2006; Wamuyu & Maharaj, 2011:48; Siwundla, 2013:v). Lack of understanding of the digital business environment has also been indicated as a barrier to use (Chang & Dasgupta, 2015:26). The m-commerce ecosystem could be regarded as a complex structure. According to Chang and Dasgupta (2015:34), some business leaders may fear deploying electronic business due to uncertainties about the market.

2.5.3.4 Lack of computer skill

In-house skills have been identified as a challenge to the deployment of IoT in enterprises (GSMA, 2020a:32). In-house skills could be critical for the effective integration and use of m-commerce systems and thus, their absence could hinder deployment success. As reported in previous research, some critical in-house skills would be the dedicated HR with computing capabilities such as but not limited to IT personnel (Kapurubandara & Lawson, 2006; Chang & Dasgupta, 2015:32; Jokonya, 2019:103) and mobile distribution systems workers (EY, 2015:7;

Song et al., 2019:541). Factors that inhibit the use of technology were also analyzed, with one being the workers' level of experience in using technology (Chang & Dasgupta, 2015:26). Previous research also indicates that the inability to use m-commerce technology could be a potential factor in business failure (Kapurubandara & Lawson, 2006; Wamuyu & Maharaj, 2011:48; Siwundla, 2013:v).

2.5.3.5 Logistics and distribution systems

Some research reported that the inability of the leadership to develop mobile distribution systems could be a barrier to adoption and use (EY, 2015:4; Hübner et al., 2016:255; Caro et al., 2020:52). EY (2015) reported that the complexities surrounding the distribution systems design would be the biggest challenge confronting the retailer. The electronic retailers' distribution systems, particularly groceries, must be designed to ensure same-day delivery to multiple destinations but at low costs of carrier services (EY, 2015:2; Hübner et al., 2016:280; Song et al., 2019:527).

2.5.3.6 Profit margin

Traditional business leaders are also concerned about the operating profit margin. A mobile shopping channel is presumed to absorb enormous costs, starting from the acquisition of products, operating the sales channel, to the delivery of products to the customers. It has been regarded as a low-profit margin business model (EY, 2015:7). EY found that more than one-third of respondents reported that their omni-channel strategies dilute margins. In other words, the strategies may lead to growth but also put the retail sector at risk of margin dilution.

2.5.3.7 Organisation characteristics

The characteristics of a business have been analyzed as an influential factor in barrier to use. For example, according to Chang and Dasgupta (2015:26), the SME characteristics that would cause barriers to adoption and use include limited resources of financial and personnel, and high dependence on owner/manager (Chang & Dasgupta, 2015:26). The financial resources barrier is that the SMEs, in general, operate at a very narrow profit margin, which may result in a lack of financial resources as well as basic ICT infrastructure for the use of m-commerce (Siwundla, 2013:v; EY, 2015:7).

2.5.4 Complexity of technology and its security, privacy and cost dilemmas

Some barriers to adoption have been reported as being associated with the technological innovation itself.

2.5.4.1 Complexity of mobile commerce

An M-commerce system would be perceived as complex technology. It has been reported that businesses find it extremely challenging to integrate m-commerce with the existing traditional business model and its IT platforms (Mallat & Tuunainen, 2008:43; GSMA, 2020a:32). Mallat and Tuunainen (2008:46) found that the usability of making online or mobile payment is still perceived to be a complex issue by merchants. Thus, they classified the complexity of the technology as a barrier to the use of m-commerce (Mallat & Tuunainen, 2008:43). Wang et al. (2016:163) investigated factors affecting mobile hotel reservation system adoption in Taiwan and found the complexity of the system to be an inhibitor. The challenge is how m-commerce technologies, including shopping application, mobile payment systems, back-office systems and mobile distribution systems can be fitted together.

2.5.4.2 Security and privacy dilemmas

Electronic commerce has been analyzed as a business model associated with significant security and data privacy risks (Siwundla, 2013:v; Chang & Dasgupta, 2015:32; Jokonya, 2019:97). The GSMA (2020a:32) report reveals that security and data privacy concerns are a major setback in the deployment of the IoT. Even though the high degree of uncertainty over m-commerce security is persistent (Kapurubandara & Lawson, 2006; Wamuyu & Maharaj, 2011:48; Siwundla, 2013:v), the most compelling evidence is that tighter security measures are available but at high costs, which is a security and cost dilemma of technology. However, by virtue of security measures concerns, issues of business data and consumers' data privacy is also a dilemma. An online business cannot prevent invasion of privacy without tightening security measures (Jokonya, 2019:104). Therefore, a business needs to be equipped with cutting-edge systems, devices and encryption formats to tighten its security measures to protect its data, consumer data and transactions against viruses, hackers and other cybercrimes (Chang & Dasgupta, 2015:32).

2.5.4.3 Cost of implementation

The cost factor as a barrier to adoption discussed in this subsection pertains to the costs of implementation of technology. Some researchers observed that m-commerce requires high initial costs and high operating costs to succeed (Mallat & Tuunainen, 2008:43; EY, 2015:7; Jokonya, 2019:104; GSMA, 2020a:32). All types of investments require that resources (i.e. capital, time) must be deployed before reaping the rewards. This, however, raises the question of whether the m-commerce business model is associated with high capital requirements or the businesses themselves have no interest in investing their resources in m-commerce. However, if the deployment of m-commerce requires a high investment capital for a business to compete effectively, the cost factor of failure to adoption and use would constitute a barrier to entry, which is associated with the technology itself.

2.5.5 Section summary

This section outlined various factors that were analyzed in prior research as potential barriers to the use of m-commerce by traditional retailers. It was identified that barriers to m-commerce use not only apply to the potential adopter (i.e. the business) but are also found in the macro environment and the market environment of the potential adopter.

The next section reviews literature relevant to support services, support institutions, and privacy and legal issues surrounding the use of m-commerce.

2.6 Support services for mobile commerce

The previous section reviewed a number of potential barriers to the use of m-commerce in the business. This section focuses on the precise nature of support services for m-commerce adoption and use by retailers and the controversial issues of privacy and security in electronic commerce data/information use and management. The purpose of this section is to address the following research question: What support is required for the use of m-commerce by brick-and-mortar retailers? (Question 5 [Qs5]). The objective of this question is to determine the nature of support that is requisite for the use of m-commerce in brick-and-mortar retailers (Objective 5 [Ob5]).

The support services reflect those services provided by the state (i.e. public institutions) and non-governmental organisations that enable a business to efficiently conduct its activities. An m-commerce business would require support services from technological cooperative institutions/agencies such as advisory services and support or direct subsidies to ICT infrastructures and training of personnel of the business (The Earth Institute and Ericsson, 2016:10). Technological cooperative institutions should also exercise elements of control and online arbitration. They must ensure the legal systems that restrict unlawful online practices are in place.

Prior research also found that SMEs in Indonesia would not recognise government support as an influential factor in their e-commerce adoption (Rahayu & Day, 2015:148). However, in 2017 the same authors, Rahayu and Day (2017) conducted another study on Indonesian SMEs to investigate the level of e-commerce adoption and their post-adoption benefits. They recommend the following:

> Compared to SMEs in developed countries, the level of e-commerce adoption by Indonesian SMEs lags far behind. This condition certainly has implications for the government to further increase their efforts through promoting effective programmes and initiatives to encourage the level of e-commerce adoption by Indonesian SMEs (Rahayu & Day, 2017:40).

This emphasises the importance of government business support services in the technological innovation diffusion. It has been observed that for integration into the digital ecosystem, brick-

and-mortar retailers may need technological business incubators and proper technological service providers. Irefin et al.'s (2012:1) study on influential factors of ICT adoption by SMEs in Nigeria, found the availability of government support as a critical determinant. They further indicated that there appeared to be a common belief that the adoption and use of this type of technology are predicated on the availability of proper government policies and regulations, well-functioning telecommunications infrastructure, and research and development (Irefin et al., 2012:7).

2.6.1 SMEs and mobile commerce policies in Angola

In 2011, the government of Angola identified the pivotal role of entrepreneurship and technology within economic development, and with that, the government started adopting new strategies and promulgating laws to promote SMEs and Science, Technology and Innovation (STI) in the country. The law of Micro, Small and Medium Enterprises (MSMEs) in Angola (known as Lei No. 30/11 de 13 de Setembro, Lei das Micro, Pequenas and Medias Empresas) (Angola. Diário da República, 2011a:4294), is aimed at deregulating the MSMEs sector, reforming its support system and setting the rules to provide the special treatment they deserve and making necessary conditions for the provision of incentives for MSMEs, to increase employment, combat poverty and inequality, and encourage economic diversification.

Laws on electronic commerce and online consumer information privacy protection need to be implemented. Existing laws in the telecommunications sector such as the Basic Telecommunications Law (referred to as Lei de Bases das Telecomunicações, Lei n.º 8/01 de 11 de Maio), approved by the Angolan National Assembly on the 23 of January 2001, do not deal with issues of the Internet or electronic commerce. One of the objectives of the Basic Telecommunications Law, particularly in item 3 of Article 1, is to defend users' interests, ensuring their right to access without discrimination, to telecommunication services, as well as respect for their constitutional rights, especially the right to privacy and confidentiality in telecommunications (Ministério das Telecomunicações, Tecnologias de Informação e Comunicação Social [MINTTICS], 2001). Although this law recognises telecommunications users' privacy as well as the telecommunications' value-added services, the 2001 Basic Telecommunication Law was laid down for both public and private telecommunications services, in which mobile network operators' interconnection, regulatory, universal access and service, scarce resources' allocation and use issues are also dealt with (Lewis & Abrahams, 2013). Nevertheless, Angola does not yet have policies and laws on electronic commerce.

Furthermore, in 2011, the government of Angola approved the National Policy for Science, Technology and Innovation (referred to as Decreto Presidencial n.o 201/11 de 20 de Julho, A Política National de Ciência, Tecnologia e Inovação) (Angola. Diário da República,

2011b:3569). The National Policy for Science, Technology and Innovation (NPSTI) is aimed at:

- Integrating science and technology in the country's development strategy to stimulate a competitive economy that enables sustainable development and improves the citizens' quality of life;
- Promoting ICT to build a knowledge society that stimulates effective interaction between local, regional, national and international institutions, organisations and communities to increase economic productivity.

The NPSTI partially recognised the need to promote science, technology and innovation, to support the growth of entrepreneurship and the innovation sector, telecommunications and information technologies sector, and other sectors (Angola. Diário da República, 2011b:3574-3575).

2.6.2 Privacy and legal issues surrounding m-commerce usage

In trading through the Internet, sensitive information related to customers and merchants becomes very vulnerable to unlawful access. Merchants experience increased cybercrime if the business does not have tight Internet security (Wamuyu & Maharaj, 2011:55). Moreover, due to the way data are collected, processed, carried (e.g. mobile), shared or stored (e.g. cloud computing) today, it also poses a considerable risk to privacy and individual liberties. It has been reported that it is possible to respect and protect customer privacy and provide comprehensive information services to customers (Piao et al., 2016:68). At the same time, it has been observed that online privacy concerns are increasing. With attention to the increase in privacy concerns, Anic et al. (2019:1) found that consumers have attributed such concerns to a lack of control over their personal information and weak government online regulation. According to Martin et al. (2020:474), the issue of consumer data privacy in a broader scope requires convergence among retailers, consumers and regulatory bodies. Moreover, these authors noted that for convergence between these players to occur, issues such as big data (resulting from the relationship between consumer and retailer), data safeguard, use and sharing regulations, and privacy protection retailer's strategies need to be precisely addressed (Martin et al., 2020:474). Therefore, businesses must recognise the critical issues concerning the organisation and customer information privacy and security when considering adopting ICT systems.

Some organisations and government institutions do go to great lengths to promote and provide guidance to both the public and private sectors on issues concerning personal privacy, ethical information practices and obligations. For example, the Asia-Pacific Economic Cooperation (APEC) organisation and the Organisation for Economic Co-operation and Development

(OECD) have each published privacy guidelines entitled the APEC Privacy Framework (APEC, 2015) and the OECD Privacy Framework (OECD, 2013). The OECD Privacy Framework includes eight basic principles of privacy that are interrelated and partly overlapping (see Table 2.4).

Table 2.4: OECD basic privacy principles

Principles		**Description**
i.	Collection Limitation	There should be limits to the collection of personal data and any such data should be obtained by lawful and fair means and, where appropriate, with the knowledge or consent of the data subject.
ii.	Data Quality	Personal data should be relevant to the purposes for which they are to be used, and, to the extent necessary for those purposes, should be accurate, complete and kept up to date.
iii.	Purpose Specification	The purposes for which personal data are collected should be specified not later than at the time of data collection and the subsequent use limited to the fulfilment of those purposes or such others as are not incompatible with those purposes and as are specified on each occasion of change of purpose.
iv.	Use Limitation	Personal data should not be disclosed, made available or otherwise used for purposes other than those specified in accordance with Paragraph 9 (i.e. principle III.) except a) with the consent of the data subject; or b) by the authority of law.
v.	Security Safeguards	Personal data should be protected by reasonable security safeguards against such risks as loss or unauthorised access, destruction, use, modification or disclosure of data.
vi.	Openness	There should be a general policy of openness about developments, practices and policies with respect to personal data. Means should be readily available for establishing the existence and nature of personal data, and the main purposes of their use, as well as the identity and usual residence of the data controller.
vii.	Individual Participation	An individual should have the right: a) to obtain from a data controller, or otherwise, confirmation of whether or not the data controller has data relating to him; b) to have communicated to him, data relating to him: i) within a reasonable time - ii) at a charge, if any, that is not excessive - iii) in a reasonable manner - and iv) in a form that is readily intelligible to him; c) to be given reasons if a request made under subparagraphs (a) and (b) is denied, and to be able to challenge such denial; and d) to challenge data relating to him and, if the challenge is successful to have the data erased, rectified, completed or amended.
viii.	Accountability	A data controller should be accountable for complying with measures that give effect to the principles stated above.

(OECD, 2013:14-15)

The OECD proposed basic principles of privacy (OECD, 2013:14-15) stress that “personal data should be protected by reasonable security safeguards against such risks as loss or unauthorised access, destruction, use, modification or disclosure of data”. In this regard,

businesses are required to seriously recognise the critical issues around customer information privacy and security and design a regulatory system that deals fairly with personal information and prevents such information from being lost or misused.

2.6.3 Section summary

The section that ends discussed the nature of support services traditional retailers would need for using the m-commerce. Two factors were identified to be relevant to the mobile channel adoption and use, the policymaker and the technological cooperative institutions, for online arbitration, and training and financial supports. Furthermore, it was identified that the country is still to introduce the electronic commerce law which lacks in the market. Some of laws on other related sectors were identified. In addition to the above, this section focused on issues of privacy and security, the regulatory bodies and the business legal obligations to respect and protect consumers' data/information.

2.7 Chapter summary

This chapter provided an overview of brick-and-mortar retailers and explored their classifications. It discussed the use of m-commerce, which introduces the different patterns of components that influence the adoption and use of m-commerce by a business. Some independent approaches to the use of m-commerce were identified in prior studies. Thus, the discussion focused on m-commerce business stakeholders, business capability, m-commerce systems and multi-channel management skills factors.

Furthermore, the chapter reviewed the benefits of using m-commerce with a focus on the value for the business and potential customers. The literature review also enlightened us on the factors preventing the adoption and use of m-commerce by brick-and-mortar retailers. The discussions on these factors enabled us to identify some associated and dissociated business factors as well as technological factors blocking the adoption and use of m-commerce. Finally, this chapter reviewed literature on the support services for m-commerce and a review of privacy and legal issues surrounding m-commerce consumers' data/information.

The next chapter discusses the theoretical foundation that serves as a lens through which to explore and understand the framework for the adoption and use of m-commerce by brick-and-mortar retailers.

CHAPTER 3
THE THEORETICAL UNDERPINNING OF THE STUDY

3.1 Introduction

In this chapter, an in-depth literature review is undertaken on models/theories relevant to the present study. Existing literature reveals an endless list of theories and models that have been created to explain factors and processes affecting the adoption and use of technology. However, the list has been increasing in that researchers continue to seek contextual solutions and innovation. This chapter reviews the basic theories and models that the present study has considered as a lens through which to understand and explain the relationship between m-commerce and brick-and-mortar retailers. The reviewed literature on the models/theories discusses the use of m-commerce and the subsequent theoretical constructs and dimensions underlying their use in businesses, and why they are necessary lenses to understand and interpret the phenomenon. The chapter is structured into the Technology-Organization-Environment (TOE) framework; the Task-Technology Fit (TTF) model; integration across TTF and TOE framework; The evolution of basic constructs of TTF and TOE; integration of TTF model and other models/theories; integration of TOE framework and other models/theories; and limitations of TTF and TOE research.

3.2 Overview of technology-organization-environment framework and task-technology fit model

This section reviews literature on the TOE framework and how it relates to the research problem. The section discusses the TOE framework and the underlying constructs or dimensions associated with its extensions. This section further provides a brief review of the TTF model before discussing the subsequent integrations across the models and their limitations.

3.2.1 Technology-organization-environment framework

The TOE framework explains technology adoption in the context of a business. It casts light on how the components of the business environment hold substantial sway on the business technology innovation decision-making (Tornatzky & Fleischer, 1990; Lippert & Govindarajulu, 2006:149; Baker, 2011). The TOE framework segments the business environment into three variables or contexts, i.e. the organisation, the technology and the environment, which lead to technology adoption decisions (see Figure 3.1).

The organisational context considers the characteristics of the firm and its resources, including the quality of the employees' technology usage expertise, managerial structure, and amount of resource slack (Lippert & Govindarajulu, 2006:149; Baker, 2011; Matikiti et al., 2018; Eze et

al., 2019). The technological context takes into consideration the potential technologies that are available in the market for the business and the existing technology at the business (Wang et al., 2016:163; Eze et al., 2019).

The environmental context takes into consideration the business external environment and stresses the elements in this setting that affect a business' technology adoption decisions. Such decisions take into account the market structure and industry characteristics, technological cooperative institutions, and regulatory bodies.

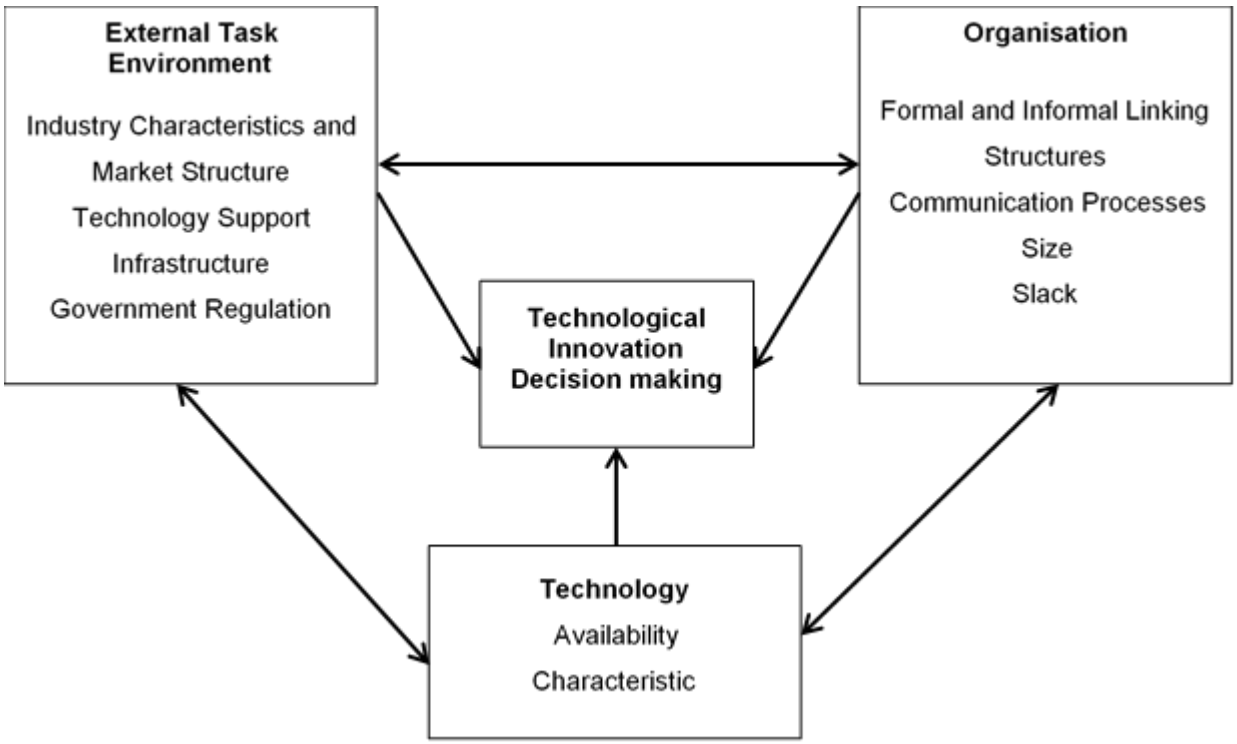

Figure 3.1: Technology-organization-environment framework

(Tornatzky & Fleischer, 1990:153)

There are studies that adopted the TOE framework to attempt to match the characteristics of technology and those of the internal and external environment of the organisation to bring about the good performance of the use of the technology. One of the studies was conducted by Lu et al. (2015) who adopted the TOE model to investigate the use of business-to-business m-commerce in Taiwan. The study suggested that further studies should be conducted to determine a multiple-criteria approach to the adoption and use of m-commerce, which is not limited to TOE evaluation criteria alone but also identify possible influential m-commerce usage criteria (Lu et al., 2015:308).

Wang et al. (2016:163) adopted the TOE to examine factors affecting Mobile Hotel Reservation System (MHRS) adoption in Taiwan. They suggest that further studies should consider influential factors of m-commerce adoption in other business setups, as the predicted power may vary in different industries and contexts (Wang et al., 2016:170), which is the objective of this study. However, due to different deployment perspectives, the factors that are requisite for the use may vary greatly from each perspective.

Chau and Deng (2018a) integrated TOE with the Diffusion of Innovation (DOI) theory to investigate the influential factors of m-commerce adoption in Vietnamese SMEs. They suggest that further studies should be conducted to assess the differences in the adoption and critical determinants by considering the varied nature of business models, products or services (Chau & Deng, 2018a:9), which this study intends to achieve.

The TOE framework is also deployed to provide enlightenment on or understanding of factors affecting the adoption of technology in different sub-units of the business and their environment. Eze et al. (2019:1) deployed the TOE framework to explore factors that may explain the mobile marketing adoption decision in the service sector in Nigeria. This study, therefore, draws on these researchers' work and argues that using a mixed methodological approach on account of other factors that are prevalent among economic sectors, industries and organisations in developing countries (Eze et al., 2019:22) will help collect the right data to address the phenomenon under study.

Furthermore, this study draws on the work of Martín et al. (2012:946) who considered using the TOE to investigate factors related to firms' perceived performance in the use of m-commerce. Martín et al. (2012:959) suggest that further study should examine perceptions of the performance of a larger number of m-commerce companies to measure against those organisations resisting demands for mobile shopping.

3.2.2 Task-Technology Fit model

The TTF model is based on the guided premise that the success impact of a specific technology on an individual's performance would result from the Task-Technology Fit, i.e. the correspondence between the technology and task characteristics (Goodhue & Thompson, 1995:216). The TTF model, as depicted in Figure 3.2, has received acceptance worldwide. There are five involved constructs in the success of the TTF model perspective, which are 1) task characteristics, 2) technology characteristics, 3) both shall predict Task-Technology Fit, which in turn 4) predicts utilisation, and 5) the last two constructs predict performance. However, the core issue of this model is that the match of the technology and task constructs should result in a high or low task-technology fit construct and that the task-technology fit construct might predict the individual's performance construct and utilisation (Goodhue &

Thompson, 1995:214; Gebauer & Shaw, 2004:20; Lee et al., 2007). Theoretically, it illustrates how these constructs are related to each other and how a worker's improved performance can be achieved through task-technology fit and utilisation. In other words, for technologies to contribute to the transformation of an organisation, their functionalities must first fit the tasks constructing the activities of such organisation, and then the technologies need to be used by the workers (Goodhue & Thompson, 1995:213; Dishaw & Strong, 1999:11; Gebauer et al., 2010:260; Vongjaturapat, 2018:40). Furthermore, it supports that the technology will be utilised in an organisation if, and only if, its embedded functionalities support the organisation's workers' activities (Dishaw & Strong, 1999:11).

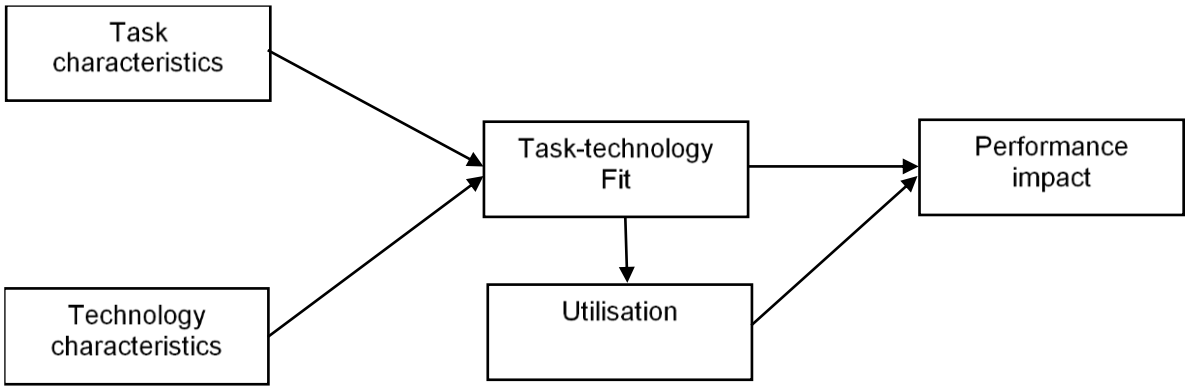

Figure 3.2: Task-Technology Fit model

(Goodhue & Thompson, 1995:220)

Some researchers have used the TTF to evaluate influential factors of performance and user acceptance of m-commerce (Lee et al., 2004; 2007), technological fitness for mobile worker use (Zheng, 2007; Gebauer et al., 2010) and technological fitness for mobile worker use and performance (Gatara, 2016). In conclusion, Zheng (2007:192) suggests that future studies should focus on managers' views of the mobile business as this would provide a completely different enterprise perspective on the management of the technological systems. Drawing on Zheng's suggestion, this study was delineated by investigating traditional retail stores' owners/managers, and m-commerce businesses' owners/managers and employees in Angola. This notion is supported by Gebauer et al. *(*2010) by citing numerous authors (Lopperi & Sengupta, 2004; Schwarz et al., 2004; Jeyaraj et al., 2006; Kim et al., 2006). Gebauer et al. (2010:269) finally suggest that further research "on the role and antecedents of task-technology fit-related behavioural variables, such as adoption, use and performance impacts, on individual and organizational levels" should be conducted and empirically tested.

Furthermore, Gatara (2016:274) emphasises this, making the following suggestion for further research:

> Assess TTF impacts in alternative tool or system user environments, consider replicating the conceptual model in other settings, industries, or sectors that are technology-driven, and in which service delivery is technology-enabled. This represents a natural progression in TTF research, with potentially far-reaching implications for industry, as it must be explicitly recognised that technology users in every conceivable setting or environment would use particular tools or systems to perform a wide range of tasks.

The above underscores the need to investigate the linkage between mobile technology, other industries' business tasks, user environmental drivers, and how they affect the use and individual or business performance outcomes. Therefore, this study sought to deal effectively with the above missing link.

3.2.3 Evolution of basic constructs of TTF and TOE

This section discusses the basic constructs of the TTF model and the TOE framework and the subsequent constructs and dimensions of the use of m-commerce in businesses proposed by follow-up research.

3.2.3.1 Technology characteristics from a TTF perspective

The characteristics of technology in TTF research should receive considerable attention in that the technology has been clearly defined as a tool (e.g. hardware, software and data in terms of information systems research) that one uses to carry out a task (Goodhue & Thompson, 1995:216; Vongjaturapat, 2018:40) but there is no consensus of what these characteristics are. In Goodhue and Thompson's study, during the test of the TTF model, the proposed measures for the technology characteristics were the information systems and different departments using them. Consequently, the users evaluated them thinking of the functions of the information systems used and of those of the department using the systems (Goodhue & Thompson, 1995:223). Furthermore, some studies base the technology characteristics on different hardware attributes and others on software attributes of the device, while some would combine both hardware and software attributes. For example, the technology characteristics construct has been reported as mobile functionalities, user interface, portability, and system support/user support (Gebauer & Shaw, 2004:36; Gebauer, et al., 2010:261). The technology characteristics construct in m-commerce research have been analyzed as personal digital assistant m-commerce systems (Lee et al., 2007:98) or tool functionality (Shih & Chen, 2013:1017) without any dimension being specified in detail. According to Lee et al. (2004:144), the measures for the technology characteristic should "represent the quality of the mobile technology" used to execute the business m-commerce activities. Most research on mobile technology systems from a TTF theoretical perspective focus more on the analysis of tool functionalities as a construct rather than technology characteristics (see Table 3.1). For

example, a study based on mobile work analyzed the construct as “functionalities of mobile work technology support” (Zheng, 2007:191). Therefore, this study adapted the functionalities of the tool conceptualisation for the technology characteristics construct of the TTF model. This study argues that the functionalities of m-commerce systems should match the requirements of m-commerce-related tasks. It presumes that the integration of mobile shopping into a traditional business may demand several tasks, which must be performed on mobile technology, therefore, it may also require different tool functions that match those tasks.

Zheng (2007), in analysing the mobile technology functions needed to support a worker, grouped them into five categories:

a) Mobile communication, which constitutes the mobile voice (discussions, information exchange) and video communication, mobile notification and text messaging;
b) Mobile information search that enables the worker to surf the Web or search business databases for access to information;
c) Mobile transaction processing, involving two facets of information processing, i.e. offline and online;
d) Location service enabler, which provides a worker with personal location tracking or global positioning system (GPS) navigation services;
e) Mobile job dispatching that enables a worker to access or assign of job assignments; and
f) Mobile office, which constitutes applications for data processing such as word processing, spreadsheet, and database creation (Zheng, 2007:86; Lembach & Lane, 2011:347).

Such mobile functionalities were identified as being significantly related to the nature of mobile work. Some researchers analyzed functionalities such as real time mobile job dispatching, mobile notification—for example, a brief message about urgent events transmitted to a targeted audience, navigation (i.e. provision of routes to targeted destinations) and location tracking (Yuan et al., 2010:125). Gebauer et al. (2010:263) observed the functionalities of mobile information systems from two perspectives—interpersonal interaction and computing. Interpersonal interaction can be categorised into one-way communication or simply notification and two-way communication (Gebauer et al., 2010:263), which is related to information exchange. Notification (one-way communication) is used to notify others but not expecting receipt of a direct response (Zheng, 2007). Two-way communication reflects shared information between two people or a group of people. Moreover, Gebauer et al. (2010:263) categorises the computing functionality of the mobile information systems into information access and data processing. On data access, the system should enable the business to access external or internal data associated with the m-commerce activities, while the data processing

functionalities should enable the business to receive orders, process purchasing approval, and manage retail inventory and delivery services.

Table 3.1: Functionality technology in mobile TTF model

Construct	Dimension	Author
Functionality of mobile IT	Notification, communication, information access, data processing.	Gebauer et al. (2010)
Mobile support functionality	Mobile email communication, online access, sales process, Internet search, mobile office functions	Lembach and Lane (2011)
Technology characteristics	Technology characteristics*	Lee et al. (2007)
Mobile work support functions	Mobile notification, tracking, navigation, real-time mobile job dispatching	Yuan et al. (2010)
Technology characteristics	Technology characteristics*	Yen et al. (2010)
Technology characteristics	Ubiquity, uniqueness	Junglas (2003)
Tool functionality	Tool functionality*	Shih and Chen (2013)
Functionalities of Mobile Technology Support	Voice communication, notification, mobile information searching, mobile transaction processing, location-related service, mobile job dispatching, mobile office	Zheng (2007)

* = one dimension was used to measure different indicators

3.2.3.2 Task characteristics of TTF

The nature of any given task is intricate. A task contains unique characteristics, which differentiate it from other tasks (Amos et al., 2016:332). In general, task characteristics from a TTF theoretical perspective have been characterised by the length of time a task would require to be performed, for example, time criticality (Gebauer et al., 2010:261; Yuan et al., 2010:125; Gatara & Cohen, 2014:333), or time-dependency (Junglas, 2003). The characterisation of these tasks indicates that technology should provide a task with timely support systems. Moreover, task characteristics have been characterised by the number of times the task regularly occurs in a particular job, namely, frequency of practice (Gebauer & Shaw, 2004) and task routineness (Gebauer et al., 2010).

The characteristics of tasks are also analyzed as task interdependence, meaning the degree to which workers depend upon each other to accomplish their tasks (Goodhue & Thompson, 1995:222, Zheng, 2007; Gebauer et al., 2010:261; Gatara, 2016), as well as interaction outside the organisation, which is extensively discussed in work design research (Humphrey et al., 2007:1336; Grant et al., 2009:33). In addition, tasks have been analyzed in terms of their

distinguished processes, for example, tax/legal information service, recruitment of potential clients, and post-contract services (Lee et al., 2007:95). However, this nature of tasks should be supported by specific tool functionalities. A task that cannot be supported by the technology functionality is regarded as irrelevant to the task-technology fit construct.

Furthermore, task characteristics are analyzed by their degree of difficulty, whether they are highly predictable, complex, analytic, and full of uncertainty or exceptions. Such task characteristics include task non-routineness (Daft & Macintosh, 1981:207; Gebauer et al., 2010:261), and task complexity (Zheng, 2007). Considering the characterisation above, it reflects that the technology should have vital functions capable of carrying out the task of challenging requirements. Research on mobile work would rely on mobility characteristics and location/information dependency characteristics as predictors of tasks that need to be carried out in different locations and of those that need travelling or equipment location-related information (Yuan et al., 2010:125; Gatara & Cohen 2014:333). Tasks in general are determined by considering the technology use specification and organisational needs. The task characteristics must be suitable for the system the user intends to use (Goodhue & Thompson, 1995:216). Task characteristics must befit technology functionalities. Table 3.2 below shows the different dimensions of task characteristics that have been analyzed in TTF research.

Table 3.2: Task characteristics in mobile TTF models

Construct	Dimension	Author
Managerial task	Interdependence, non-routineness, Time criticality	Gebauer et al. (2010)
Insurance task	Recruitment of potential clients, post-contract services, tax/legal information services	Lee et al. (2007)
Mobile task characteristics	Time criticality, mobility, location dependency	Yuan et al. (2010)
Task characteristics	Accessing notifications, localising materials, downloading relevant documents	Vongjaturapat (2018)
Task characteristics	Time-dependency, location-dependency, identity-dependency	Junglas (2003)
Task	Time criticality, interdependence, mobility, information dependency	Gatara and Cohen (2014)

3.2.3.3 Conceptualisation of task-technology fit construct in m-commerce research

There are distinct types of fit that have been operationalized in TTF research. The basic fit operationalization of the task-technology fit construct denotes the correspondence between the dimensions of technology and task. The correspondence stance of the operationalization of fit means that fit is determined through theoretically analysing the correspondence between task requirements and technology functionality (Goodhue & Thompson, 1995:218; Gatara & Cohen, 2014:324; Vongjaturapat, 2018:39). In other words, the dimensions of the task-technology fit construct reflect the net result of the interaction between the two constructs (task characteristics and technology characteristics) as shown in Figure 3.3 (Goodhue & Thompson, 1995:218). These dimensions are characterised by analysing the technology support on decision-making task needs, day-to-day operational task needs and changed business task needs (Goodhue & Thompson, 1995:222).

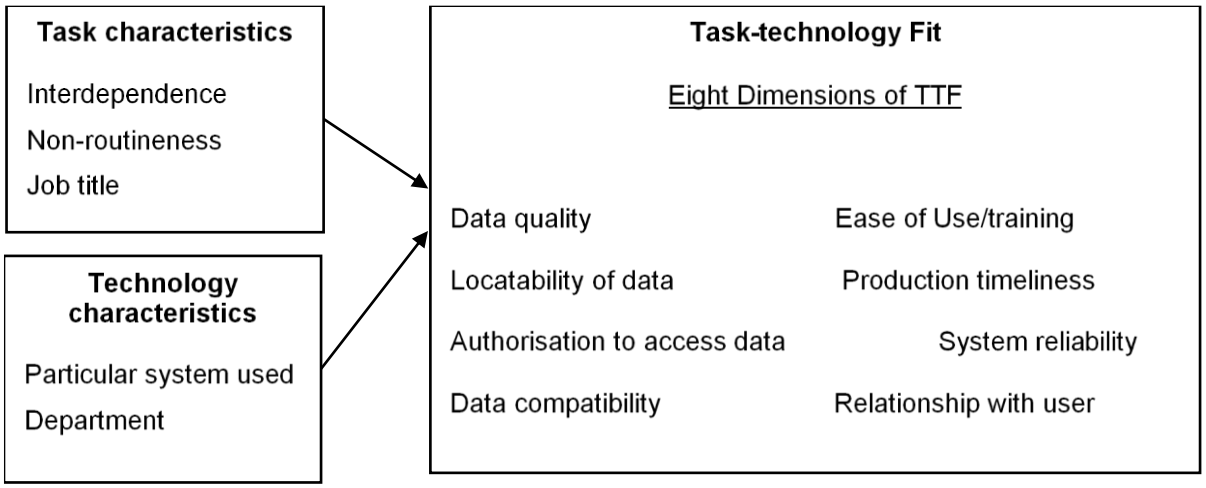

Figure 3.3: Basic fit operationalization of task-technology fit construct

(Goodhue & Thompson, 1995:218)

Other fit conceptualisations available for assessing the success of a technology include the six approaches of fit, i.e. “fit as moderation, fit as mediation, fit as matching, fit as Gestalt, fit as a profile and fit as covariation", proposed by Venkatraman (1989:423). These conceptualisations of fit are widely used in strategic management research and can also be applied to evaluate fit between task and technology (Strong et al., 2006; Gatara & Cohen, 2014; Gatara, 2016). For example, fit as moderator has been conceptualized as computed interaction in TTF research (Dishaw & Strong, 1998:14; Strong et al., 2006:99). Computed interaction conceptualisation of fit is viewed as multiplicative interaction between the two variables. Such interaction can be demonstrated as follows:

$$\textbf{Fit} = f(\textbf{task} * \textbf{technology})$$

In addition to the above, fit in TTF research has been operationalized from two perspectives, i.e. subjective and objective (Junglas, 2003; Zheng, 2007). The subjective fit reflects the user evaluation stance of fit, which means that fit should be measured from the technology user's perspective. The objective view of the operationalization of fit maintains that fit should be operationalized from the system developer's view. In this regard, fit of technology and the task is external to the users of the system. An objective fit is distinguished at three levels—ideal fit, over-fit and under-fit (Junglas & Watson, 2003). Table 3.3 shows the different fit conceptualization used in prior research.

Table 3.3: Constructs and operationalized fit in TTF model

Model constructs	Fit operationalized	Author
Utilisation; task characteristics; technology characteristics; task-technology fit; performance impact	Correspondence	Goodhue and Thompson (1995)
Task-technology fit; managerial tasks; mobile IT; mobile use context; performance	Profile	Gebauer et al. (2010)
Maintenance task activity, maintenance tool functionality, task-technology fit, tool use	Computed interaction	Dishaw and Strong (1998)
Task-technology fit of PDA for insurance; insurance task; PDA technology characteristics; individual differences	Correspondence	Lee et al. (2007)
Functionalities of mobile work technology support; mobile task characteristics; fit for mobile work technology; intention to use	Subjective	Zheng (2007)
Task characteristics; mobile characteristics; task-technology fit; performance impact	Correspondence	Vongjaturapat (2018)
Task characteristics; technology characteristics; perceived task-technology fit; use; user performance	Mediation	Gatara and Cohen (2014)
Task characteristics; technology characteristics; individual characteristics; task-technology fit; perceived usefulness; perceived ease of use; intention to use; use; impact	Objective	Junglas (2003)
Task characteristics; technology functionality; computer self-efficacy; task-technology fit; CSET fit; technology utilisation	Computed interaction	Strong et al. (2006)

3.2.3.4 The use construct in TTF research

The use construct in the TTF model has been proposed as a mediator between the task-technology fit construct and performance constructs. In other words, it is affected by the task-

technology fit construct outcome (Gatara, 2016), whereby it plays a role also as a predictor for the performance construct. It has been suggested that the use should be observed as the intensity of integration of m-commerce systems integration into a user's work routines (Goodhue & Thompson, 1995). It has been observed as an individual's behaviour of employing technology in completing tasks (Goodhue & Thompson, 1995). However, measures of use should be a reflective indicator of the individual's behaviour toward the deployment of technology. Measures of use in TTF research have been conceptualised as the degree of a worker's dependence on IT use (Goodhue & Thompson, 1995), the frequency of use of a system in the organisation, and the intensity of use or how much time a user spends using it (Teo & Men, 2008; McGill & Klobas, 2009; Gatara, 2016). Furthermore, researchers have evaluated the use of technology by the extent of use very positively (Dishaw & Strong, 1999; Zheng, 2007; Gebauer, 2008), good decision, willing to use (Lee et al., 2004:145). Moreover, it has been indicated that the use of technology can be conceptualised as a binary condition of 0-1, i.e. the choice of a particular individual or organisation to use a specific technology for performing a task, or not to use it (Goodhue & Thompson, 1995; Goodhue et al., 1997). Hence, the individual or organisation choice of using technology would signal their acceptance of the institutionalisation of the technology.

3.2.3.5 The environmental context of TOE

The environmental context of the TOE framework reflects the external characteristics of the business environment that accounts for the use of the innovation (Tornatzky & Fleischer, 1990) (see Table 3.4). It defends that the environment in which the entrepreneur does business would determine their technology adoption decision. That is, the adoption of technology is associated with certain combinations of environmental characteristics that would play a part in the technology integration process. However, characteristics of the environmental context in TOE research have been analyzed as dependent partner readiness (Lippert & Govindarajulu, 2006:147), business partner support (Lu et al., 2015:308) or critical mass (Wang et al., 2016:170) and customer pressure (Chau & Deng, 2018a:8) to describe customer demand or readiness for the uptake of the proposed technology. Other evaluated characteristics include competitive pressure (Zhu & Kraemer, 2005:61; Lippert & Govindarajulu, 2006:147; Lu et al., 2015:308; Wang et al., 2016:170; Chau & Deng, 2018:438; Eze et al., 2019:22) and regulatory influence (Lippert & Govindarajulu, 2006:147) or regulatory support (Zhu & Kraemer, 2005:61; Lu et al., 2015:308) or government support (Chau & Deng, 2018a:8) to describe government policies and regulations intervention. Table 3.4 shows the constructs of the environmental context that are most commonly used in some mobile TOE frameworks.

Table 3.4: Constructs of the environmental context in TOE framework

Construct	Author								
	Zhu and Kraemer (2005:61)	Wang et al. (2016:170)	Lu et al. (2015:308)	Chau and Deng (2018a:8)	Lippert and Govindarajulu (2006:147)	Eze et al. (2019:22)	Picoto et al. (2014:580-581)	Zhu et al. (2006a:607)	Martín et al. (2012:956)
Critical mass		√	√	√			√	√	
Policy and regulation	√		√	√	√				
Competitive pressure	√		√	√	√	√	√	√	√
Operator network			√				√		

3.2.3.6 Mobile commerce technology with TOE

The technological context is concerned with the characteristics of the technological structure of the business internal and external settings (Lippert & Govindarajulu, 2006:149; Baker, 2011; Martín et al., 2012:949; Wang et al., 2016:165; Eze et al., 2019:4). The entrepreneur should take cognizance of the important technology the business already has and that which is available in the external environment before the adoption and use of new technology.

However, taking cognizance of the existing technological structure would help the firm to define its limitations and easily identify the relevant technology in the market (Baker, 2011). In previous research, some divergence between constructs of the technological context can be detected. Constructs discussed in the literature include relative advantage (Jain et al., 2011:162; Picoto et al., 2014:580; Gangwar et al., 2015:120), data security or security of data capturing and sharing, reliability (Lippert & Govindarajulu, 2006:147; Lu et al., 2015:308; Chau & Deng, 2018b:438), complex nature of technology (Gangwar et al., 2015:120; Lu et al., 2015:308; Chau & Deng, 2018b:438). However, similarities between constructs of technological context are also identifiable in deployability (Lippert & Govindarajulu, 2006:147), compatibility (Wang et al., 2016:165; Chau & Deng, 2018b:438) and adaptive capability (Eze et al., 2019:11), proposed to describe a good match or good fit between the new technology

and the firm's existing capability and technological structure. These constructs would describe the nature of new technology to adhere to standards (Lippert & Govindarajulu, 2006:152), to "integrate to both the business operations and the existing IT applications in the organisation" (Eze et al., 2019:11). Some of the most commonly used constructs of the mobile systems are shown in Table 3.5 below.

Table 3.5: Constructs of the mobile systems in TOE research

Construct	Authors							
	Zhu and Kraemer (2005:61)	Wang et al. (2016:170)	Lu et al. (2015:308)	Chau and Deng (2018a:8)	Lippert and Govindarajulu (2006:147)	Picoto et al. (2014:580-581)	Jain et al. (2011:162)	Gangwar et al. (2015:107)
Data security			√	√	√			
Compatibility		√		√		√		√
Relative advantage						√	√	√
Complexity		√	√	√		√	√	√

3.2.3.7 The organisational context of TOE

The organisational context reflects the organisational strategic value, design characteristics and resource characteristics that promote adoption. The formal and informal links between the staff, the managerial structure, the nature of centralisation (Baker, 2011) and firm's size (Zhu & Kraemer, 2005:61; Lippert & Govindarajulu, 2006:147; Baker, 2011; Lu et al., 2015:306; Wang et al., 2016:163) are among the organisational context's variables discussed in the literature. Other variables analyzed in previous research would be related to human and technological resources characteristics (see Table 3.6). Empirical research such as Picoto et al. (2014:581) and Wang et al. (2016:163) classify the technology competence construct of the organisational context as a critical influential factor in adoption decision. Some authors in their analysis of the organisational setting focused on top management support (Gangwar et al., 2015:107; Lu et al., 2015:306), employees' skills in integrating the new technology (Lippert & Govindarajulu, 2006:147; Chau & Deng, 2018a:8) and perceived benefits (Lippert & Govindarajulu, 2006:147) as possible support dimensions. Furthermore, Chau and Deng (2018b:438) in their analysis also emphasize the organisational aspects such as readiness

and strategic orientation factors. Table 3.6 shows the most commonly used constructs of the organisational context in some TOE research.

Table 3.6: Constructs of the organisational context in some TOE research

Construct	Authors									
	Zhu and Kraemer (2005:61)	Wang et al. (2016:170)	Lu et al. (2015:308)	Chau and Deng (2018a:8)	Zhu et al. (2006a:607)	Picoto et al. (2014:580-581)	Jain et al. (2011:162)	Gangwar et al. (2015:107)	Martín et al. (2012:956)	Zhu et al. (2006b:1560)
Top management support			√					√		
Technology competence	√	√			√	√		√	√	
Firm size	√	√			√		√			
Employees IS knowledge			√	√			√			
Managerial obstacles						√				√

3.2.3.8 The use construct in TOE research

The technological innovation adoption decision construct of TOE framework has been analyzed as e-business use (Zhu & Kraemer, 2005:67), e-business adoption (Zhu et al., 2006b:1566) m-business usage (Picoto et al., 2014:574), e-commerce adoption (Chandra & Kumar, 2018:247), adoption of a mobile system (Wang et al., 2016:163), m-commerce adoption (Jain et al., 2011:158; Chau & Deng, 2018a:4) and mobile marketing adoption (Eze et al., 2019). Research on the TOE adapts this construct to the use/adoption of the technological innovation (i.e. m-commerce in the present study) under investigation. The use construct in TOE research has been proposed as a dependent variable, which is affected primarily by the technology, organisation and environment constructs. According to Zhu and Kraemer (2005:67) and Picoto et al. (2014:574), the use context reflects the extent to which technological innovation is deployed in the execution of a firm's activities.

3.2.4 Section summary

This section explored the literature on the TOE framework and the TTF model. The literature review focused on the basic constructs of the TTF model, the technology characteristics, the task characteristics, the task-technology fit and utilisation. The section also reviewed constructs of the TOE framework, the environment, the technology, the organisational contexts and the use.

The next section provides an overview of the integration of the TTF model and other models/theories, and the TOE framework and other models/theories, covering extensions and integration across these theoretical perspectives.

3.3 Integration across TTF model and TOE framework

This section reviews the subsequent integration of the basic TTF model and other models/ theories, and the TOE framework and other models/theories, and identifies the knowledge gaps in the literature. Furthermore, the section identifies the limitations of prior research on TOE and TTF. It discusses the shortcomings in the framework and model and the intention to integrate them as lenses to understand and interpret the phenomenon under investigation.

3.3.1 Integration of TTF and other models/theories

Regarding the TTF model, some researchers have integrated it with the Technology Acceptance Model (TAM), also a widely studied model in the area of information systems and marketing, to examine the success of the technology. For example, Dishaw and Strong (1999:9) integrated the TTF model and TAM to explore the influential factors of technology utilisation and the links between the two models to assess their explanatory power. In their study, Dishaw and Strong (1999:17) proposed a new construct, i.e. tool experience. As depicted in Figure 3.4, they posit that all the antecedent constructs should have a direct effect on dependent constructs. Thus, they found strong support for all the above-proposed links except for the link between task-technology fit and perceived usefulness.

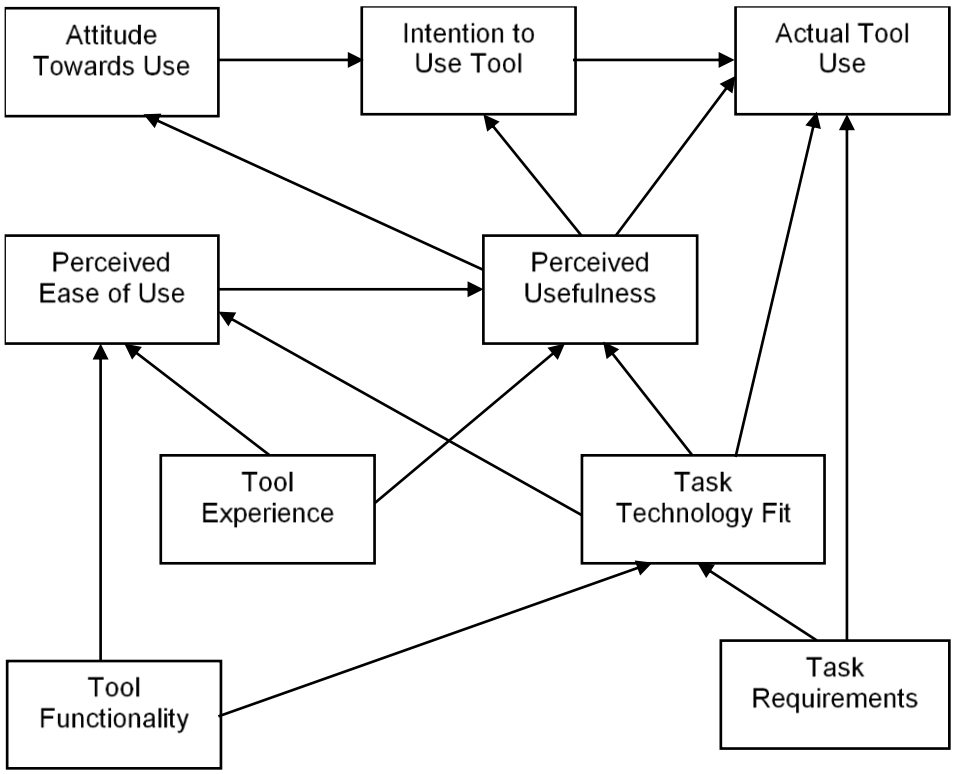

Figure 3.4: Integrated model of TAM and TTF

(Dishaw & Strong, 1999:16)

Based on Dishaw and Strong's (1999) integrated model of TAM and TTF, follow up studies have used the integrated model to investigate users' intentions to use mobile technology in organisations (Junglas, 2003) and m-commerce (Yen et al., 2010; Shih & Chen, 2013).

Junglas (2003) integrated the TTF model and TAM and extended it to Technology Impact Model (TIM) (see Figure 3.5). TIM was extended to explain how the nature of task and technology affect both worker and organisational performance (Junglas, 2003:52). The extended model confirms that although the fit construct of the TTF model would affect the antecedents of intention to use the construct of the TAM model, the fit construct would directly impact performance at both individual and organisational levels.

Many previous studies revealed somewhat similar paths, such as Dishaw and Strong's (1999:17) integrated model of TTF and TAM. Yen et al. (2010:906) in their integrated model study to assess the determinants of users' intention to use mobile technology, did not find a significant effect of the task-technology fit construct on perceived usefulness. Furthermore, since Yen et al. (2010:914) considered a wide range of wireless technologies and task requirements to investigate users' intention to use, they suggested that further studies should consider more specific dimensions of mobile technology and task characteristics to determine the respondents' assent to their fit. Thus, this study intends to determine the task

characteristics and the features and characteristics of m-commerce systems for brick-and-mortar retailers. Furthermore, Shih and Chen (2013:1009) used the integrated model of TTF and TAM to examine the m-commerce adoption in the real estate industry. Overall, they found a greater explanatory power of intention to use m-commerce with the integrated model rather than each of the models individually. They suggest that further investigation should be carried out and consider uncovered factors and industries (Shih & Chen, 2013:1019), which the present study seeks to achieve.

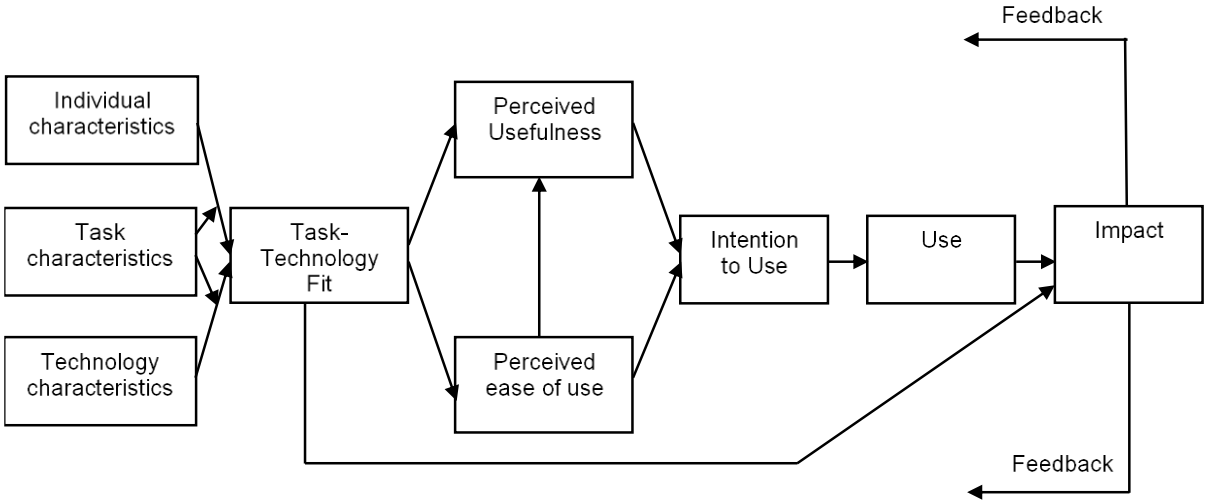

Figure 3.5: Integrated TTF & TAM - Technology Impact Model

(Junglas, 2003:52)

Liang et al. (2007) used the TTF model and sought to determine the motivation behind a business decision to adopt mobile technology. By doing so, they extended the TTF model to a Fit-Viability Model (FVM) (see Figure 3.6) which measures a business' internal environmental conditions in which mobile technology can be adopted (Liang & Wei, 2004:7; Liang et al., 2007:1154). They proposed the following determinants of mobile technology adoption: task, technology characteristics, IT infrastructure, capital (or economic), and HR (or organisation), fit, viability, and performance. Hence, this extended model was proposed to assist management with guidelines on the business' internal environmental conditions to adopt mobile technology effectively. Furthermore, other researchers have integrated the TTF model with different theoretical perspectives, such as the Unified Theory of Acceptance and Use of Technology (UTAUT), which was done by Prasarry et al. (2015) to assess m-commerce adoption by firms.

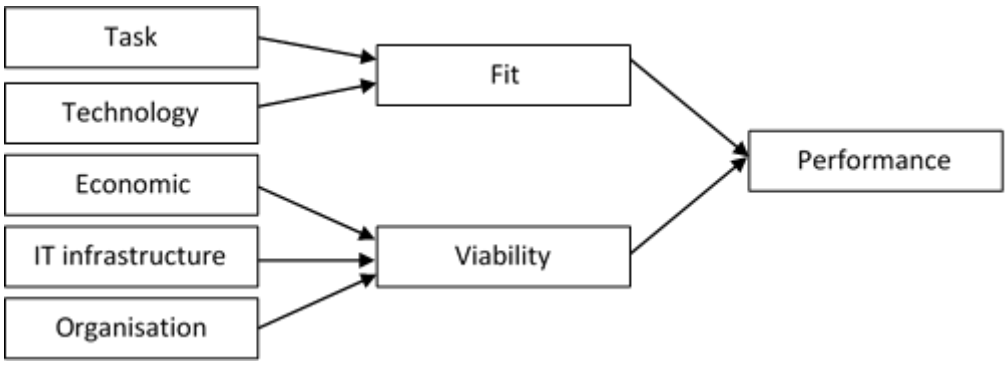

Figure 3.6: The fit-viability model

(Liang et al., 2007:1158)

3.3.2 Integration of TOE and other models/theories

Zhu et al., (2006a:601) integrated the TOE framework and the DOI theory to investigate the determinants of e-business usage and how the usage impacts firm performance. The results of their study indicated a combined explanatory power of both the framework and the theory. Their study suggests that the economic and regulatory factors should be given careful attention in that they may cause uneven innovation diffusion among countries (Zhu et al., 2006a:601).

Another study that integrated the TOE framework with the DOI theory was that of Picoto et al. (2014) who examined the usage and value of mobile business and the determinant factors. Picoto et al. (2014:582) observed that the mobile business benefits highly depend on the nature of the business and the type of work its workers perform. As a result, they suggest further studies to investigate "the different patterns of usage of mobile business within each industry" (Picoto et al., 2014:582). Therefore, this study considers the knowledge gaps in the work of Picoto et al. (2014) and considers investigating the different contexts of interrelated components that create the right environment for the use of m-commerce by brick-and-mortar retailers.

This study further draws on the work of Picoto et al. (2014:582) who suggested that:

> Employees vs the organizations could be studied across levels of analysis. This would allow matching the understanding from the employees' point of view and the organization's point of view regarding the implications of m-business usage at both levels of analysis.

Thus, combined potential participants such as m-commerce business owners/managers and employees were applicable to this study.

Furthermore, Gangwar et al. (2015:107) integrated the TOE framework and TAM to investigate determinants of the cloud computing use from an organisation perspective in India and this

integration sought to access the predicting power of the integrated model. The authors suggest that for further study, other contexts such as the inclusion of non-adopters and a case-based approach should be explored (Gangwar et al., 2015:107).

3.4 Limitations of TTF and TOE research

Despite the highlighted importance of the TTF model and the TOE theoretical model, there are apparent limitations. The TTF model is not tailored as a business technological evaluation model. In contrast, it is a diagnostic tool to evaluate technological fitness for an individual (worker) task, utilisation and performance (Goodhue & Thompson, 1995; Zheng, 2007; Gebauer et al., 2010; Gatara, 2016). However, the TOE framework explains the technology adoption in the context of a business but is a non-context-specific framework and rather a generic, higher-level framework (Gangwar et al., 2015:111; Wang et al., 2016:165), which should be strengthened by integrating it with more purpose-built models to overcome its limitations (Gangwar et al., 2015:111).

Most of the research found in the literature deployed either the TTF model or the TOE framework individually and integrated either the TTF model with other models/theories or the TOE framework with other models/theories but not both the TTF model and the TOE framework. Individually analyzed, these models have demonstrated some limitations in predicting the use of the technology in question, in a business context (Dishaw & Strong, 1999:9; Shih & Chen, 2013:1009; Lu et al., 2015:308; Prabowo et al., 2018:310). The supporting structure of TTF may cover evaluation of the technology characteristics and business-related task characteristics and the synergic power between them but takes the focus away from other internal and external business environmental aspects. Previous researchers also identified these shortcomings (Shih & Chen, 2013:1009; Prabowo et al., 2018:310). Moreover, it has been reported that the m-commerce technological characteristics cannot be explained by the technology characteristics construct from the TTF perspective alone but also by other factors pertaining to the internal business environment, which the TOE theoretical model may yield (Prabowo et al., 2018:310). The TOE framework is regarded as a potential structure with a considerable degree of explanation of technology adoption from a business environment perspective (Eze et al., 2019:22). However, one must recognise that the composition of TTF would complement the TOE framework's robustness because the use of m-commerce technology is completely reliant on tasks. Therefore, the lack of business-related tasks to be performed on the mobile channel means no fit between the technology and business. In essence, the present study presumes that the TTF model constructs can harmonise with the TOE framework. The study propounds that task characteristics that are omitted from the TOE constructs or dimensions are highly relevant to the use of m-commerce by brick-and-mortar retailers.

This study considers integrating the TTF model and the TOE framework to deal with the complexities surrounding the adoption and use of m-commerce by brick-and-mortar retailers. There are a number of reasons to incorporate different frameworks or variables to investigate the adoption or use of new technological innovations by businesses. For the most part, researchers support that potential models/frameworks are too fragmented for contextualising a business sector/industry (Wang et al., 2016:165) or that their proposed constructs and dimensions/measurements for explaining and evaluating the external variables (Gangwar et al., 2015:111) and the technological innovation variables are not clearly defined (Shih & Chen, 2013:1009). While some existing m-commerce adoption models and frameworks advanced by prior research tend to cover limited determinant factors of adoption at a business level, Chau and Deng (2018b:438) assert that integrations across existing theories or adding constructs from one theory into another would provide a more comprehensive explanation of how to adopt technological innovation in organisations. Similarly, it has been observed that the improvement of explanatory and predicting power is the inspiring motivation behind models and frameworks integration decisions (Chau & Deng, 2018b:438). The latter is corroborated by Dishaw and Strong (1999:9), Shih and Chen (2013:1009) and Gangwar et al. (2015:107).

Despite the original TTF model being specifically tailored to evaluate the technological fitness for workers' tasks and utilisation, the current study identified that its constructs can be harmonised with other m-commerce systems' utilisation-driven factors to explore the technological fitness for the retailers' usage. In exploring prior research on TTF, three constructs that are relevant to this study were identified as criteria used chiefly for m-commerce usage's theories formulation or deployment, which are task characteristics, functionalities of m-commerce systems (for technology characteristics) and task-technology fit.

This study identified that factors such as the readiness for mobile distribution systems, the mobile payment gateway and technological cooperative institutions did not receive enough attention in previous frameworks/models. Therefore, the study assumes that the integration of the TTF model with the TOE framework and the above relevant factors serve as lenses to understand the adoption and use of m-commerce by brick-and-mortar retailers. Furthermore, they may serve as the theoretical support to explore the underlying factors that influence the adoption of the mobile channel because of the combined relationship of 15 relevant constructs: top management support, technology competence, task characteristics, readiness for mobile distribution systems (for the retailer/organisational context), functionalities of m-commerce systems, data security, task technology fit, relative advantage (for technological context), policy and regulations, operator network, technological cooperative institutions, critical mass, mobile payment gateway competitive pressure (for the environmental context) and m-commerce use.

3.5 Chapter summary

This chapter reviewed the TOE framework and the TTF model. In addition, an extensive literature review on the basic constructs of the TTF and TOE was conducted. The chapter discussed the different integrations of TTF and other models/theories and TOE and other models/theories propounded by earlier research. Lastly, the chapter identified some of the limitations of earlier research on TTF and TOE.

The next chapter, Chapter 4, presents the theoretical conceptual framework. It describes the proposed framework constructs, identifies the relationship among them and develops the propositions that present a systematic framework for exploring and explaining the phenomenon under investigation.

CHAPTER 4
CONCEPTUAL FRAMEWORK

4.1 Introduction

Chapter 3 discussed the competing models/theories of the use of technology that were selected to underpin the theoretical foundation of this study. This chapter proposes a conceptual framework, based on two theoretical perspectives reviewed in Chapter 3, the TTF model and the TOE framework. Furthermore, the chapter discusses the constructs of the proposed theoretical framework and proposes the dimensions of these constructs which may explain the factors that are requisite for the adoption and use of m-commerce by brick-and-mortar retailers. Moreover, it describes the relationship among constructs and develops propositions.

4.2 The framework theoretical perspective

The main objective of this study is to investigate the underlying factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers. To deal with the complexities surrounding the underlying factors, this study uses the TTF model and the TOE framework. Analysing the theoretical perspective of the proposed framework, the study assumes that the integration of the TTF model with the TOE model serves as lenses through which to understand the adoption and use of m-commerce by brick-and-mortar retailers in the Angolan context.

The proposed theoretical framework has the following principles:

- The main theoretical foundation is the TOE framework.
- Although the TOE framework has been criticised in the literature for having the characteristic of a generic or non-context-specific framework, the proposed framework integrates it with some elements of the TTF model as well as with some relevant factors of the use of m-commerce by businesses identified in Chapter 2, to overcome these limitations.
- The TTF model and TOE framework serve as the theoretical support to explain and explore the factors that are requisite for the use of m-commerce by brick-and-mortar retailers, because of the predicting power of the combined relationship of their constructs, i.e. the task characteristics, functionalities of m-commerce systems, and the task-technology fit (from the TTF model), the organisational context, the technological context, the environmental context, and the m-commerce use (from TOE theoretical model).

- Other factors of the use of m-commerce: Framework development and testing in electronic commerce in marketing still pose major challenges since it must borrow many theoretical foundations from other fields, reconcile and discount all the differences between the philosophical and practical approaches to provide a legal and acceptable framework foundation for the subject under investigation.

Prior research on TOE has paid little attention to some of the factors discussed in the literature that are deemed to be relevant to m-commerce adoption and use. The literature reviewed in Chapter 2 reveals that for mobile electronic commerce to survive and develop, special conditions and a favourable institutional environment should exist. This research questions the empirical evidence of some factors that may significantly affect the adoption and use of mobile electronic commerce by retailers in developing countries. Hence, this study seeks also to further examine and empirically test the following factors to provide solutions and favourable conditions for the use of mobile retail: operator network, technological cooperative institutions, mobile payment gateway (environmental context) and readiness for mobile distribution systems (organisational context).

This study assumes that the integrated constructs of the TTF and TOE and the extended dimensions may act as lenses to better explore the magnitude of this research problem.

4.3 Conceptual framework

Given the discussions on the theoretical models (in Chapter 3) underpinning this study, a conceptual framework to explore and explain the factors that are requisite for the adoption and use of m-commerce by brick-and-mortar retailers is proposed. Through integrating the TTF model with the TOE framework (Tornatzky & Fleischer, 1990; Goodhue & Thompson, 1995), this study proposes the contexts of the use of m-commerce in the retail business of the environmental context, organisational context, technological context, and m-commerce use (Figure 4.1 below).

Analysing the theoretical perspective of the proposed conceptual framework, the study assumes that the availability of the proposed constructs of the environmental context is requisite for the adoption and use of m-commerce in brick-and-mortar retailers. The study also proposes that a strong presence of the proposed constructs should have a positive influence on m-commerce use (Picoto et al., 2014:582; Gangwar et al., 2015:130; Lu et al., 2015:294; Wang et al., 2016:171; Chau & Deng, 2018:8; Prabowo et al., 2018:310; Kamble et al., 2019:165). Regarding the technological context, the study posits that all its proposed constructs, except for the functionalities of m-commerce systems, have a positive influence on m-commerce use (Goodhue & Thompson, 1995; Gebauer & Shaw, 2004; Yen et al., 2010:912;

Lu et al., 2015:294; Wang et al., 2016:165; Chandra & Kumar, 2018:247). Furthermore, the study holds that the functionalities of m-commerce systems positively influence the task-technology fit (Dishaw & Strong, 1999:13; Yen et al., 2010:913; Prabowo et al., 2018:307). This study also proposes that all constructs of the organisational context, apart from the task characteristics, positively affect m-commerce use (EY, 2015:4; Lu et al., 2015:294; Wang et al., 2016:171; Caro et al., 2020:52) and that the business-related task characteristics positively influence the task-technology fit (Goodhue & Thompson, 1995; Gebauer & Shaw, 2004; Lee et al., 2007; Yen et al., 2010:913).

The current study observed that the lack of meaningful evidence of the use of m-commerce in brick-and-mortar retailer research consists of the consistent test of existing theories/models with limited stepwise exploratory study to explore and understand earlier models for the formulation of a new theory that represents the contextual retail sector. Therefore, this research closes this gap and proposes that the linkage between m-commerce and brick-and-mortar retailers is assumed to be achieved through the alignment between the constructs of the environmental context, organisational context, technological context, and m-commerce use. Thus, these constructs and associated factors shall exist in the business environment for a retailer to adopt and use m-commerce.

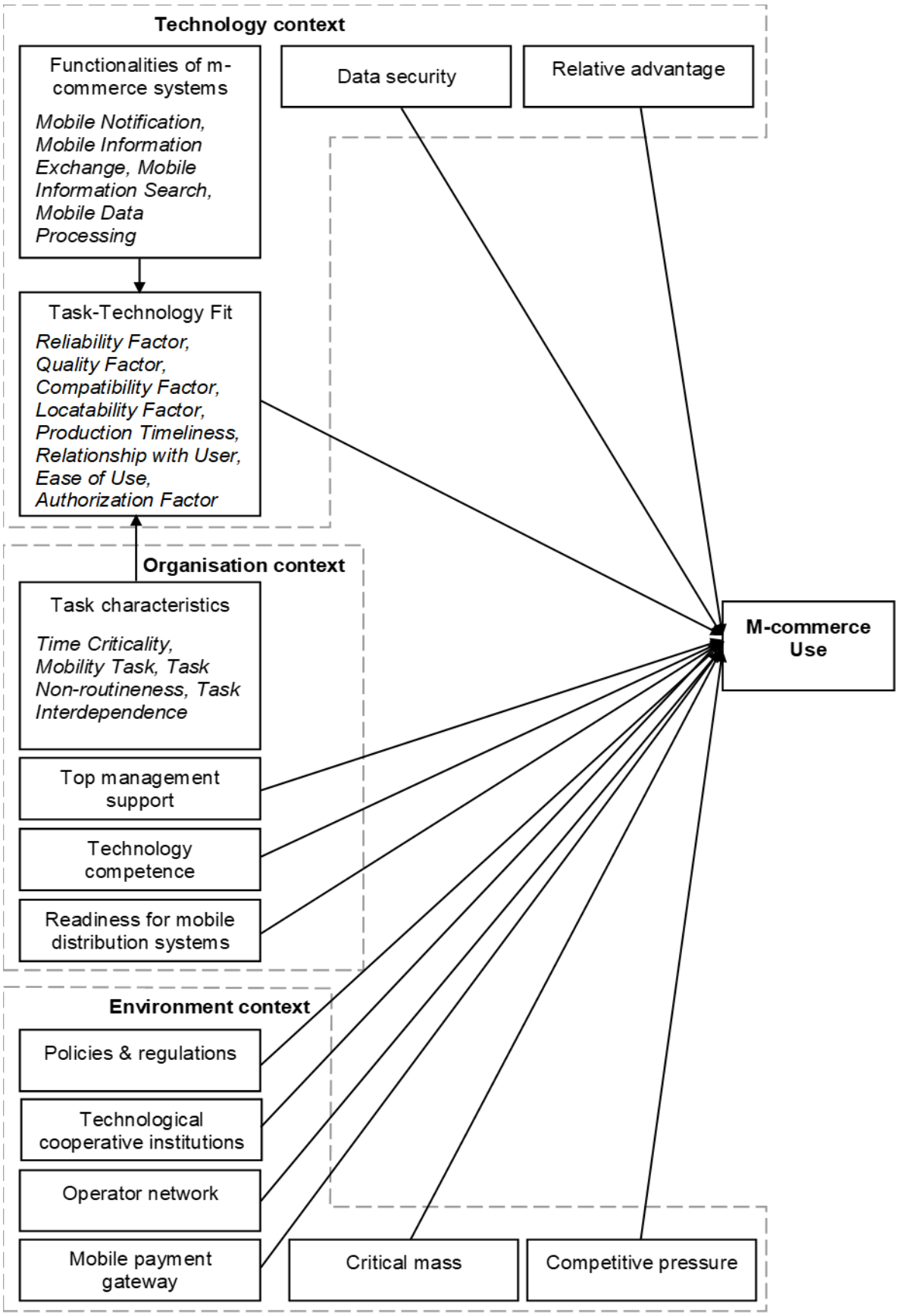

Figure 4.1: Conceptual framework

4.3.1 The technological context

The technological context reflects the necessary features and characteristics of m-commerce systems that a business will need. It is assumed that the m-commerce systems should have something to contribute to the business and be able to deal with issues related to database management, security, mobile protocols and secure transactions. The technological context is attached to four factors that were introduced in Chapter 3—the functionalities of m-commerce systems (Zheng, 2007; Gebauer et al., 2010; Yuan et al., 2010; Shih & Chen, 2013), the task-technology fit as correspondence (Goodhue & Thompson, 1995; Lee et al., 2007; Vongjaturapat, 2018), relative advantage (Jain et al., 2011:162; Picoto et al., 2014:580-581; Gangwar et al., 2015:107) and data security (Lippert & Govindarajulu, 2006:147; Lu et al., 2015:308; Chau & Deng, 2018a:8).

4.3.1.1 Functionalities of mobile commerce systems

Functionalities of m-commerce systems are concerned with the functions that the technology can support and provide for the execution of particular task characteristics. The functionalities of m-commerce systems were analyzed along the following dimensions as discussed in Chapter 3: notification (Zheng, 2007:86; Gebauer et al., 2010; Yuan et al., 2010), mobile data processing (Zheng, 2007:86; Gebauer et al., 2010; Lembach & Lane, 2011), mobile information search (Zheng, 2007:86; Yuan et al., 2010; Lembach & Lane, 2011) and mobile information exchange.

Mobile notification

The m-commerce systems include various functions, one of which is mobile notification (Gebauer et al., 2010:263; Yuan et al., 2010:128). In general, m-commerce business workers rely on m-commerce systems as support tools for notifying stakeholders, i.e. sending a brief message about an event. Notification is about the need to reach other stakeholders without the expectation of receiving a direct response (Gebauer et al., 2010:263). For example, the m-commerce systems may allow workers to notify a client about an order they placed or to ensure delivery. It may also alert business stakeholders of an emergency or when time is critical. As shown in Figure 4.2, m-commerce systems must be useful for sending notifications to stakeholders such as still images, e-mails, voicemail messages, voice, video notification messages, or text messages (Gebauer et al., 2010:263).

Mobile information exchange

The mobile information exchange has not been given enough attention in previous studies. Mobile information exchange involves reaching and being reached by others immediately via mobile technology. Earlier research reveals that certain business tasks (e.g. task interdependence and mobility task for home delivery) rely more on information exchange functions to clarify things, such as assignments, orders, addresses, and progress (Lee et al.,

2004:149; Zheng, 2007:94; Gebauer et al., 2010:264). Brick-and-mortar business workers may rely on m-commerce systems as supporting tools for exchanging information (in a reciprocated manner) among themselves and with other stakeholders such as customers. Therefore, mobile information exchange was analyzed due to increasing and reliable mobile communication sub-functions related to it. Retailers may need mobile information exchange functions in support of voice and video calls, text messages exchange, e-mail enquiries and online chatting (see Figure 4.2) (Gebauer et al., 2010:263).

Mobile information search

Mobile information search functions are used to search for products, customers, suppliers or other business partners' related information on the business' mobile information systems (intranet wireless connection, database), or for up-to-date information online when needed (Yuan et al., 2010:127). The brick-and-mortar retailers need m-commerce systems that support the search for information/data.

Mobile data processing

Mobile data processing functions have been particularly used to process task-related transactions such as inventory management and shipment or delivery, and to manage schedules and provide reports on transactions (Gebauer et al., 2010; Lembach & Lane, 2011). Data processing functions are also used for "data editing, data manipulation, data storage and document production" (Stair et al., 2008). Therefore, the mobile data processing functionalities of m-commerce systems must deal with well-structured customer actions and business tasks that rely on inputs and outputs (Yuan et al., 2010:127). The system should provide a mobile point of sale interface to customers and enable them to enter and process data via their mobile technology. The processing functions should effectively enable a business to capture transaction data from customer mobile devices and interpret and process the data.

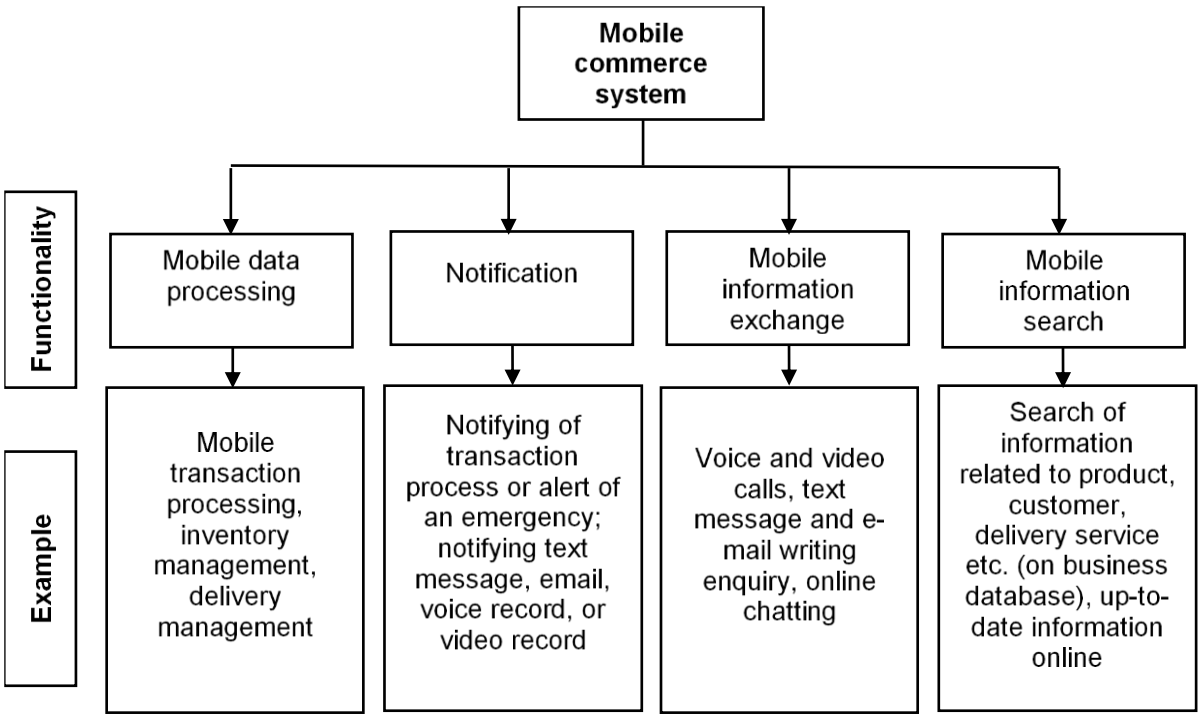

Figure 4.2: Mobile commerce function sets derived from literature reviewed

4.3.1.2 Data security

Data security has been analyzed in some earlier studies (Lippert & Govindarajulu, 2006:147; Lu et al., 2015:308; Chau & Deng, 2018a:8). Security is described as "the perception, or judgment, and fear of safeguarding mechanisms for the movement and storage of information through electronic databases and transmission media" (Lippert & Govindarajulu, 2006:147). Thus, data security reflects the extent to which the stored data/information and the transactions across the Internet are protected against crimes and threats (Lu et al., 2015:294). Data security characteristics of m-commerce systems were considered in this study due to data security issues that have been observed as hurdles to the adoption of m-commerce by SMEs. Thus, this study assumes that an m-commerce system with tighter security measures would influence brick-and-mortar retailers to trust it, adopt it and use the system (Eze et al., 2019:11). The tighter the security measures the higher is the trust in and the less the risk of the use (Gangwar et al., 2015:122). M-commerce systems should ensure data security measures are established by having personal data management standards, protection against crimes and data access control.

4.3.1.3 Relative advantage

Before the adoption or the actual use of technology, businesses tend to evaluate the involved costs and benefits as determinants (Picoto et al., 2014:580; Wang et al., 2016:165). Relative advantage reflects the extent to which a technology is perceived to offer a business intrinsic

value over the alternative or existing technology (Jain et al., 2011:162). Thus, this study presumes that the relative advantage characteristics of m-commerce systems influence their adoption and use by brick-and-mortar retailers. The advantages include better profitability, betterment of business processes (Chandra & Kumar, 2018:247), increased market share, speeding up a business process, helping to lower costs (Wang et al., 2016:170), helping to increase sales, reducing costs, reducing paperwork and speeding up data capture/analysis (Picoto et al., 2014:580).

4.3.1.4 The task-technology fit

Due to the nature of this study, the fit as proposed by Goodhue and Thompson (1995), i.e. the user evaluation of task-technology fit, was used. In the task-technology fit construct the m-commerce system is seen as an enabler, in which the consequence of the correspondence between task characteristics and functionalities of m-commerce systems has implications for the use of m-commerce by retailers. In this regard, the fit between the characteristics of the retailer's m-commerce tasks and the functionalities of m-commerce systems constitutes the primary determinant of the use of m-commerce systems by business. From a business use perspective, dimensions of task-technology fit has been analyzed as data quality, ease of use/training, locatability of data, production timeliness, Authorization to access data, system reliability, data compatibility and relationship with user (Goodhue & Thompson, 1995:229; Lee et al., 2007:106).

4.3.2 The organisational context

The organisational context reflects the internal business resources and capabilities required to enable the business to use m-commerce effectively and efficiently. Four factors identified in Chapter 2 and Chapter 3 were used as constructs of the organisational context, which are task characteristics (Goodhue & Thompson, 1995; Yuan et al., 2010; Vongjaturapat, 2018), top management support (Gangwar et al., 2015; Lu et al., 2015), technology competence (Zhu & Kraemer, 2005; Picoto et al., 2014; Wang et al., 2016) and readiness for mobile distribution systems (EY, 2015; Hübner et al., 2016; Caro et al., 2020). These factors are discussed below.

4.3.2.1 Task characteristics

Task characteristics refer to a typical quality of task that drives a worker to rely on technological innovation to carry out the task. Task characteristics were analyzed along with the following dimensions (discussed in Chapter 3): Task non-routineness (Goodhue & Thompson, 1995; Gebauer et al., 2010), mobility task (Yuan et al., 2010; Gatara & Cohen, 2014), task interdependence and time criticality (Gebauer et al., 2010; Yuan et al., 2010; Gatara & Cohen, 2014).

Task non-routineness

Task non-routineness reflects the extent to which a task is difficult, multifaceted, predictable and reflects non-repetitive procedures in its execution (Gebauer et al., 2010:261). Task non-routineness requires relatively more data processing than a simple routine task (Perrow, 1967:194; Gebauer et al., 2010:261). This dimension was used to assess tasks that are complex, analytic, and full of uncertainty and exceptions (Perrow, 1967:194; Daft & Macintosh, 1981:207; Gebauer et al., 2010:261). It evaluates a task that has unique problems and those that may arise from mobile transaction processing.

Mobility task

Mobile technology has introduced a new support platform for mobile work. It has eliminated the confines of certain activities that were only localised and allows workers to perform a large number of business-related tasks off-site. Brick-and-mortar retailers would use the functionalities of m-commerce systems to perform mobility tasks and tasks that are not constrained to their habitual geographical boundary (Basole, 2004; Gebauer et al., 2010:263), such as delivery services. Thus, the mobility task was used to evaluate the extent to which the m-commerce systems are used by workers to perform tasks away from their business premises (Yuan et al., 2010:129; Gatara & Cohen, 2014:326). A worker's task is considered high task mobility if the worker changes location frequently and routinely uses the mobile tool to perform it. In contrast, when changes of position do not occur often while performing a task, it is considered low task mobility (Gebauer et al., 2010:264).

Task interdependence

Task interdependence focuses on the social characteristics of work, in which a task requires the worker to interact with co-workers. it is evaluated by the degree to which it is interdependent, i.e. either high or low (Gebauer et al., 2010:265). Highly interdependent tasks require workers to interact constantly to achieve goals. In this type of task, interactions between workers occur in an order, where the outputs of one employee inevitably become the input of another employee (Zheng, 2007:62). For example, a grocery service delivery can be considered a high interdependent task, which requires matching the order processing unit with the stock keeper and service delivery units. In general, the execution of task interdependence would require frequent co-ordination and being regulated into procedures. Team workflow exists when employees work collectively in close collaboration on the execution of highly interdependent tasks. Tasks with low interdependence tend to be performed by a single worker (Gebauer et al., 2010:265). Measurement of task interdependence needs other functions to be involved in the task performer (Goodhue & Thompson, 1995:236) and frequent co-ordination with other co-workers or managers (Zheng, 2007).

Time criticality

Time criticality assesses the attributes of a task that requires the task to be performed with urgency or the length of time required for the task to be performed (Gebauer et al., 2010:261). Time criticality is related to timely notifications or alerts the nature of tasks. In the retail m-commerce systems, some time criticality tasks should be fully automated and executed by the system to provide customers or other stakeholders with a prompt response to their requests or mobile transaction processing. Time criticality could be a promise dimension of retailers' m-commerce tasks characteristics that need to be executed urgently or involve deadlines. Workers, when faced with obstacles in a complex environment, tend to take responsibility to respond to any obstacle and accomplish the task. Measures such as urgency, handling an emergency, provision of timely services, and speedy accessibility to information have been proposed in previous mobile technology studies to evaluate the time criticality task (Gebauer et al., 2010:262; Gatara & Cohen, 2014:328). Previous studies have observed that time criticality can positively affect task-technology fit and therefore, impact technology use (Gatara & Cohen, 2014:333).

4.3.2.2 Top management support

The proposed framework presumes top management support (i.e. senior management's favourable response or attitude towards the integration) of m-commerce as a predictor of use (Lu et al., 2015:293; Wang et al., 2016:165). Businesses are more likely to adopt m-commerce when top managers have an interest in creating a vision that incorporates m-commerce adoption (Wang et al., 2016:165). Top management support shows commitment to the integration. Thus, if they support, they will also take the responsibility for the risks involved in and gathering the resources needed for the integration (Lu et al., 2015:294). Factors such as top management's willingness to invest funds, take risks and gain competitive advantage have been analyzed to measure top management support for m-commerce use (Wang et al., 2016:171; Prabowo et al., 2018:310).

4.3.2.3 Technology competence

Technology competence is a result of internal organisational resources, such as the technology infrastructure, personnel and their associated characteristics that will facilitate the adoption and use of the innovation. The organisational resources associated with m-commerce adoption and use would be based on existing information systems infrastructure, employees with m-commerce-related skill, facilities for providing m-commerce-related training to employees (Zhu & Kraemer, 2005:65; Picoto et al., 2014:573; Wang et al., 2016:171; Prabowo et al., 2018:310). Technology competence is analyzed as an integrative construct of the organisational context. Firms that reach a high level of technological competence, i.e. are endowed with IT professionals and IS, are believed to have the foundation for the mobile

channel (Martín et al., 2012:959; Wang et al., 2016:166). In that case, they might also have an increased interest in the adoption and use of new technology (Martín et al., 2012:959; Wang et al., 2016:166).

4.3.2.4 Readiness for mobile distribution systems

Brick-and-mortar businesses' readiness for mobile distribution systems has also not received enough attention in previous models/frameworks. The operations of the m-commerce distribution systems are usually perceived to be complex since retailers must transform their supply chains to dispatch various parcels to multiple destination points simultaneously (EY, 2015:2; Hübner et al., 2016:280; Song et al., 2019:527). Since the brick-and-mortar retailers must either develop grocery service delivery systems of their own (a new department) or outsource them (Finotto et al., 2020:1; Goddard, 2020:4), this study presumes that a conventional business' readiness to engage in m-commerce distribution systems may be tenable for the adoption and use of m-commerce. In other words, the willingness or preparedness to engage in delivery services and return of goods is critical for the adoption and use of m-commerce. The typical characteristics of a business that is ready to engage in m-commerce distribution include a willingness to integrate the traditional supply chains with m-commerce distribution systems to expand the delivery modes, segment m-commerce distribution systems to meet different product demands, design products and packaging for the m-commerce distribution systems (EY, 2015:23), match up the order with delivery units, and increase the delivery speed and service levels (Hübner et al., 2016:290; Caro et al., 2020:52). Other characteristics include the development of either its own grocery service delivery system or outsourcing it (Finotto et al., 2020:1; Goddard, 2020:4) and the development of central retail distribution (EY, 2015; Hübner et al., 2016:290).

4.3.3 The environmental context

Six factors of the environmental context are integral to the adoption and use of m-commerce by brick-and-mortar retailers and include policies and regulations (Zhu & Kraemer, 2005; Lippert & Govindarajulu, 2006; Lu et al., 2015), critical mass, competitive pressure (Zhu et al., 2006a; Picoto et al., 2014; Lu et al., 2015; Wang et al., 2016:170; Eze et al., 2019), and operator network (Martín et al., 2012:956; Lu et al., 2015:308), technological cooperative institutions and mobile payment gateway.

4.3.3.1 Policies and regulations

Policies and regulations reflect the demand for state and international laws that govern the operations of digital business (e.g. m-commerce), and the use and storage of data/information in each business sector or industry. Government policies and regulatory support are critical for the adoption and use of m-commerce (Lu et al., 2015:294; Chau & Deng, 2018a:8). The

adoption and use of m-commerce would force a business to establish new relationships with its partners. Therefore, state laws should deal with businesses' digital operation issues such as legal obligations, partners' data, online transactions and the use of devices such as credit cards and debit cards (Zhu & Kraemer, 2005:68).

4.3.3.2 Critical mass

Critical mass is considered when the adoption of technology is at a tipping point and the level when the adoption becomes self-sustaining (Wang et al., 2016:166). Critical mass is associated with the "level of mobile technology usage and support in the market" (Picoto et al., 2014:574). It considers the number of individuals who have adopted mobile technology, the popularity of online shopping, and the groups of potential online customers that are smartphone/tablet and Internet users (Kapurubandara & Lawson, 2006). Brick-and-mortar retailers would be under customers' compulsion to adopt and use m-commerce when customers who have adopted the mobile technology devices have power over the business and pressurise the firm to use it. Critical mass was measured through people's perception of the number of other individuals using smartphones/tablets (Wang et al., 2016:171) or customers' demands (Picoto et al., 2014:587).

4.3.3.3 Competitive pressure

Competitive pressure refers to peer group pressure and its tendency to push members to use new technology and seek competitive advantage through innovation (Lu et al., 2015:294). It reflects the extent to which an organisation is affected by industry members' pressure to adopt and use the technology. Brick-and-mortar retailers operate in a very competitive sector with varied retail business models and formats. Businesses tend to respond to competitive pressure associated with the modern structure of the industry and the integration of new technologies. Due to competition, brick-and-mortar retailers may identify the need or be forced to leap at the opportunity to adopt m-commerce to stay ahead or to remain in the market (Chandra & Kumar, 2018:244). Retailers may experience competitive pressure from competitive disadvantage, degree of technology influence, or degree of competition in local and national markets (Zhu et al., 2006b; Picoto et al., 2014:587).

4.3.3.4 Operator network

The operator network is concerned with the characteristics of mobile operators' network service at the national level. The mobile operators' network services should be of good quality, able to overcome the long distances by providing timely access to mobile services for subscribers in general independently of their local, national and international positions (Maritz, 2014; Poulson, 2014; GSMA, 2015). It should be able to effectively enable interconnectivity across different networks (Wamuyu & Maharaj, 2011:55; GSMA, 2015). Therefore, the

provision of adequate availability of mobile bandwidth and efficient support service by mobile operator networks may contribute to the use of m-commerce (Picoto et al., 2014:582; Kamble et al., 2019:165).

4.3.3.5 Technological cooperative institutions

Another factor that did not receive enough attention in previous models/frameworks is technological cooperative institutions. The technological cooperative institutions reflect the existence of government and private organisations with a more progressive programme to enforce m-commerce policies and regulations, and data use privacy and security (Gangwar et al., 2015:114; The Earth Institute and Ericsson, 2016:10; Kamble et al., 2019:165) and institutions that subsidise the information systems or m-commerce infrastructure and training of personnel of the business and promote science, technology and innovation to the business (The Earth Institute and Ericsson, 2016:10). The availability of technological cooperative institutions was deemed important in that most retailers in developing countries fall mainly into the two categories—SMEs, they always have a limited number of workers and limited revenue and often lack financial resources, as well as basic ICT infrastructure for the use of new technology (Siwundla, 2013:v; EY, 2015:7; Prasanna et al., 2019:1). Therefore, the present study presumes that the availability of technological cooperative institutions in the market is a requisite factor for the use of m-commerce by retailers. These institutions may provide support in the process of m-commerce technology adoption and use in brick-and-mortar retail stores for their full participation in the digital ecosystem (Singh et al., 2019).

4.3.3.6 Mobile payment gateway

The mobile payment gateway is a factor that was also not given enough attention in previous studies. A customer thinks about consuming something any time of the day and if he/she has money in his bank account, he may grab the cell phone and starts shopping right away at the place of their convenience. Therefore, the non-existence of certain electronic payment methods may hinder customers in the use of mobile shopping. Although the adoption of a multiplicity of m-commerce payment methods may incur additional costs to the business, fully mobile payment methods are essential to accommodate customers' seamless experiences. The perceived m-commerce security and privacy risks discussed in the literature (Chapter 2) are to some extent related to weak online financial transaction security measures (Lippert & Govindarajulu, 2006:147; Gangwar et al., 2015:122; Lu et al., 2015:294). Thus, the payment systems and security measures provided by some mobile payment gateways in the contemporary market deserve full attention. Therefore, this study proposes the existence of a mobile payment gateway for effective and efficient m-commerce payment systems.

A mobile payment gateway refers to a third-party organisation that manages the payment mobile electronic systems. It strives to make the online financial transaction as accurate as

possible and reports to all the parties involved, including the merchant, online client, merchant's bank and online client's bank (Masihuddin et al., 2017:10; Kalbande, 2019:421; Thangamuthu, 2020:86). The mobile payment gateway ought to oversee the security architecture, reliability and speed of seamless monetary transactions, which ensure the privacy and security of sensitive information (Bezovski, 2016:129; Masihuddin et al., 2017:10; Naeem et al., 2020:4).

4.3.4 Mobile commerce use

Research on TOE has indicated that the use of m-commerce systems should reflect the extent to which the mobile system is used to support the firm-related technological processes. It has been suggested that the use should be derived from the rate or number of certain tasks (e.g. customers' orders, sales, businesses' orders) conducted through using the mobile system (Zhu & Kraemer, 2005:82), the system's immediate support to workers and system support to sales activities (Picoto et al., 2014:587).

4.3.5 Links between constructs and proposition development

The following discussion explores the effects of antecedent constructs on dependent constructs and develops the propositions that present a systematic framework for the adoption and use of m-commerce by brick-and-mortar retailers. Theoretical propositions were formulated between the constructs.

4.3.5.1 Technological context and m-commerce use

The basic structure of the TTF has hypothesised a direct link between technology characteristics and task-technology fit constructs. Such a direct link has also been proposed in several other technology drivers' studies and significant support could be observed (Dishaw & Strong, 1999:13; Yen et al., 2010:913; Prabowo et al., 2018:307). Therefore, this study proposes that the functionalities of m-commerce systems should correspond to the requirements of m-commerce-related tasks and positively affect the TTF. For m-commerce systems to be used by retailers, their functionalities must first fit the tasks constructing the activities of retailers' m-commerce (Gebauer et al., 2010; Abbas et al., 2018; Vongjaturapat, 2018). The present study proposes the following:

Proposition 1 (P1): The perception of functionalities of m-commerce systems positively influences the task-technology fit.

The task-technology fit construct has been observed as an antecedent of utilisation, particularly in TTF research. It has been discussed and hypothesised that the task-technology fit construct should predict the business system's utilisation construct (Goodhue & Thompson, 1995; Gebauer & Shaw, 2004; Lee et al., 2007; Gatara & Cohen, 2014:324; Vongjaturapat,

2018:39). In their study, Dishaw and Strong (1999:17) hypothesised that the task-technology fit directly affects the use of technology and found strong empirically tested support for their presumption. Yen et al. (2010:912) observed that a good task-technology fit should be expected to positively influence use. Similarly, Vongjaturapat (2018:39) found a significant effect of task-technology fit on the adoption of m-commerce.

However, this study adopted the m-commerce use construct from the TOE theoretical perspective. Since few studies have attempted to integrate the TTF model and the TOE theory, there has been no support identified for the relationship between the task-technology fit construct of the TTF model and the use construct of the TOE theoretical framework although this study proposes a direct and positive effect of the task-technology fit construct on m-commerce use. The use construct in TOE research and TTF research has been proposed as a dependent variable (Goodhue & Thompson, 1995; Gebauer & Shaw, 2004; Zhu & Kraemer, 2005:67; Lee et al., 2007; Gatara & Cohen, 2014:324; Picoto et al., 2014:574), and for another, the task-technology fit construct evaluates technology as an enabler in which the consequence of the correspondence between task and technology may affect the business' decision to use or not use m-commerce. Therefore, for the antecedent task-technology fit construct and dependent m-commerce use construct, the following proposition (P2) is made:

Proposition 2 (P2): The perception of good task technology fit is requisite for the use of m-commerce in brick-and-mortar retailers.

Relative advantage has been proposed as an antecedent of adoption decisions. In a study of m-commerce adoption in hotels, Wang et al. (2016:165) hypothesised a positive relationship between relative advantage and m-commerce adoption, and significant support was found. The linkage between relative advantage and technology use, as well as the significant support of their relationship, has also been observed in studies such as m-business adoption (Picoto et al., 2014:580) and augmented reality technology adoption (Chandra & Kumar, 2018:247). Regarding the data security construct of the TOE framework, Lu et al.'s (2015:294) analysis of the attributes of the implementation of m-commerce by SMEs support that data security is a critical construct of the technological context. Data security has been hypothesised as critical for m-commerce adoption in Chau and Deng's (2018a:4) study. In their study, Chau and Deng (2018a:6) observed strong support for the composite reliability and convergent validity of the data security construct but they did not test the correlation coefficient for this presumption. According to Lu et al. (2015:294) and Eze et al. (2019:11), the perception of the m-commerce systems' data security measures may positively affect m-commerce use.

Proposition 3 (P3): The perception of the relative advantage of m-commerce is a requisite for the use of m-commerce in brick-and-mortar retailers.

Proposition 4 (P4): Data security is a requisite for the use of m-commerce.

4.3.5.2 Organisational context and mobile commerce use

Although task characteristics must befit technology functionalities, they should also have a direct effect on the task-technology fit construct.

In previous studies, the task construct has been proposed as an antecedent of the task-technology fit construct. Several researchers on TTF hypothesised that the task characteristics will affect task-technology fit, in which these hypotheses were empirically tested and positive support was found (Goodhue & Thompson, 1995; Gebauer & Shaw, 2004; Lee et al., 2007; Yen et al., 2010:913). Therefore, it is proposed that high task-technology fit would result from the retailer-related m-commerce task characteristics that befit the functionalities of m-commerce systems.

Proposition 5 (P5): The task characteristics positively affect the task-technology fit.

Management who support the adoption and use of technological innovation would conduct a cognitive comparison between the technology richness and the strategic business goals needed to be achieved from the use thereof (Sheng et al., 2005). Considering the organisational aspect, its top management support construct has been proposed as a critical criterion for m-commerce implementation (Lu et al., 2015). Top management support has been observed as a direct antecedent of m-commerce use (Lu et al., 2015; Wang et al., 2016:163). However, Wang et al. (2016:163) found no empirical support for the proposed link. In contrast, Chau and Deng (2018a:6) found an excellent effect of top management support on m-commerce use. Therefore, m-commerce use in this context is expected to be influenced by managers' support, which depends on their expectations of the operational benefits (Chen, 2017).

Proposition 6 (P6): Top management support is a requisite for the use of m-commerce.

Prior research on TOE suggests that technology competence should directly affect m-commerce use. Wang et al. (2016:170) predicted the linkage between technology competence and it was positively supported. Chau and Deng (2018a:6) found good support from the empirical test for the proposed links between employees' IT knowledge, organisational readiness, strategic orientation, and m-commerce use. Employees' IT knowledge has been proposed as a critical antecedent of m-commerce adoption (Lu et al., 2015:308). In addition to the above, the availability of financial resources is also reported to have a positive influence on m-commerce adoption (Chau & Deng, 2018b:438). This study presumes that brick-and-mortar retailers with technology resources are more likely to use m-commerce. In light of the above, technology competence has been positioned as follows:

Proposition 7 (P7): Business technology competence is a requisite for the use of m-commerce.

The readiness for mobile distribution systems has also been indicated as a requisite for the adoption and use of m-commerce by brick-and-mortar retailers (EY, 2015:4; Caro et al., 2020:52). The m-commerce distribution systems may affect m-commerce use in that the strategically ready retailer can configure its delivery system and take over responsibilities such as online stock, online delivery (e.g. home delivery, store pickup), return costs, return process and delivery speed (EY, 2015:16-17; Hübner et al., 2016:292). Brick-and-mortar retailers' readiness to develop m-commerce distribution system strategies would enable them to optimise their mobile supply chain systems, face other challenges and use m-commerce.

Proposition 8 (P8): Brick-and-mortar retailers' readiness for mobile distribution systems is a requisite for the use of m-commerce.

4.3.5.3 Environmental context and mobile commerce use

Prior research on TOE suggests that particular attention should be paid to the relationship between government policies/regulations and m-commerce use (Lu et al., 2015:294; Chau & Deng, 2018a:8; Kamble et al., 2019:165). Policies and regulations have been analyzed as an antecedent of m-commerce adoption decisions (Zhu et al., 2006b:1564; Chau & Deng, 2018a:8). A positive relationship between these constructs has been assessed in previous research (Zhu et al., 2006b:1564). Comparatively, it was found that government regulations would have an important effect on use decisions in developing countries (Zhu et al., 2006b:1571). In another study, Chau and Deng (2018a) hypothesised that policy and regulation support was critical to m-commerce adoption decisions and significant support was found (Chau & Deng, 2018a:6).

Previous research has observed that technological cooperative institutions hold substantial sway over technological innovation adoption decisions (Picoto et al., 2014:582; Gangwar et al., 2015:130; Chau & Deng, 2018a:8). The availability of cooperative institutions is expected to facilitate m-commerce-related training and financial support (Wang et al., 2016:171; Chau & Deng, 2018a:7; Prabowo et al., 2018:310). Therefore, for the link between policy and regulation, technological cooperative institutions, and m-commerce use, the following propositions are formulated:

Proposition 9 (P9): The availability of policies and regulations is a requisite for the use of m-commerce by brick-and-mortar retailers.

Proposition 10 (P10): The availability of technological cooperative institutions is a requisite for the use of m-commerce by brick-and-mortar retailers.

Regarding the mobile operator network infrastructure, Picoto et al. (2014:582) support that adequate availability of mobile bandwidth can influence m-business usage. Studies on Internet/Web adoption have proposed that network service providers should influence ICT adoption (Lippert & Govindarajulu, 2006:154; Taylor, 2015:285) but no empirical tests were performed. The critical mass construct, which represents customers' readiness to do business via m-commerce, has been analyzed as a direct influential factor in m-commerce use (Picoto et al., 2014:582; Wang et al., 2016:171). Thus, Wang et al. (2016:166) found that critical mass has a positive influence on the use of mobile hotel reservation systems. Prior studies suggest that the rate of customers who have adopted the innovation matters. Thus, businesses' adoption of this kind of technology is affected when there is customer demand (Picoto et al., 2014:587) or a general perception that the technology is being used by everyone (Kapurubandara & Lawson, 2006; Wang et al., 2016:166). Given the above support, the following propositions pertaining to mobile operator network infrastructure, critical mass, and m-commerce are formulated:

Proposition 11 (P11): The availability of an adequate mobile operator network is a requisite for the use of m-commerce by brick-and-mortar retailers.

Proposition 12 (P12): The availability of critical mass is a requisite for the use of m-commerce by brick-and-mortar retailers.

Mobile payment gateway is expected to influence the use of m-commerce mainly when it is a provider of wireless financial transaction systems, security and privacy (Gangwar et al., 2015:130; Masihuddin et al., 2017:10; Prabowo et al., 2018:309). Mobile payment gateway has been suggested as a requisite for mobile shopping use (Gangwar et al., 2015:130; Masihuddin et al., 2017:10; Prabowo et al., 2018:309). Interestingly, in these studies, the proposed link between these variables lacks empirical evidence. Thus, the validation of the relationship between mobile payment providers that integrate both telecommunications infrastructure and financial infrastructure to facilitate payment solutions and the use of m-commerce is recommended (Bezovski, 2016:132). The following proposition emerges from the above:

Proposition 13 (P13): The availability of mobile payment gateway is a requisite for the use of m-commerce by brick-and-mortar retailers.

Competitive pressure has been observed as an antecedent of m-commerce use (Picoto et al., 2014:587; Chau & Deng, 2018a:8). Although some researchers have hypothesised a positive relationship between competitive pressure and m-commerce use but did not find a significant effect on the relationship (Wang et al., 2016:266; Chandra & Kumar, 2018:244), other researchers have found strong support for the relationship between competitive pressure and

m-commerce use (Picoto et al., 2014:587). Therefore, this study is based on the presumption that due to strong competition in the retail sector, brick-and-mortar retailers are likely to identify the need or be forced to adopt and use m-commerce to be able to compete in the market (Chandra & Kumar 2018:244). In contrast, a weak competitive pressure would be associated with failure to use (Lu et al., 2015:294).

Proposition 14 (P14): The availability of competitive pressure is a requisite for the use of m-commerce in brick-and-mortar retailers.

4.4 Chapter summary

In this chapter, the proposed theoretical framework, which is based on the TTF and the TOE, was proposed. The chapter delineates the proposed framework's theoretical perspective. It defines the context of the use of m-commerce in business, the technology and organisational contexts, the environment and m-commerce use contexts and their constructs. Furthermore, this chapter discussed the relationship among the constructs and developed the propositions that present a systematic framework for exploring and explaining the adoption and use of m-commerce by brick-and-mortar retailers.

The next chapter, Chapter 5, discusses the research methodology, the approaches and strategies in which this study is grounded.

CHAPTER 5
RESEARCH STRATEGY AND METHODOLOGY

5.1 Introduction

The previous chapter, Chapter 4, proposed the constructs and relevant dimensions for the proposed theoretical framework that provides a logical explanation for one to be fully aware of and able to evaluate the factors that are requisite for the adoption and use of m-commerce by brick-and-mortar retailers. Given the conceptual framework in the previous chapter, the research approaches, strategies and methods that the present study is grounded in are discussed in this chapter.

The chapter discusses the present research's philosophical properties and overall methodological standpoints. Furthermore, it explains the research design, the coding and analytical procedures followed for the empirical evaluation of the conceptual framework.

5.2 The philosophical standpoint of the research

There are two widely accepted doctrines for social research, i.e. the epistemological and the ontological doctrines. Epistemology deals with the researcher's actual comprehension of the social phenomenon and their standpoint (Cohen et al., 2007:7; Greener, 2008:34; Yin, 2011:18). It is "the study of how we know things" (Bernard, 2006:3). Ontology deals with the factual knowledge existent within social constructions and what is known about the phenomenon (Cohen et al., 2007:7; Greener, 2008:34). It is concerned with the knowledge that is supposed to exist about the social reality.

However, in the design of the research, the researcher's conception of the ontological position of reality leads to epistemological assumptions. In turn, they affect the methodological approaches, the research instruments, and data collection and analysis (Cohen, 2007:5; Greener, 2008:35). As a whole, the researcher's assent to the philosophical stance arguably has a direct influence on the fabric of social research. Therefore, three widely accepted epistemological positions of the researcher on social research—the positivist paradigm, the interpretive paradigm, and the critical research paradigm—are discussed further below.

5.3 Positivist, interpretive and critical research paradigms

The philosophical perspective of a researcher's stance on dealing with reality and presenting data can either be from a positivist perspective, an interpretive perspective (or a combination of both perspectives) and a critical research perspective (Marvasti, 2004:5; Bhattacherjee, 2012:8). The positivist theoretical perspective holds that "science provides us with the clearest possible idea of knowledge" (Cohen et al., 2007:11). The physical and social reality is external to those who observe it and by taking a rational course of action to observe and understand

the rules and laws that govern it, knowledge can be derived (Cohen et al., 2007:7; Hamunyela, 2012; Bless et al., 2013:15). Another view of the positivism perspective is that "all genuine knowledge is based on sense experience and can be advanced only by means of observation and experiment" (Cohen et al., 2007:9). It defends that reality can be examined objectively through existing data or possible knowledge of it.

The interpretive perspective ascertains that the views of the social reality are multiple, therefore, knowledge should be socially constructed. It holds that the individuals are the true source of knowledge of things in which they are involved. It is related to the subjectivism approach, which holds that the comprehension of the social reality is only achieved through examining individuals' consciousness of the social reality and its expressed meaning (Bless et al., 2013). The interpretive perspective underscores that people are the main actors in the construction of overall social historical events, therefore their actions and views of the reality that surrounds them should be interpreted and understood (Sarantakos, 1998:39; Bryman, 2004:13).

The critical research paradigm defends that different voices and views should be heard (Cohen et al., 2007:34). It is a research paradigm of a prescriptive and normative nature, which seeks to emancipate the disempowered and the ideal individual's equality and freedom (Cohen et al., 2007:26). The main purpose is to change situations rather than understand them. It aims to question and transform phenomena (Cohen et al., 2007:27). According to Bhattacherjee (2012:8):

> …critical research attempts to uncover and critique the restrictive and alienating conditions of the status quo by analysing the oppositions, conflicts and contradictions in contemporary society, and seeks to eliminate the causes of alienation and domination.

Both the positivist and interpretive paradigms were identified as relevant to this study. The major reasons why these paradigms were adopted for the study were to ensure concurrent validity and give the study strength, conformability and an overall picture of the use of m-commerce for brick-and-mortar retailers. The section below discusses the divergence between the qualitative research method, the quantitative research method, and mixed-method research.

5.4 Research approaches

Social problems are investigated using identifiable approaches/methods, approaches that provide social research with a structure and technical information. This section discusses three of the main research approaches used in social research—the qualitative research approach, the quantitative research approach, and the mixed-methods research approach (the use of both qualitative and quantitative research approaches).

5.4.1 Quantitative research method

The quantitative approach has its roots in the positivism tradition (Cohen et al., 2007:138). The quantitative approach "emerged from the philosophical belief that the world runs according to natural laws and that the role of the scientist is to uncover or discover these pre-existing laws" (Bless et al., 201315). This research method seeks to rely on prior reports of general laws, tested propositions and premises for the acquisition of scientific knowledge. In other words, it involves exploring the apparent occurrences concerning the reality for understanding and controlling dependent and independent variables (Cohen et al., 2007). This method retains its objectivist approach throughout the research process. Due to its underpinning theory, quantitative research deploys structured data collection instruments such as observations, questionnaires and surveys, which enable a quantifying set of empirical data to be elicited (see Table 5.1 for more details on this approach) (Mack et al., 2005).

5.4.2 Qualitative research approach

The qualitative approach emerged from philosophical beliefs that truth is relative and that social research should be carried out through a formal logic that leads to the discovery of people's beliefs and consciousness of the reality (Bless et al., 2013:15). This method is often applied in research where very little knowledge about the reality exists (Bless et al., 2013:16). As a result, a smaller sample is used so that the findings are not generalized to the whole population but are better understood from the respondents' convictions of the reality. Given the nature of this approach, instruments that help collect data such as oral, written expressions of opinions, or feelings, should be adopted (Bless et al., 2013:17). Instruments for qualitative research include interviews (structured, semi-structured, unstructured) or a focus group that would enable a researcher "to gain insight into attitudes, emotional and contextual aspects of human response" (Debus, 1990:2). Table 5.1 below illustrates the divergence between the qualitative and quantitative research approaches.

Table 5.1: The differences between qualitative and quantitative approaches

Qualitative	Quantitative
Founded on inductive approach.	Founded on deductive approach.
Places high value on new concepts and theories development.	Places high value on existing theories application and testing.
Uses a more flexible style of data collection instruments.	Uses a more rigid style of data collection instruments.
Allows the researcher to engage with respondents throughout the data collection process.	Allow the researcher and respondents to remain isolated throughout the data collection process.

Qualitative	Quantitative
Deals with small samples	Deals with large samples
Uses verbal data (e.g. descriptive narrative, themes, noting patterns, categories, tabulated data).	Uses numerical data (e.g. scales of data, descriptive statistics, inferential statistics).
Processes data verbally.	Processes data numerically.
Seeks to discover units of general and relevant meaning, redundant and themes.	Seeks to discover collinearity, multiple regression and clusters among variables.
Provides all the possible descriptions of the phenomena.	Provides cause-and-effect explanations of certain assumptions about the phenomenon.
Describes individual experiences and group norms.	Quantifies variation in past experiences and occurrences.
Arrive at conclusions by reasoning from the general to the particular.	All specific instances are considered and analyzed to arrive at conclusions that are of general interest.

(Adapted from Mauch & Park, 2003:19-20; Mack et al., 2005:2)

5.4.3 Mixed-methods research approach

A mixed-methods approach reflects the use of both qualitative and quantitative methods. This approach is usually a must-do to properly address a study's research questions (Yin, 2011:310). Greener (2008:80) suggests that mixed methods could be useful if elements of the quantitative approach and those of the qualitative approach are used to triangulate results and give an overall picture of the phenomenon. Triangulation is also suitable for demonstrating concurrent validity (Cohen et al., 2007:141). The approaches hold divergent methods which can provide evidence from distinctive perspectives, which can be combined and used as a powerful resource to elucidate the phenomenon (Ritchie & Lewis, 2003:38). Various methods for data collection are available for a mixed-methods approach, ranging from questionnaires, interviews and observations, to tests, field notes, and documentary data (Cohen et al., 2007:79).

Therefore, the present research sought to study the complexity of the phenomenon from a multiple approach perspective by deploying a mixed-methods approach. It has been observed that the methods selected for data collection have significant effects on research outcomes and that some research methods would match a research problem better than other methods (Mauch & Park, 2003:17). Therefore, the research methods must match the theoretical propositions under scrutiny in the study (Mauch & Park, 2003:126). For this reason, sensible mixed methods, which fit the requirements of this research, were adopted. By using the

triangulation between methods, the convergence between the independent data collected was taken into consideration. The independent measures were consolidated to arrive at a pragmatic solution to each research objective.

5.5 Population under study

The study population reflects an entire set of subjects, i.e. individuals or units such as families, small groups, organisations or social artefacts that manifest the same characteristics and from which a researcher seeks to extract a sample (Bless et al., 2013). Moreover, a population can be seen as the entire mass of observations or a multitude of similar things from which a sample is to be formed (Singh, 2006). The population for this study comprised owners/managers of conventional retail stores in the category of SMEs m-commerce business personnel in Luanda, Angola. There are 1,867 formal, registered SMEs in effective operation in Luanda, which translates to 59.33% of all SMEs registered and operating in Angola (INAPEM, 2018). As the study population is located within this agglomeration of SMEs, this concentration of SMEs provided the study with a significant proportion of the selected target population.

5.6 Sample method/techniques and sample size

5.6.1 Sample method

There are two types of sample techniques used to approach potential respondents—probability or random sampling, and non-probability sampling. Probability or random sampling is when the probability of including each potential participant as a representative of the population exists, while non-probability sampling is when the probability of including each potential participant in a sample is unknown (Bless et al., 2013).

Owing to the lack of precise information (names) related to the entire population (Ritchie & Lewis, 2003), the probability sampling strategy was selected, and the area or cluster sampling approach was used to select owners/managers who operate traditional retail stores and employees of m-commerce business in each of the seven districts (Luanda, Viana, Cacuacu, Cazenga, Belas, Icole-e-Bengo & Kilambakiaxi) of Luanda in Angola. Area sampling is a multi-stage sampling technique applied in a geographical area, which gives attention to eligible, potential respondents that are widely spread geographically (Sarantakos, 1998). Area sampling involves stratifying the research area progressively into smaller and more concrete areas (Sarantakos, 1998; Gravetter & Forzano, 2009). The area sampling approach comprises many stages in selecting the sample, in which the geographical features give the basic structure to this sampling paradigm (Cohen et al., 2007). For the current study, initially, five streets from each of the seven districts were selected and the businesses operating on each of the chosen streets were identified. Further m-commerce businesses were identified through an online search of the geographical area. The probability sampling technique, particularly the

area sampling approach was adopted strictly to identify brick-and-mortar retail stores and m-commerce businesses (for distribution of questionnaires to brick-and-mortar business owners/managers and m-commerce business personnel).

This study also adopted the non-probability sampling strategy and used purposive sampling techniques. The purposive sampling technique was used to approach the m-commerce businesses' owners/managers and business professionals, who also possess valuable knowledge about the research problem. However, the guiding principle of theoretical saturation, i.e. the point reached when the researcher is not discovering new responses or relations about categories, was utilised for the sample size in qualitative research (Bernard, 2006:501).

5.6.2 Sampling frame and sample size

A sampling frame consists of a list with detailed information about all the subjects eligible to participate in a study (Greener, 2008:39). It is a list of units of analysis from which the researcher draws a sample and estimates the representation of a population (Bernard, 2006:149). Although it is known that approximately 1,867 registered formal SMEs are in operation in Luanda, Angola (INAPEM, 2018), there is no precise information (names) on the population, i.e. the traditional retail stores and m-commerce businesses. Therefore, the appropriate approach for an accurate sample size should be adopted.

A sample size typically refers to the number of units that are chosen from a population, from which data will be gathered, if it is not the whole population (Griffee, 2012:60). Before calculating sample size, the type of data to be analyzed, e.g. continuous data (ordinal variables) or categorical data (nominal or dichotomous variables) needs to be determined (Bartlett et al., 2001:46). In the present study, the nature of data, i.e. continuous data (ordinal variables), which plays the primary role in the data analysis was identified (Bartlett et al., 2001:46). The variables that served as the basis for the sample size were measured by 7-point Likert rating scales, i.e. ordinal level of data. According to Bartlett et al. (2001:48), for a population of 1,867, the minimum sample size for continuous data (using a margin of error at .03 and alpha level of .05) should be 112. Furthermore, Bartlett et al. (2001:48) suggest that if multiple regression analysis or factor analysis is used in the study, the ratio (i.e. the number of observations to independent or exogenous variables), as well as the maximum number of exogenous variables in the multiple regression model, should be observed. Therefore, 112 survey questionnaires were considered as the minimum sample size to collect data from the m-commerce business personnel and 112 survey questionnaires were considered as the minimum sample size to collect data from owners/managers of brick-and-mortar retail stores. However, with an expected return of 65% (as suggested by Bartlett et al., 2001:47), the final sample size adjusted for response rate was 345 respondents. The sample composition of the

qualitative research method was guided by the principle of theoretical saturation, i.e. the point at which the researcher is not discovering new responses or relations about categories.

5.7 Data collection instrument, design and approach

Instruments for data collection are tools designed and used by researchers to collect quantitative or qualitative data from research participants (Mack et al., 2005:115). Data collection instruments include interview guides (for in-depth, semi-structured, structured and focus groups interviews), observation guides, surveys and questionnaires (Mack et al., 2005:115). Since the present study used a mixed-methods approach, two or more forms of data were used and, therefore, more than one research instrument for collecting these data was needed (Griffee, 2012:47). This study used both structured questionnaires and semi-structured interviews as data collection instruments.

5.7.1 Questionnaire

A questionnaire is a research tool comprising a set of questions to capture standardised responses from different respondents. A questionnaire may contain both unstructured and structured questions. Unstructured questions require respondents to complete in their own words, in writing (e.g. open-ended questions), while structured questions require respondents to choose an answer from a range of options (Bhattacherjee, 2012:74).

Two structured questionnaires were developed. The questionnaire in Appendix C2 was designed to collect data from brick-and-mortar retailers. It aimed at probing the underlying factors that impede conventional businesses from using m-commerce. This questionnaire included dichotomous questions, multiple-choice questions, rating scale questions (using 7-point Likert rating scales) and open-ended questions. Levels of data collected from this questionnaire included nominal (questions 1, 2, 3, 4, 5, 6 and 7), ordinal (questions 8, 9 and 10) and word-based data (question 8.1).

The questionnaire in Appendix B2 was administered to m-commerce business personnel. The indicators or observed variables developed for the questionnaire survey instrument in Appendix B2 is discussed below.

5.7.1.1 Survey instrument measures development

It is important to reiterate that this study sought to explore the use of a framework for m-commerce in brick-and-mortar retailers. It sought to explore and understand the underlying factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers. In a sequential manner, a conceptual framework based on the TOE framework and TTF model with relevant constructs and dimensions that explain the use of m-commerce by brick-and-mortar retailers was proposed in Chapter 4. The constructs underpinning the

requisite factors for the use of m-commerce encompass the functionalities of m-commerce systems, Data Security, Task-Technology Fit, Relative Advantage (i.e. for technological context), task characteristics, Top Management Support, Technology Competence and Readiness for Mobile Distribution Systems (i.e. for organisational context) and Policies and Regulations, Operator Network, Technological Cooperative Institutions, Critical Mass, Mobile Payment Gateway and Competitive Pressure (i.e. for environmental context). Therefore, the proposed constructs, their dimensions and the measures (also referred to as items or indicators) developed for the survey instrument are described below. The indicators outlined in the tables below comprise some items developed for this study by the researcher and others adapted from pre-tested survey instruments which were used in prior studies. Table 5.2 below provides a short description of the proposed constructs.

Table 5.2: Explanation of proposed constructs

Context	Constructs	Definitions
Technological context	Relative advantage	The extent to which a technology is perceived to offer a business intrinsic value over the alternative or existing technology (Jain et al., 2011:162).
	Data security	The extent to which the data/information stored-up and the transactions across the Internet are protected against crimes and threats.
	Functionalities of m-commerce systems	What the technology is able to support and provide for the execution of particular task characteristic.
	Task-Technology Fit	The correspondence between the dimensions of task characteristics and functionalities of the technology (Goodhue & Thompson, 1995:218).
Organisational context	Task characteristic	A typical quality of task that makes a worker rely on the technological innovation to carry out the task.
	Top management support	The senior leaders' commitment to the integration of a new technology into the business.
	Technology competence	Relevant organisational resources such as IT infrastructure, employees with IT knowledge, facilities for providing m-commerce-related training to employees and other associated resources (Zhu & Kraemer, 2005:65; Picoto et al., 2014:573).
	Readiness for mobile distribution systems	A business' willingness or preparedness to engage in m-commerce delivery services and return of goods.
Environmental context	Policy and regulation	The state and international laws govern the operations of digital business (e.g. m-commerce), and the use and storage of data/information in each business sector or industry.

Context	Constructs	Definitions
	Critical mass	The popularity of online shopping, the groups of potential online customers that are smartphones/tablets and Internet users (Kapurubandara & Lawson, 2006).
	Operator network	The quality and strong presence of mobile operators' network services that must be available at the national level.
	Competitive pressure	The peer group pressure and its tendency to push members to use new technology and seek competitive advantage through innovation (Lu et al., 2015:294).
	Mobile payment gateway	The payment-based mobile electronic system manager, is a third-party organisation who ensures a secure mobile transaction.

i) Technological context

In the technological context, 38 indicators related to its four constructs were identified and adapted for this study. The four constructs encompass Relative Advantage, Data Security, functionalities of m-commerce systems and Task-Technology Fit. All items were rated on a 7-point Likert scale, ranging from 1 = strongly disagree to 7 = strongly agree.

Relative advantage

To measure relative advantage (RA), four (4) indicators as given in Table 5.3 below are proposed.

Table 5.3: The relative advantage of using mobile commerce

Variable	Item	Statements	Sources
relative advantage	RA1	M-commerce helps my organisation increase market share.	Wang et al. (2016)
	RA2	We expect m-commerce technologies to help lower business costs.	Picoto et al. (2014); Wang et al. (2016)
	RA3	The m-commerce technologies help my organisation increase the quality of customer service.	*
	RA4	M-commerce helps my organisation speed up the sales process.	Wang et al. (2016); Chandra and Kumar (2018)

* = item developed and proposed by the researcher

Data security

Table 5.4 provides the items (i.e. two indicators) adapted for the Data Security (DS) construct.

Table 5.4: Perceived mobile commerce data security

Variable	Item	Statements	Sources
Data security	DS1	The m-commerce systems I use, operate in an encrypted way and use authentication.	Gangwar et al. (2015)
	DS2	The m-commerce systems I use, impose strict control over our organisation and business partners (e.g. customers) information access.	

The functionalities of m-commerce systems

To measure the functionalities of mobile-commerce systems, 13 indicators were adapted. The indicators are related to the four dimensions of functionalities of mobile-commerce systems identified in Chapter 4, i.e. Mobile Notification (MNO), Mobile Information Exchange (MIE), Mobile Information Search (MIS), and Mobile Data Processing (MDP). Mobile Notification refers to the functionality of m-commerce systems deployed to notify other stakeholders without the expectation of receiving a direct response (Gebauer et al., 2010). Mobile Information Exchange refers to the functionality of m-commerce systems deployed to reach others and be reached by others in the way that it is reciprocated. Mobile Information Search refers to the functionality of m-commerce systems deployed to search m-commerce related data and Mobile Data Processing refers to the functionality of m-commerce systems deployed to process data. Table 5.5 below shows the indicators adapted to measure the functionalities of m-commerce systems.

Table 5.5: Typical functionalities of mobile commerce systems

Variable	Item	Statements	Sources
Mobile notification	MNO1	The m-commerce systems I use work well in putting co-workers on the alert for an emergency or when time is critical.	Yuan et al. (2010); Gatara and Cohen (2014)
	MNO2	The m-commerce systems I use, works well in providing timely notification to business stakeholders (customers, suppliers, co-workers) of urgent intervention required.	
	MNO3	The m-commerce systems I use work well in providing timely notification of marketing localised campaign.	
	MNO4	The m-commerce systems notify me of emergencies.	
Mobile information exchange	MIE1	M-commerce systems enable an easy sharing of information with other stakeholders.	Lee et al. (2004)
	MIE2	M-commerce systems effectively enable the provision of personalised services to customers.	
	MIE3	M-commerce systems enable reciprocal co-operation with co-workers.	
Mobile information search	MIS1	The m-commerce system is reliable in searching business-related information (e.g. sale, inventory, worker, customers, suppliers or industry information).	Lembach and Lane (2011); Gatara and Cohen, 2014
	MIS2	M-commerce effectively compiles data from various sources.	
	MIS3	The m-commerce systems make information readily accessible in any place.	
Mobile data processing	MDP1	The m-commerce systems I use effectively monitor, track and report jobs assignments (e.g. information about sales, delivery, intelligent transport systems).	Yuan et al. (2010); Lembach and Lane (2011)
	MDP2	The m-commerce systems I use effectively enable digital data entry/recording, editing, manipulating, and reporting.	
	MDP3	The m-commerce systems I use effectively enable business transactions processing (e.g. online mobile payment, order placing, inventory processing, bar code scanning, signature processing).	

Task-Technology Fit

The Task-Technology Fit construct consists of 19 7-point Likert scale indicators to measure its dimensions, Quality Factor (QF), Locatability Factor (LF), Authorization Factor (AF),

Compatibility Factor (CF), Production Timeliness (PT), Ease of Use (EU), Reliability Factor (RF) and Relationship with User (RU). Table 5.6 below depicts the indicators adapted to measure the task-technology fit construct.

Table 5.6: Brick-and-mortar retailer Task-Technology Fit

variables	Items	Statements	Sources
Reliability Factor	RF1	The m-commerce systems I use are usually up and accessible when I needed them.	Goodhue and Thompson (1995); Lee et al. (2007)
	RF2	The m-commerce systems I use keep crashing and make it harder to accomplish my tasks.	
Quality Factor	QF1	The data and information from the m-commerce systems I use are current enough to meet my business task requirements.	
	QF2	The m-commerce systems I use store and maintain the right data for my job.	
	QF3	The data stored in the m-commerce systems I use are maintained at an appropriate level of detail.	
Compatibility Factor	CF1	The m-commerce systems I use provide us with consolidated data/information.	
	CF2	The information I use on m-commerce systems is very consistent.	
Locatability Factor	LF1	It is easy to locate the particular data or information I need from the m-commerce systems.	
	LF2	It is easy to find out and understand the definition of data I use for my tasks on the m-commerce systems.	
Production Timeliness	PT1	The m-commerce systems provide task-related information in a timely manner.	
	PT2	The m-commerce systems run scheduled production, business-related reports and other activities on time.	
Relationship with User	RU1	The m-commerce systems I use are user-friendly and complement my department's day-to-day objectives and goals within the business.	
	RU2	The m-commerce systems' supporting team provides consistent assistance when requested.	
	RU3	Customers are generally satisfied with the service we offer through m-commerce.	

variables	Items	Statements	Sources
	RU4	I find m-commerce convenient to do business in a contemporary market.	
Ease of Use	EU1	I found it very easy to use m-commerce related technologies, including hardware and software.	
	EU2	I get the necessary training to effectively use the m-commerce systems in my organisation.	
Authorization Factor	AF1	I am properly authorised to access and download the data that is relevant to my tasks from the business database.	
	AF2	I do not always have the Authorization to access the data that would be useful to complete my tasks.	

ii) Organisational context

The organisational context consists of 26 indicators to its proposed constructs, i.e. task characteristics, Top Management Support, Technology Competence and Readiness for Mobile Distribution Systems. All the indicators were measured by 7-point Likert scale, ranging from 1 = strongly disagree to 7 = strongly agree.

Task characteristics

The task characteristics construct consists of four dimensions and 14 indicators. The four dimensions encompass Mobility Task (MT) and Task Interdependence (TI), which were measured by four indicators each and Time Criticality (TC) and Task Non-Routineness (TN), were assessed by three indicators each. The items to measure task characteristics are shown in Table 5.7 below.

Table 5.7: Brick-and-mortar retailers related task characteristics

Variable	Item	Statements	Sources
Time criticality	TC1	It is very important for me to take immediate action on performing my m-commerce task.	Gatara and Cohen (2014)
	TC2	It is very important for me to promptly respond to emergencies (e.g. take responsibility to respond to any obstacle, provide timely services).	
	TC3	It is very important for me to start my m-commerce tasks on time.	Yuan et al. (2010)
Mobility task	MT1	I frequently perform m-commerce tasks in several places.	Yuan et al. (2010)
	MT2	I frequently perform my m-commerce tasks in any given place.	
	MT3	I frequently have the freedom to choose a place to perform my m-commerce tasks.	
	MT4	I frequently perform my m-commerce tasks in one specific place.	
Task Non-routineness	TN1	I often need to handle unexpected m-commerce tasks.	Goodhue and Thompson (1995)
	TN2	I often need to deal with unstructured m-commerce tasks (e.g. order processing, delivery management, information searching, interactive transmission of data).	
	TN3	I often need to solve difficult m-commerce tasks with no apparent solutions (e.g. data interpretation, data editing, document production, interacting with different business partners for online transaction problem-solving).	
Task Interdependence	TI1	I frequently need to obtain information from co-workers to complete my m-commerce tasks.	Goodhue and Thompson (1995); Teo and Men (2008)
	TI2	I frequently need to share knowledge or information with co-workers.	
	TI3	I frequently need to depend on the work of co-workers to complete my m-commerce task.	
	TI4	I frequently need to deal with problems that involve efforts from other departments.	

Top management support and technology competence

Table 5.8 below presents the indicators adapted for Top Management Support (TMS) and Technology Competence (TCO).

Table 5.8: Top management support and technology competence variables

Variable	Item	Statements	Sources
Top management support	TMS1	My organisation's top management is very encouraging and willing to invest funds in m-commerce.	Wang et al. (2016)
	TMS2	My organisation's top management is willing to confront the risks involved in using m-commerce.	
Technology competence	TCO1	We have the relevant information and communication technology infrastructure for the use of m-commerce.	Gangwar et al. (2015); Wang et al. (2016)
	TCO2	In general, our organisation employs candidates who have technological skills for m-commerce.	
	TCO3	Our organisation has the necessary resources (e.g. financial, staff, equipment) to use m-commerce.	

Readiness for mobile distribution systems

The Readiness for Mobile Distributions Systems was determined by five indicators, as depicted in Table 5.9.

Table 5.9: Readiness for mobile distribution systems

Variable	Item	Statements:	Sources
Readiness for Mobile Distribution Systems	MDS1	My company has been prepared for the consolidation of online and offline inventories.	Hübner et al. (2016)
	MDS2	My company is ready to anytime m-commerce home delivery.	*
	MDS3	My company is willing to outsource some of the m-commerce home delivery services.	
	MDS4	My organisation is prepared to receive customers returns of goods in the store they were bought.	
	MDS5	Our organisation is prepared to receive customers returns of goods in any of our store, or distribution centre, or return centre.	

* = item developed and proposed by the researcher

iii) The environmental context

The environmental context comprises 18 indicators allotted to its six constructs—Policies and Regulations (PAR), Operator Network (ON), Technological Cooperative Institutions (TCI), Critical Mass Factor (CMF), Mobile Payment Gateway (MPG), Competitive Pressure Factor (CPF). All indicators, as shown in Table 5.10, were measured on a 7-point Likert scale, ranging from 1 = strongly disagree, to 7 = strongly agree.

Table 5.10: Brick-and-mortar retailer environmental context

Variable	Item	Example	Author
Policies and regulations	PAR1	The existing electronic business laws in the country.	Zhu and Kraemer (2005)
	PAR2	Government incentive for the use of m-commerce.	
	PAR3	Government online customer information security and privacy protection laws.	
Technological cooperative institutions	TCI1	The ready availability of institutions providing technological training and education programs.	Chau and Deng (2018a)
	TCI2	Promotion of technological innovation and awareness of m-commerce usage in the country.	
	TCI3	The financial support or technological infrastructure subsidies from governmental cooperative institutions in the country.	
Operator Network	ON1	The availability of mobile network bandwidth in the country.	Lippert and Govindarajulu (2006); Picoto et al. (2014)
	ON2	The mobile operators' Internet services or broadband data packages affordability.	
	ON3	The mobile operators' network consistent performance or reliability.	
mobile payment gateway	MPG1	The availability of secure digital payment systems for wireless financial transactions' security and privacy protection in the country.	*
	MPG2	The availability of online payment options such as (credit cards, smart cards, debit cards, electronic cash) in the country.	
	MPG3	The availability of organisations operating as payment gateways or providers of online payment methods in the country.	

Variable	Item	Example	Author
Competitive pressure factors	CPF1	Competitive pressure in the local market.	Zhu et al. (2006b); Wang et al. (2016)
	CPF2	To avoid experiencing a competitive disadvantage in the near future.	
	CPF3	To avoid losing customers to our competitors.	
critical mass factor	CMF1	The increasing popularity of retail online shopping in the market.	Picoto et al. (2014); Wang et al. (2016)
	CMF2	Customers pressure on my company.	
	CMF3	Most of our potential customers use smartphones.	

* = item developed and proposed by the researcher

iv) The m-commerce use construct

The four indicators as shown in Table 5.11 below were adapted to measure the M-Commerce Use construct.

Table 5.11: Mobile commerce use

Variable	Item	Statements	Sources
M-commerce usage	MCU1	Mobile information search (e.g. for searching job dispatch information, information related to product, customer, delivery service, location) on business database or online.	Zhu and Kraemer (2005); Picoto et al. (2014)
	MCU2	Mobile information exchange (e.g. for decision support, providing customer support, text message and e-mail writing enquiry, online chatting, sales problem-solving).	
	MCU3	Notification (e.g. to notify customers of their order or transaction process, alert co-workers of an emergency, obstacles)	
	MCU4	Mobile data processing (e.g. for order processing, inventory management processing, delivery processing, appointment management, job dispatch, data editing, document production)	

5.7.2 Interview

The interview is one of the research instruments convenient for the exploration of verbal and non-verbal communication simultaneously. It can assist the interviewer in discovering respondents' beliefs and the value they place on reality as well as their motives for the practices.

An interview can be unstructured, which is used to discover in-depth information to gain a deeper understanding of reality (Debus, 1990:8). An unstructured or in-depth interview is not standardized and to some extent, it can be seen as informal in that it “can go right off the point – to discover much more about the interviewee by what they say and think, than how they answer specific questions” (Greener, 2008:89). In a structured interview, interviewees are asked predetermined questions in a consistent way with pre-set wording. As the interview’s questions are fully structured in format, it often offers little opportunity for the interviewee to stimulate an interesting discussion on the topic. Though it can be comparably thought of as a questionnaire, the open-ended question and the scenario give another dimension to the research method (Greener, 2008:89).

This study adopted the semi-structured interview, a method in which the interviewer confines the interview to a predetermined set of questions that are posed in order. However, the order can be changed if the interviewer finds the need to advance a question or to divert to other more interesting things (Greener, 2008:89). Two semi-structured interview guides were constructed and used in this study as research instruments for collecting data from m-commerce business managers and business professionals, which are described in Appendix D2 and Appendix E, respectively. The semi-structured interview helped to produce reasoned responses from the exploration of interviewees’ beliefs and opinions about m-commerce. In general, it enabled the interviewer to acquire detailed information on the use of m-commerce for brick-and-mortar retailers and obtain answers to all the questions.

5.8 Data collection/fieldwork

Primary data was collected under the researcher’s administration. The questionnaire survey instrument provided in Appendix C2 was distributed to owners/managers of small and medium-sized brick-and-mortar retailers. The questionnaire survey instrument in Appendix B2 was distributed to the m-commerce business personnel (i.e. the employees and their leaders) in Luanda province. Using the area or cluster sampling approach (Sarantakos, 1998; Gravetter & Forzano, 2009), the Luanda geographical region was stratified by districts, then by distinctive areas, and then by streets. Owners or managers of retail stores operating on the selected streets were approached at their business premises and this approach worked effectively with conventional businesses. Of the 301 questionnaires distributed to brick-and-mortar business

owners/managers, 259 were returned, four were discarded due to defect and incompleteness, and 255 were deemed good for analysis. Most m-commerce businesses were identified through an online search using the geographical area; consequently, the online businesses in six of the seven districts (i.e. Luanda, Viana, Cacuacu, Cazenga, Belas and Kilambakiaxi) were identified. These businesses were first reached via email and/or telephone, and then at their premises after arranging meetings to deliver and collect questionnaires. It was observed that 45% of these online businesses were informal businesses, run from the owner's house and highly reliant on instant messaging and social networking messaging platforms to perform their transactions. Forty-two m-commerce businesses participated in the study. A total of 263 questionnaires were distributed to m-commerce business personnel, 240 were returned, 11 were discarded due to defect and incompleteness, and 229 were good for analysis. Considering that potentially eligible respondents are widely spread in the Luanda province, the researcher needed assistant fieldworkers to help with the distribution of questionnaire survey instruments.

Both telephone (4) and face-to-face (1) semi-structured interviews (following interviewees' wishes) with m-commerce businesses owners/managers in Luanda were conducted by the researcher and an assistant fieldworker to investigate the underlying factors that are requisite for the adoption and use of m-commerce in brick-and-mortar retailers. Three interviews were conducted with online business managers, one with an operator's survey security specialist, and one with an e-commerce business expert, which amounted to five interviews. Altogether, the sample groups that answered the questionnaires and the sample group that gave interviews totalled 569 respondents that participated in the study. In total, 499 questionnaires were returned and 15 questionnaires were deemed unusable, resulting in 489 questionnaires and interviews deemed valid for final analysis.

5.8.1 Limitations of the research

The study sought to develop a framework for the use of m-commerce by brick-and-mortar retailers to stimulate the application of m-commerce in conventional businesses and enable them to compete effectively in the Angola market. However, some managers of formal electronic businesses viewed this action as a direct threat to their continuation in the market. Some of these managers initially agreed to participate in the study but after confirming a date for the interview, they withdrew their consent, while others declined to be interviewed from the start. The majority of the managers only agreed to participate by completing the structured questionnaire, which resulted in very few interviews.

Furthermore, due to COVID-19, the data collection process was negatively impacted to a degree. The process was very slow because of travel bans and contact being forbidden while distributing the questionnaires.

5.9 Data analysis

The selected method for processing and analysing the data is explained below. Data analysis entails examining or interpreting how properties of things are related to or depend upon one another (Bernard, 2006). It involves breaking down complex data to uncover inherent facts or meanings (Singh, 2006).

Given the data collected from the questionnaire and interview instruments, the sample was coded into three Datasets of respondents (See Table 5.12).

Table 5.12: Datasets of respondents

Instrument	Respondents	Dataset
Semi-structured interview	M-commerce business managers, operator' survey security specialists and e-commerce business professionals	Dataset I
Structured questionnaire	M-commerce business personnel	Dataset II
Structured questionnaire	Brick-and-mortar business owners/managers	Dataset III

Given the three sample groups, mixed analysis was appropriate for the study (Yin, 2011:292). The triangulation of quantitative data and qualitative data was used. Triangulation between methods implies that two or more methods are used concurrently in pursuit of a research objective (Cohen et al., 2007:143; Almalki, 2016:292). Therefore, the study used the research questions and objectives to consolidate the data during discussions and in the findings. This way, the qualitative data was integrated with quantitative data and interpreted. The data were converged, analyzed and interpreted concurrently.

5.9.1 Quantitative data analysis

The quantitative data analysis provides the research readers with a quantifying set of information such as tabulated figure materials, cause-and-effect explanations or forms of relationship between the variables (Bradlet, 2007; Spiegel & Stephens, 2011). Thus, for the analysis of the primary data, the descriptive analysis approach and Structural Equation Modeling (SEM) analysis were performed using Statistical Package for the Social Sciences (SPSS) software and AMOS software.

The descriptive analysis without inference or prediction was used to report and discuss all the data related to participants' demographic information and the data collected from owners/managers of brick-and-mortar retail stores in particular. Furthermore, it was used to organise the raw data and produce a descriptive summary of instrument measures scores.

The measure of frequency was appropriately used for the presentation of data in tables and charts.

In general, this study used the SEM method of analysis to understand the nature of interconnection between variables and the meaning of the data collected from m-commerce business personnel. The use of AMOS (the SEM software) and SPSS enabled the researcher to screen the raw data, conduct the multiple regression analysis and assess the test results of the structural model or paths analysis. The various approaches used for the data analysis are discussed below.

5.9.1.1 Screening

Before the analysis of the structural model, the data collected from m-commerce business personnel were screened for defect and completeness. The rule of thumb is that if an individual's cases have missing data which are assigned on a random basis and these missing data are less than 10% of all the cases, that individual should be retained (Gallagher et al., 2008:262). Thus, 11 individual cases were excluded from the analysis based on randomisation and percentage principles, while the rest of the individual cases with missing values were validated and retained and their missing values were replaced with the series mean (see Appendix F). Furthermore, the data were screened for the detection of outliers. By converting the data into standardised (z) scores, the potential outliers were identified using univariate detection (see Appendix F). The potential outliers were retained because they were not above 4, the threshold for the z score established for a large sample.

Multiple regressions amongst the dependent variables and independent variables were done to assess the model collinearity. However, there were no independent variables with tolerance below 0.20, nor with Variance Inflation Factor (VIF) above 5. Thus, there was no concern about collinearity (see Appendix G). Having performed the data screening for missing values and outlier detection and the multiple regression for collinearity, the regression analysis for the Confirmatory Factor analysis (CFA) was conducted.

5.9.1.2 Regression analysis

Once the constructs with their associated indicators were specified using AMOS software, they were co-varied to assess the model fit, their indicator factor loadings and their internal consistency reliability, convergent validity as well as discriminant validity.

Fit measures

There are varied indices used to measure the goodness of a model fit in AMOS-SEM. Three main groups of indices can be identified from the Goodness-of-Fit (GOF). First, the absolute fit indices evaluate how well a proposed theoretical model fits its raw data and reproduces the

sample data (Hu & Bentler, 1999:2; Gallagher et al., 2008:265). Indices related to this group include the Chi-square (x^2 or CMIN) statistics; the Probability, i.e. the P-value, which is expected not to be statistically significant to indicate that the model fits perfectly; and the ratio of Chi-square to Degrees of Freedom (CMIN/df), for which the ratio should not be greater than 3 (Gallagher et al., 2008:265). The Goodness-of-Fit index (GFI) and Adjusted Goodness-of-Fit index (AGFI) take into consideration both the sample size and model complexity and their scores should equal or exceed 0.90 and 0.85, respectively (Schermelleh-Engel et al., 2003:43; Gallagher et al., 2008:265); and the Standardised Roots Mean Square Residual (SRMR) and Roots Mean Square Error of Approximation (RMSEA) that assess the badness-of-fit, which take into account lower values for the evaluation of a model, the score of 0.0 is a perfect fit; scores that are less than 0.05 are indicators of a good fit and scores between 0.05 and 0.08 are considered acceptable (Schermelleh-Engel et al., 2003:36; Gallagher et al., 2008:266; Sharif & Nia, 2018).

Second, Incremental Fit Indices measure the proportionate improvement of the theoretical model fitness in comparison to alternative baseline models, also known as null models (Hu & Bentler, 1999:2; Gallagher et al., 2008:266). The Normed Fit Index was the original measure in this group but it still had issues of not dealing very well with small samples. As a result, it led to the development of other measures such as Relative Fit Index (RFI), Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) to compare the null models to the theoretical model. These measures have a 0.90 cut-off score, whereby a score of 1 indicates a perfect fit (Sharif & Nia, 2018). Third are the parsimony fit indices, which are the parsimony adjustment to some of the indices discussed above and consider the comparisons between alternative models and the complexity of the theoretical model. They are the Parsimony Goodness-of-Fit Index (PGFI), the Parsimony Comparative Fit Index (PCFI), and the Parsimony Normed Fit Index (PNFI). For the parsimony indices, a 0.50 cut-off has been suggested (Mulaik et al., 1989:439; Gallagher et al., 2008:266).

However, the threshold for the GFI discussed above was considered and the test results of the measurement model denote a good model fit. The measurement model scores for the GFI are provided in Appendix J and the scores for the structural model are analyzed in Chapter 6.

Constructs' validity and reliability

The indicator factor loadings were assessed. The rule of thumb is that a factor loading should exceed 0.70. In addition, the factor loading that is statistically significant and improves its construct composite reliability and Average Variance Extracted (AVE) but its value is between 0.50 and 0.70, should be acceptable (Gallagher et al., 2008:267). After assessing the factor loadings, the composite reliability test was performed to achieve the construct internal consistency reliability. Composite reliability reflects the degree to which the indicators of or the

observations of a particular construct differ from one another. Values of 0.70 and above are widely considered acceptable indications of reliability but, values that range between 0.60 and 0.70 are also acceptable (Gallagher et al., 2008:267; Hair et al., 2011:145). Furthermore, tests of the convergent validity and discriminant validity were also assessed to establish the construct validity. Convergent validity evaluates the extent to which indicators of a construct converge or share a high proportion of variance in common. It provides indications of how close the indicators come together to determine the construct in which they are associated. To determine the convergent validity, the AVE was assessed. AVE is the average of the squared factor loadings for each construct. AVE that exceeds 0.50 is considered acceptable (Gallagher et al., 2008:267; Hair et al., 2011:145).

The indicators that had values above the threshold for factor loadings discussed above were considered for analysis. After the tests of composite reliability and convergent validity, the constructs that had values below the threshold discussed above, their indicator values (factor loadings) were subjected to scrutiny. Appendix H shows the values of each factor loading, the composite reliability and convergent validity (i.e. the AVE). Furthermore, it also shows the indicators that were excluded from the analysis in that they failed to meet the internal consistency reliability and convergent validity of their associated construct.

Appendix I shows the results of the test of discriminant validity. Discriminant validity reflects the degree of correlation or distinction between two constructs. It determines how the constructs (latent variables) are different, discriminated or deviated from each other. To assess discriminant validity, two approaches can be used: 1) by assessing the cross-loadings of observed variables (indicators). An observed variable's factor loading on the associated latent variable must exceed all its factor loadings on dissociated latent variables, and 2) by determining the square root of a construct’s AVE and comparing it with its correlations. However, each construct’s squared root of AVE should be greater than its correlations (Gallagher et al., 2008:268; Hair et al., 2008:145).

5.9.1.3 Structural model analysis

Once the assessment of the model fit and the constructs' internal consistency reliability, the convergent validity, and discriminant validity were carried out, the structural model was specified and run.

From the output, the fit measures, the unstandardized regression weights—also known as unstandardized coefficients (B coefficients), the Probability (P-value) and its significance level and Squared Multiple Correlations (R^2), regression equations were assessed. The unstandardized regression coefficient reflects the extent of change that will occur in the dependent variable for each whole unit change in the independent variable. Squared multiple correlation reflects the proportion of variance in a criterion variable accounted for by its

predictors in the structural model. The multiple regression equations were used to discover the direct or total effects of the independent variables (i.e. functionalities of m-commerce systems, task-technology fit, Relative Advantage, Data Security, task characteristics, Top Management Support, Technology Competence, Readiness for Mobile Distribution Systems, Policies and Regulations, Technological Cooperative Institutions, Operator Network, Mobile Payment Gateway, Competitive Pressure and Critical Mass Factor) on the dependent variables (task-technology fit and Mobile Commerce Use). They enabled the researcher to find the strength of a large array of correlations between observed variables (Bradlet, 2007; Spiegel & Stephens, 2011; Rumsey, 2018). Results of the structural model are provided in Chapter 6.

5.9.2 Qualitative data analysis

The qualitative data collected from the interviews were transcribed an initial coding and content analysis were performed. All the relevant data were gathered together to provide a given research question with a collective answer, which enabled the researcher to extract themes, patterns and similarities (Cohen et al., 2007:468). The organisation, presentation and interpretation of data under specific research questions and objectives enabled the researcher to consolidate the empirically-based qualitative and quantitative data and the secondary data discussed in the literature reviewed. Thus, interviewees' frequency of words and similar responses was considered, grouped and coded into categories that align with the quantitative data (Yin, 2011:198). Table 5.13 presents the interviewees' demographic information.

Table 5.13: Interviewees' demographic information

Respondent	Gender	Position	Years of experiences
A	Male	Business manager	10
B	Male	Business manager	5
C	Male	business manager	2
D	Male	Survey security specialist	4
E	Male	E-commerce business expert	9

5.10 Ethical considerations

Ethical issues in social research concern all stakeholders involved in the research (e.g. research respondents, sponsor, and researcher). The regulatory ethical frameworks, guidelines and codes of practice are generally formulated by agencies or professional bodies belonging to the same domain in which ethics have to be enforced (Yin, 2011:39). Ethics can be defined as "a matter of principled sensitivity to the rights of others" and articulation of the

truth behind the conduct of research (Cohen et al., 2007:58). In vouching for the truth, the researcher has to vet how the research objectives, contents, methods, reporting and outcomes abide by ethical principles and practices. The researcher must take into account the ramifications of the research on participants and make an effort to preserve the participants' dignity as human beings (Cohen et al., 2007:58).

According to Cohen et al. (2007:71), "researchers striving at the frontiers of knowledge must take cognizance of the ethical codes and regulations governing their practice". Ethical practices considered by the researcher in the current study include:

- Respondents were assured that their participation in the survey was purely voluntary;
- Respondents had freedom of choice in completing the questionnaire or not;
- No invasion of privacy was suffered by potential participants;
- Respondents were assured that they will not be exposed to risk or harm if they decided not to participate in the survey;
- No information relating to the true nature of the research was withheld;
- Participants could contact the relevant people or university departments if they experienced discomfort or encountered difficulties in completing the survey;
- The privacy of participants was respected, confidentiality was guaranteed, and participants were treated with the utmost respect at all times; and
- Participants were at no time coerced to participate.

A letter of informed consent was annexed to the survey instrument so that participants were made aware of the type of information that was being sought, their expected role of participation in the study and the way the study could directly or indirectly affect them. The informed consent letter underscored that participants should be aware that a) their responses were purely for research purposes and would have no negative impact on their job or career prospects; b) participation in the study was purely voluntary; c) there were no negative consequences if they declined to participate in the study; d) anonymity and confidentiality of all documents were guaranteed, and e) all organizational intellectual property would be treated with respect (Cohen et al., 2007:55). The data collection instrument was translated from English to Portuguese by a sworn translator.

5.11 Chapter summary

In this chapter, the research strategies and methodologies were discussed. The positivist and interpretive philosophical perspectives as well as the qualitative and quantitative approaches (i.e. the mixed methods) adopted for this study were also discussed. It was determined that the sampling frame comprises brick-and-mortar business managers/owners, m-commerce business personnel and professionals. The research sample size, sample design, survey

instruments and the methods for analysing the overall data were clearly delineated. It was determined that both the structured questionnaire and the semi-structured interview survey instruments were appropriate for the collection of qualitative and quantitative data.

This chapter also highlighted the importance of the SPSS software and the AMOS software in the analysis of quantitative data. The descriptive analysis and statistical multiple regression equations methods were found to be applicable to the analysis of the quantitative data, while the content analysis methods were ideal for the analysis of the qualitative data.

The test results of the proposed framework for the use of m-commerce by brick-and-mortar retailers are discussed and analyzed in the next chapter.

CHAPTER 6
DATA PRESENTATION, DISCUSSION AND ANALYSIS

6.1 Introduction

The previous chapter, Chapter 5, discussed the research strategies and methods in which the study is grounded.

This chapter presents, discusses and analyzes the data collected from m-commerce business managers and personnel, business professionals and brick-and-mortar business owners/managers. The conceptual framework proposed in Chapter 4 is reviewed and the test results of the framework are presented and discussed. Furthermore, this chapter covers the research questions and their analysis, the demographic information of respondents, and the results and findings from Datasets I, II and IIII.

6.2 Research questions

This chapter presents the results from the empirical investigation. The results are related to the research questions and objectives established in Chapter 1, which are repeated below.

This study aimed to explore the use of a framework for m-commerce in brick-and-mortar retailers. Table 6.1 shows the study research questions.

Table 6.1: Research questions

Research questions
Qs 1. What different contexts of the use of m-commerce align with the brick-and-mortar retailer business lines and capabilities?
Qs 2. What is the nature of the new added value that aligns with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailers?
Qs 3. What are the required features and characteristics of m-commerce systems for brick-and-mortar retailers? Question Three has the following research sub-question:
Qs 3.1: How would online businesses deal with data security and privacy issues of trading over the Internet?
Qs 4. What factors within the brick-and-mortar retailer setup will impede the use of m-commerce?
Qs 5. What support is required for the use of m-commerce by brick-and-mortar retailers?

6.3 Presentation and discussion of results

To ensure consolidation of the theoretical conceptual framework and the empirical evidence, this study integrated two forms of empirical data—qualitative and quantitative data. Thus, the

triangulation between methods was used to analyze the independent data collected. The responses to research sub-questions per Dataset were as follow: three research sub-questions, i.e. Qs 2, Qs 3 and Qs 5, were asked to two Datasets - Dataset I and Dataset II; One research sub-question, i.e. Qs 4, was asked to two Datasets - Dataset I and Dataset III; and one research sub-question, i.e. Qs 1, was asked to one Dataset - Dataset II.

6.3.1 Demographic information

A discussion on the demographic information of the interviewees (Dataset I), m-commerce business personnel (Dataset II) and brick-and-mortar business owners/managers (Dataset III) is presented in this section. It addresses the respondents' gender, age group and level of education.

The results in Table 6.2 show that 100% of Dataset I were males, 53.3% of Dataset II were males and 53.7% of Dataset III were males. The results further inform us that there are proportionately more males than females amongst respondents; the percentage of males in Dataset II is similar to that of Dataset III.

Table 6.2: Respondents' gender

	Dataset I		**Dataset II**		**Dataset III**	
Gender	*n = 5*	*Percent*	*n = 229*	*Percent*	*N = 255*	*Percent*
Male	5	100	122	53.3	137	53.7
Female	0	0.0	103	45.0	108	42.4
Total	5	100	225	98.3	245	96.1
Missing	0	0.0	4	1.7	10	3.9

Results in Table 6.3 inform us that most of the respondents in Dataset II and Dataset III were relatively young. The results indicate that the large majority of respondents' ages range from 25 to 35 (38.9%) and below 25 (34.5%) for Dataset II. The results show that no respondents in Dataset II were over 66 years of age. There is no information relating to age variables for Dataset I.

Table 6.3: Age group

	Dataset II		Dataset III	
Age group	***n = 229***	***Percent***	***n = 255***	***Percent***
Below 25	79	34.5	27	10.6
25 to 35	89	38.9	81	31.8
36 to 45	43	18.8	47	18.4
46 to 55	10	4.4	49	19.2
56 to 65	3	1.3	28	11.0
66 above	0	0.0	21	8.2
Total	224	97.8	253	99.2
Missing	5	2.2	2	0.8

Table 6.4 reveals that most respondents have a higher or secondary education. The results indicate that there was a slightly higher proportion of Dataset II (32%) and Dataset III (38%) who held at least a bachelor's degree than those who received a secondary school education. However, this information is missing for Dataset I.

Table 6.4: Education level

	Dataset II		Dataset III	
Education level	***n = 229***	***Percent***	***n = 255***	***Percent***
Primary school	20	8.7	24	9.4
Secondary school	72	31.4	71	27.8
Post-matric school certificate	47	20.5	45	17.6
Bachelor's degree	74	32.3	97	38.0
Post graduate degree	8	3.5	4	1.6
Total	221	96.5	241	94.5
Missing	8	3.5	14	5.5

6.3.2 Business description

The business core product and the number of employees are discussed below.

In Table 6.5, the results indicate that food products were the most retailed products by Dataset II (33.2%) and Dataset III (29.8%). After food products came shoes and clothing for Dataset II (25.3% and 18.3% respectively) and clothing and other types for Dataset III (17.6% and 16.5% respectively). The other types of products largely found in the Angolan market were domestic appliances, alcoholic beverages, auto accessories, pharmaceutical products, body care products and hair extensions, retailed by Dataset III. In Dataset II, more consumer electronic components, body care products, hair extensions and alcoholic beverages were found than fast food and pastry products. Numerous retailers sell a mix of the core and other products.

Table 6.5: Business core product line

	Dataset I		**Dataset II**		**Dataset III**	
Type of product	***n = 5***	***Percent***	***n = 229***	***Percent***	***n = 255***	***Percent***
Food products	2	40.0	76	33.2	76	29.8
Clothing	1	20.0	42	18.3	45	17.6
Shoes	0	0.0	58	25.3	24	9.4
Furniture	0	0.0	14	6.1	25	9.8
Books	0	0.0	0	0.0	8	3.1
Music items	0	0.0	5	2.2	7	2.7
Jewellery	0	0.0	6	2.6	3	1.2
Toys	0	0.0	0	0.0	3	1.2
Building material	0	0.0	0	0.0	18	7.1
Other types	2	40.0	22	9.6	42	16.5
Total	5	100	223	97.4	251	98.4
Missing	0	0.0	6	2.6	4	1.6

The results in Table 6.5 further indicate that 40% of Dataset I offers other types of products/services. These are service-related mobile communication and Internet, and training and education.

The results in Table 6.6 show that 80% of businesses for Dataset I have more than 10 workers and that 57% of businesses for Dataset III do not have more than 10 workers. The results inform us that a high proportion of businesses in Angola employed from 11 to 50 and above 100 employees for Dataset I, and from 5 to 10 employees for Dataset III.

Table 6.6: Number of employees

	Dataset I		**Dataset III**	
Employees	*n = 5*	*Percent*	*N = 255*	*Percent*
5 to 10	1	20.0	145	56.9
11 to 50	2	40.0	92	36.1
51 to 100	0	0.0	17	6.7
Above 100	2	40.0	0	0.0
Total	5	100	254	99.6
Missing	0	0.0	1	0.4

6.4 Research questions analysis

Five research questions were introduced in Chapter 1 and also revisited in the section above. Per the research questions, the responses of each Dataset of respondents are presented and discussed in this section.

6.4.1 Conceptual framework

Research Question 1:
What different contexts of the use of m-commerce align with the brick-and-mortar retailer business lines and capabilities?

The literature reviewed in Chapter 2 and the underpinning theory in Chapter 3 provide different patterns of m-commerce technology adoption and use that may give a different understanding and interpretation of brick-and-mortar retailer business lines and capabilities. Those patterns gave rise to the conceptual framework (see Figure 6.1), which was proposed in Chapter 4. Therefore, the study assumes that the proposed theoretical framework will provide the necessary window through which the phenomenon under investigation will adequately be understood and interpreted for the following reasons:

1. The constructs of the organisational context were used to determine the factors in the brick-and-mortar retailer internal environment that is requisite for the adoption and use of m-commerce. The task characteristics, in this setting, are used to effectively explore the nature of m-commerce tasks to be performed by brick-and-mortar retailers in their mobile shopping channels.
2. The constructs of the technological context are adapted to explore the m-commerce technological characteristics that are requisite for the use of mobile channels in brick-and-mortar retailers. It also assesses whether the functionalities of m-commerce systems fit

brick-and-mortar retailers' task characteristics and the underlying added value or synergetic power between them.

3. The environmental context is proposed to determine the elements within the business external environment that are requisite for the use of m-commerce by brick-and-mortar retailers.

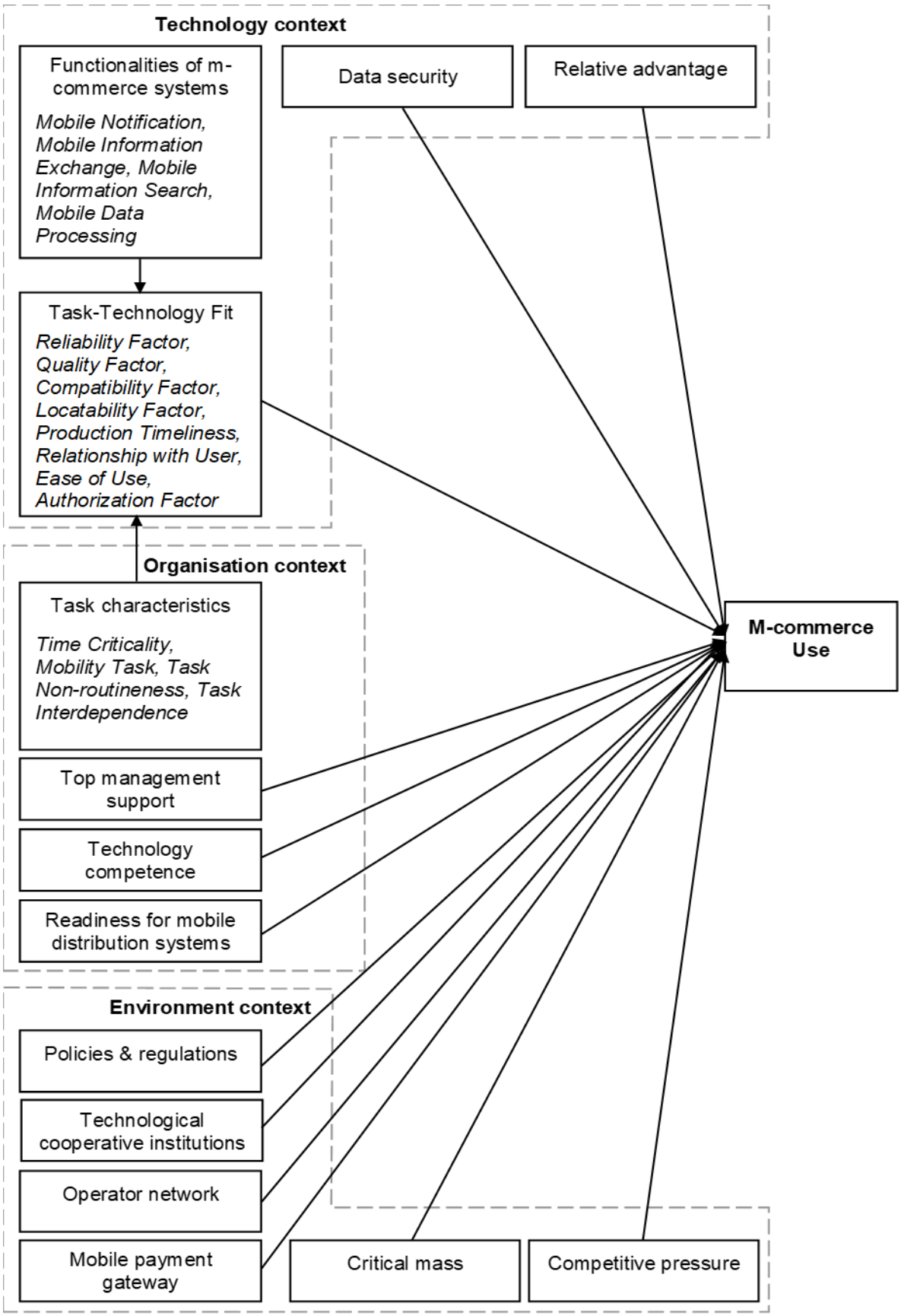

Figure 6.1: Conceptual framework

6.4.2 Dataset I: Results

The results from the interviews (qualitative data) conducted with three m-commerce business managers (Respondents A, B and C), one mobile operator survey security specialist (Respondent D) and one e-commerce business expert (Respondent E) are presented and analyzed in this section. Due to the small sample size and the purposive sampling technique used to assess participants who have in-depth information about m-commerce activities in the Angolan market, the participants should not by any means be treated as representative of the wider population neither their comments be generalized.

Research Question 2:
What is the nature of the new added value that aligns with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailers?

For the new added value that yields synergy between m-commerce and brick-and-mortar retailers, the following themes were extracted from respondents' responses:

a) **Cashless value**: M-commerce businesses are adding new value for customers, which enables customers to make cashless purchases and minimizes the risk of carrying around a large sum of money. Respondent A said:

> M-commerce makes it easy for customers not to carry cash at hand. By not carrying cash, customers avoid being killed or kidnapped for having a large amount of cash at hand.

Customers also derive other benefits like a lump-sum payment from the use of m-commerce. Respondent A reported that:

> If you go to the bank, inside, they only allow you to take a certain amount of cash. But if you do a transaction through e-business you end up having the benefit of paying up to three million Kwanza.

These results confirm the notion that m-commerce makes the buying process more convenient for customers.

b) **Ease and Timesaving**: M-commerce has contributed to a reduction in the time customers need for shopping. Respondent C stated that "Customers do not need to move, to wait and waste their time, from where they are, they can buy, just from the cell phone". Respondent A supported this notion and stated that "It is easy, simple and fast when things are working properly. You don't have to wait in a queue to pay for a service."

c) **Job creation**: M-commerce businesses create job opportunities for society. It is another way of fighting poverty through job creation. Respondent B stated that "We create business jobs and contribute to the diminishing of poverty".

d) **Meeting people's needs**: M-commerce also enables businesses to meet consumers' needs and wants. Respondent B said, "We satisfy people's needs in terms of transport, food, clothing". All the above value-added features of m-commerce, other than the cashless value, are supported by earlier studies (Picoto et al., 2014:573; Njenga et al., 2016:13; Goddard, 2020:4). The cashless value seems to be a new finding of the value-added feature of m-commerce that is associated with customers' experience.

Research Question 3:

What are the required features and characteristics of m-commerce systems for brick-and-mortar retailers?

Research sub-question 3.1: How would online businesses deal with data security and privacy issues of trading over the Internet?

Responses were coded into themes as follows:

a) **Awareness of the situation:** Brick-and-mortar retailers must be aware of the issues surrounding data security and data privacy. Respondent D stated that "Data privacy is one of the major concerns with online transactions … and companies providing this type of service should be well aware of that."
b) **The use of procedures for appropriate data treatment:** Brick-and-mortar retailers need to adopt appropriate procedures for dealing with data. Respondent E said that businesses have to "use procedures and processes to make sure that the customers' data are given appropriate treatment".
c) **Technical control:** it is important to use resources (equipment) that guarantee technical control over the business and partners' data altogether. Respondent D stated that brick-and-mortar retailers must "ensure the controls are in place, at every level. From the communication, the data at waste, the data in transit, every aspect of it". This statement was also supported by Respondent E who stated that "the data should be protected so that customer privacy is always at hand".
d) **Appropriate personnel:** Respondent E said that "companies should be able to have appropriate people".
e) **Training of personnel:** "Train the people in the way that they will handle such data in an appropriate way" (Respondent E).

Research Question 4:

What factors within the brick-and-mortar retailer setup will impede the use of m-commerce?

Identifying the kind of challenges that m-commerce businesses are facing in Angola is important in that the brick-and-mortar retailers become aware of the problems that remain unresolved. Thus, the following challenges to the use of m-commerce were noted:

Lack of financial services: Getting financial assistance from the government and financial institutions is one of the economic infrastructure challenges faced by m-commerce businesses in Angola. Respondent A said "We have financial challenges. We don't have a specific institution that deals with electronic issues, making e-commerce easy."

Lack of trust: Consumers' lack of trust in m-commerce is a challenge in Angola. Respondent E said that "there is still some lack of trust from the people in the country, especially the old ones". This statement also received support from Respondent A, who stated that "many people still do not believe in m-commerce. People are still very sceptical about doing business the way it is". Respondent E added that "some people are afraid … because they think their data will be exposed".

Bureaucratic issues: The government's continued involvement in private businesses is a challenge to m-commerce. Respondent C stated that "The government is too involved, that cut the possibility of the private business to develop." Similarly, Respondent A said that "We have too many bureaucratic issues. The government does not make things easy."

Network problems: Issues of poor coverage of networks have been reported as a challenge. Respondent D stated that "The Internet is still being a problem here, especially in some other provinces, people have issues having access to the Internet." Furthermore, Respondent B also made an unsatisfied demand for the network service. He said that "There is constantly network failure. So, networks should have reliability to avoid creating unnecessary backlogs." Respondent B added It is conducive. However, it still needs improvement in terms of network reliance". In support of the above, Respondent C stated that "We have a lot of problems with signals, with the network". Moreover, respondent D stated that "There are still a lot of things that need to be done but we are moving toward getting coverage all the country."

A question related to m-commerce businesses complaints was put to Respondent D and he said:

> The network is really good at the places we have coverage. Well, I am really talking about the capital and some suburb areas. Because at some places in the country, I am talking about some provinces, we still have problems with the coverage, and sometimes users are not really able to make their transactions and so on. Yes, there are a few complaints but mostly from places where the network coverage is not really that good.

Therefore, it is safe to say that the current network services provided by the mobile operator are partially adequate for the use of m-commerce by brick-and-mortar retailers.

Lack of affordable Internet data service to the public: Unaffordability of mobile data poses a challenge to the m-commerce business and its customers. Respondent D stated that:

> The Internet is quite expensive this side and not everyone can afford that. So, businesses cannot get as much customers as possible because most of the population is not connected to the Internet and they struggle to do that.

Respondent D opened up a discussion on the lack of affordable public mobile service to consumers and stated that "not just the customers, but also the affordability of services to them".

Research Question 5

What support is required for the use of m-commerce by brick-and-mortar retailers?

Need for government intervention: The m-commerce business managers expect policymakers' interventions in their business. Respondents A, B, and C agreed that the government should intervene in m-commerce businesses with new policies and regulations. The view of Respondent B is that "everyone should know who is who, and what are the procedures to be in this kind of business", While Respondent C stated that "the government should have more control of the security issues." In previous studies, the need for policymakers' interventions was also found critical, particularly for developing countries (Zhu & Kraemer, 2005:80; Kamble et al. 2019:165).

Support service for m-commerce: Although the m-commerce businesses reported that they also need other kinds of support such as financial support and managerial support, they only receive support for m-commerce applications (software) from private technological cooperative institutions. Respondent A stated that "These private institutions sell software to support you to do your electronic business easily." In support of the above, Respondent C added that "there is not any company of our government, but we have international companies running here".

Mobile electronic payment services: Mobile money is expected to be available for m-commerce to support the online businesses in the Angolan market. Respondent D stated that "mobile money was something that was actually missing in the country ... our company will be launching mobile money very soon". Respondent E reported that:

> People are still doing business in the traditional way, limited to Internet banking transfers and ATM, the world is evolving. I think for a complete electronic transaction, the online payment methods like credit card and debit card should be available in the Angolan market.

Potential target market: M-commerce business seeks support from all age groups. Respondent B stated that:

The younger generation, from 18 and up to earlier 30s are the people that mainly use the m-commerce. However, the online businesses need the support of all the age groups.

6.4.2.1 Dataset I: Findings

This study found that m-commerce yields different values to customers and the community at large. With regards to customers, respondents place importance on cashless value, ease of use, timesaving and lump-sum payment value while shopping online. The cashless value refers to customers' minimization of certain risks of moving around with a large sum of money and the benefit of making a lump-sum payment when using m-commerce. For society, m-commerce businesses provide job opportunities and meet people's needs/wants.

It was found that m-commerce businesses' awareness of data security and data privacy is critical. Data security and privacy constitute one of the major concerns with online transactions, therefore, m-commerce businesses must be aware of the risks involved. The use of appropriate procedures to ensure fair treatment of business stakeholder data is equally critical. Brick-and-mortar retailers need to be equipped with adequate protection and technical control over the data that are no longer needed, in transit and in a storage device. Retailers must have appropriate personnel and provide them with technical training to deal with data security and privacy.

This study found that m-commerce businesses withstand different challenges in Angola. There is a lack of financial support for m-commerce businesses, that is, the economy lacks financial institutions that provide the m-commerce businesses with the required financial assistance.

The lack of trust in m-commerce and lack of affordable Internet data service to the population has led to a limited customer base. Many consumers remain sceptical about mobile business transactions. Similarly, many consumers are not connected to the Internet because they cannot afford an Internet data package. The m-commerce business managers warned that their business operations have been affected by bureaucratic red tape. It was revealed that the government is very involved in private business, causing difficulties rather than making things easier. Due to the immense importance of the use of m-commerce, a well-operated, reliable mobile operator network is needed. Network signal and coverage require improvement because it causes problems for m-commerce businesses.

The study found that Angolan government policies and regulations interventions in m-commerce businesses are required. The results inform us that the Angolan government should establish procedures for being in m-commerce business and have laws to protect privacy and enforce security. It was found that financial support from the financial services industry (i.e. governmental and private institutions), managerial support and technical support are required

for the adoption and continuation of the use of m-commerce. M-commerce businesses do not receive any support other than support for m-commerce applications. It was found that mobile electronic payment services such as mobile money, online credit card and debit card payment options are required in support of m-commerce businesses in the Angolan market. M-commerce businesses are doing financial transactions relying largely on traditional methods such as Internet banking transfers, ATM and cash payments. In addition to the potential target group, i.e. the young generation, the study also found that m-commerce businesses seek support from all age groups.

6.4.3 Dataset II: Results

The results from the questionnaire (quantitative data) administered to the m-commerce business personnel are presented and analyzed in this section.

Research Question 1:
What different contexts of the use of m-commerce align with the brick-and-mortar retailer business lines and capabilities?

6.4.3.1 The structural model analysis

The proposed theoretical framework was empirically tested. Once the constructs' internal consistency reliability and the convergent validity and discriminant validity were established, the structural model was specified and run using AMOS package. Results of the structural model are provided below.

Structural model's paths analysis
The paths of the structural model are depicted in Figure 6.2 below. The model indicates the paths that point away from the task characteristics and functionalities of m-commerce systems to the task-technology fit construct, and the paths that point from the task-technology fit construct to m-commerce use.

In this operationalization, the task-technology fit, despite being the correspondence between task characteristics and functionalities of m-commerce systems, is also a requisite influence on m-commerce use. Therefore, the task characteristics, i.e. Time Criticality, Mobility Task, Task Non-routineness and Task Interdependence, and the functionalities of m-commerce systems, i.e. Mobile Notification, Mobile Information Exchange, Mobile Information Search and Mobile Data Processing, are all predictor (exogenous) variables, which have effects on the dimensions of task-technology fit, i.e. Reliability Factor, Quality Factor, Compatibility Factor, Locatability Factor, Production Timeliness, Relationship with User, Ease of Use and Authorization Factor, the criteria (endogenous) variables and, consequently the task-technology fit dimensions (the endogenous variables) have effects (become exogenous) on

the use of m-commerce (the criterion or endogenous variable). This way the task-technology fit dimensions play a role as endogenous and exogenous variables.

Furthermore, we discussed the path models for the effects of Relative Advantage, Data Security, Top Management Support, Technology Competence, Readiness for Mobile Distribution Systems, Policies and Regulations, Technological Cooperative Institutions, Operator Networks, Mobile Payment Gateway, Competitive Pressure and Critical Mass Factor on the use of m-commerce.

Structural model goodness-of-fit analysis

After running the AMOS package, an assessment of the model fit for the structural model was carried out. Table 6.7 shows the GFI scored by the tested structural model. The assessment of the model fit indicates that some GOF scores were good (i.e. for the X^2/df and SRMR), others were acceptable (i.e. for the CFI, IFI and RMSEA) and some others were bad (i.e. for the P and GFI). However, the low score for GFI can be associated with the sample size used in this study. The GFI tends to decrease with smaller sample size and as the model complexity increases (Gallagher et al., 2008:265). Thus, the structural model shows a good fit.

Table 6.7: Goodness-of-fit indices

GOF indices	Structural Model value	Recommended value
Chi-square per degree of freedom (X^2/df)	1.574	≤ 3
Probability (P)	.000	> .05
Comparative Fit Index (CFI)	.909	> .900
Incremental Fit Index (IFI)	.912	> .900
Goodness-of-fit index (GFI)	.752	> .900
Roots Mean Square Error of Approximation (RMSEA)	.050	< .080
Standardised Roots Mean Square Residual (SRMR)	.046	< .080

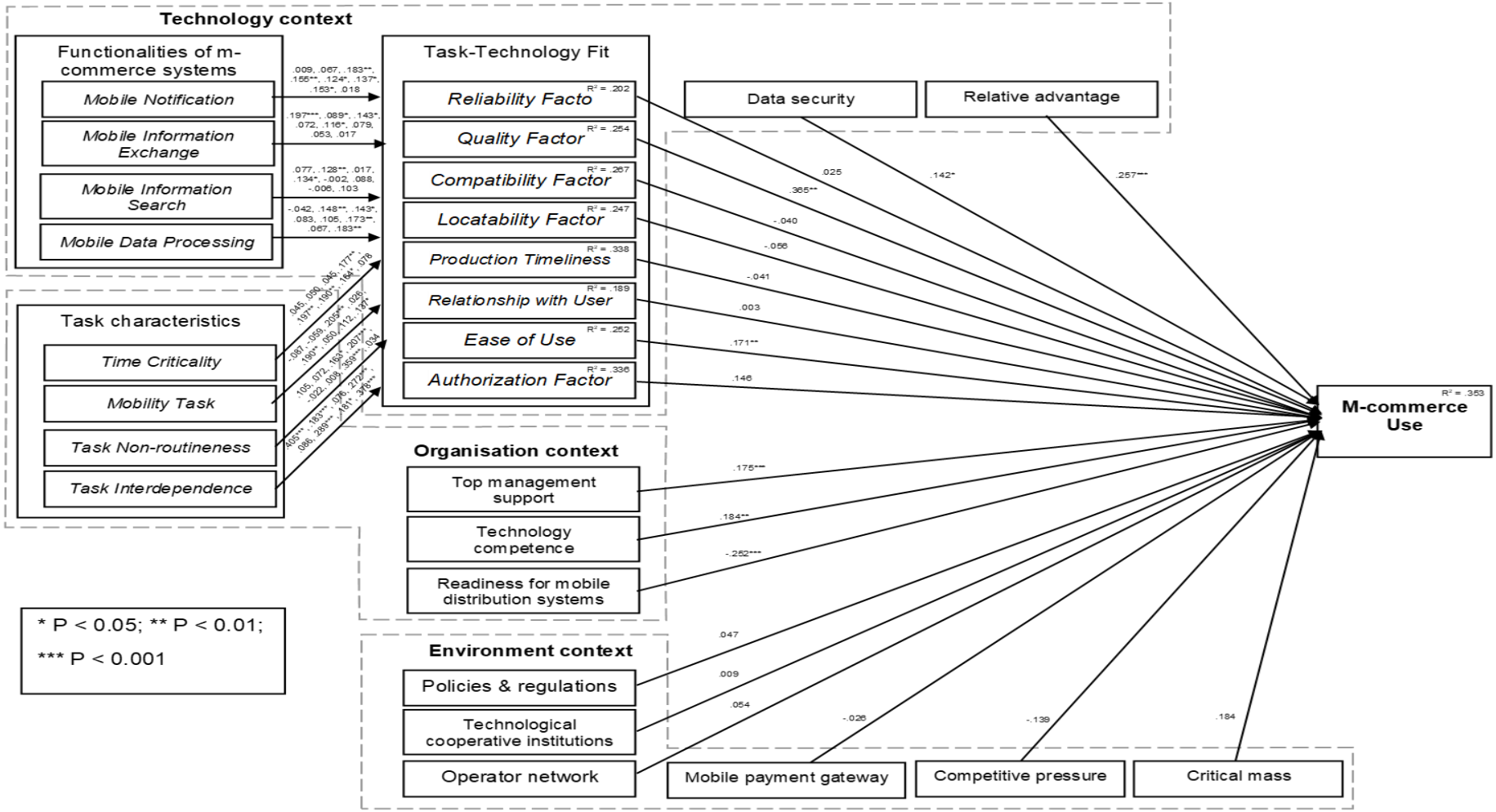

Figure 6.2: A framework for mobile commerce adoption and use in brick-and-mortar retailers – path effects

6.4.3.2 The interaction between task characteristics and task-technology fit dimensions

The results in Table 6.8 indicate whether the retailers' personnel task requirements are suitable for the functionalities of m-commerce systems using four out of eight dimensions of task-technology fit. Results of interaction between Time Criticality, Mobility Task, Task Non-routineness, Task Interdependence, and Reliability Factor, Quality Factor, Compatibility Factor and Locatability Factor are shown in Table 6.8 below. Similarly, the table provides the path coefficient, the P-value and its significance level.

The results in Table 6.8 further indicate that Task Interdependence (B = 0.405, P < 0.001) was the only task characteristic that had significant positive effects on the Reliability Factor. The results show that the Task Interdependence (B = 0.183, P < 0.001) was the only task characteristic that had significant positive effects on Quality Factor. The strong predictive effect of Task interdependence on Reliability Factor is supported by previous studies (Goodhue & Thompson, 1995:224). These results inform us that the more the retailer personnel recognise the fit of Reliability Factor and Quality Factor, the more they will use the m-commerce systems to obtain information from, share information with and depend on the work of co-workers.

Two task characteristics, the Mobility Task (B = 0.205, P < 0.001) and the Task Non-routineness (B = 0.163, P < 0.05) had a significant positive interaction effect on Compatibility Factor (see Table 6.8 below). The Time Criticality (B = 0.045) and Task Interdependence (B = 0.076) effects were not significant. The results related to Mobility Task imply that when personnel needs to perform m-commerce tasks in several places, they rely on the fit of Compatibility Factor. Similarly, the results related to Task Non-routineness inform us that when personnel needs to handle unexpected tasks, deal with unstructured tasks and solve difficult tasks with no apparent solutions, they rely more on the fit of Compatibility Factor. The more they take cognizance of the fit of Compatibility Factor, the more they perform the two task characteristics.

The results in Table 6.8 also show that three out of four task characteristics highly supported Locatability Factor. The B coefficient of correlation of 0.272 for Task Interdependence (P < 0.001), 0.207 for Task Non-routineness (P < 0.001), and 0.177 for Time Criticality (P < 0.01) had significant positive effects on Locatability Factor. The B coefficient of correlation of 0.026 for Mobility Task (P > 0.05) was not significant. The strong predictive effect of Task Non-routineness on Locatability Factor is supported by previous studies (Goodhue & Thompson, 1995:224). The results imply that the more retailer personnel perceive that it is easy to locate the particular data/information or to find out and understand the definition of data on the m-

commerce systems, the more they use the systems to perform Task Interdependence, Task Non-routineness and Time Criticality.

Table 6.8: Interaction effects of task characteristics on Reliability, Quality, Compatibility, Locatability Factors

Paths	Path coefficient	P-value	Significance Level
Time Criticality (TC) → Reliability Factor (RF)	0.045	0.532	NS
Mobility Task (MT) → Reliability Factor (RF)	-0.087	0.202	NS
Task Non-routineness (TN) → Reliability Factor (RF)	0.105	0.126	NS
Task Interdependence (TI) → Reliability Factor (RF)	0.405	0.001	***
Time Criticality (TC) → Quality Factor (QF)	0.050	0.304	NS
Mobility Task (MT) → Quality Factor (QF)	-0.059	0.203	NS
Task Non-routineness (TN) → Quality Factor (QF)	0.072	0.130	NS
Task Interdependence (TI) → Quality Factor (QF)	0.183	0.001	***
Time Criticality (TC) → Compatibility Factor (CF)	0.045	0.496	NS
Mobility Task (MT) → Compatibility Factor (CF)	0.205	0.001	***
Task Non-routineness (TN) → Compatibility Factor (CF)	0.163	0.011	*
Task Interdependence (TI) → Compatibility Factor (CF)	0.076	0.265	NS
Time Criticality (TC) → Locatability Factor (LF)	0.177	0.007	**
Mobility Task (MT) → Locatability Factor (LF)	0.026	0.671	NS
Task Non-routineness (TN) → Locatability Factor (LF)	0.207	0.001	***
Task Interdependence (TI) → Locatability Factor (LF)	0.272	0.001	***

* P < 0.05; ** P < 0.01; *** P < 0.001; NS = Not Significant

The results in Table 6.9 below reveal the interaction effects of Time Criticality, Mobility Task, Task Non-routineness and Task Interdependence on Production Timeliness, Relationship with User, Ease of Use and Authorization Factor and the table also provides the path coefficient, the P-value and its significance level.

Table 6.9 reflects the significant positive interaction effects of Mobility Task (B = 0.190, P < 0.01) and Time Criticality (B = 0.197, P < 0.01) on Production Timeliness. These results show that when retailer personnel increasingly recognise the fit of Production Timeliness, they are more likely to perform Mobility Task and/or Time Criticality. That is, the more they feel that m-commerce systems can provide Mobility Task and Time Critical Task with information in a timely manner and run these tasks on time, the more they use the systems.

Furthermore, Task Non-routineness (B = -0.022, P > 0.05) had very low negative and not significant effects and the Task Interdependence (B = 0.086, P > 0.05) had positive and not significant effects on Production Timeliness.

Table 6.9 also reflects that the interaction between Task Interdependence (B = 0.289, P < 0.001), Time Criticality (B = 0.190, P < 0.01) and Relationship with User were all positively significant. This shows that Task Interdependence and Time Criticality are highly performed when the m-commerce systems are increasingly recognised as user-friendly systems. This provides services with which customers are satisfied and complements the business department's objectives and goals. Amongst the interaction with no significant effects on Relationship with User, Task Non-routineness (B = 0.008, P > 0.05) had the least.

Table 6.9: Interaction effects of task characteristics on Production Timeliness, Relationship with User, Ease of Use and Authorization Factor

Paths	Path coefficient	P-value	Significance Level
Time Criticality (TC) → Production Timeliness (PT)	0.197	0.004	**
Mobility Task (MT) → Production Timeliness (PT)	0.190	0.003	**
Task Non-routineness (TN) → Production Timeliness (PT)	-0.022	0.729	NS
Task Interdependence (TI) → Production Timeliness (PT)	0.086	0.210	NS
Time Criticality (TC) → Relationship with User (RU)	0.190	0.004	**
Mobility Task (MT) → Relationship with User (RU)	0.050	0.424	NS
Task Non-routineness (TN) → Relationship with User (RU)	0.008	0.899	NS
Task Interdependence (TI) → Relationship with User (RU)	0.289	0.001	***
Time Criticality (TC) → Ease of Use (EU)	0.164	0.018	*

Paths	Path coefficient	P-value	Significance Level
Mobility Task (MT) → Ease of Use (EU)	0.112	0.089	NS
Task Non-routineness (TN) → Ease of Use (EU)	0.359	0.001	***
Task Interdependence (TI) → Ease of Use (EU)	0.181	0.012	*
Time Criticality (TC) → Authorization Factor (AF)	0.078	0.233	NS
Mobility Task (MT) → Authorization Factor (AF)	0.137	0.027	*
Task Non-routineness (TN) → Authorization Factor (AF)	0.034	0.585	NS
Task Interdependence (TI) → Authorization Factor (AF)	0.378	0.001	***

* P < 0.05; ** P < 0.01; *** P < 0.001; NS = Not Significant

Task Non-routineness (B = 0.359, P < 0.001), Task Interdependence (B = 0.181, P < 0.05) and Time Criticality (B = 0.164, P < 0.05) had positive and significant effects on Ease of Use. Mobility Task (B = 0.112, P > 0.05) did not have a significant effect on Ease of Use (see Table 6.9). These results can be interpreted as the higher the business personnel perceive that they received the necessary training, and the m-commerce system is very easy to use, so they use it to perform Task Non-routineness, Task Interdependence and Time Criticality.

In addition, results in Table 6.9 indicate that the effects of Task Interdependence (B = 0.378, P < 0.001) and Mobility Task (B = 0.137, P < 0.05) on Authorization Factor are positive and significant. That is, when the business personnel increasingly perceive that they are properly authorised or do not have the Authorization to access and download the data/information, they perform Task Interdependence and Mobility Task.

The effects of Time Criticality (B = 0.082, P > 0.05) and Task Non-routineness (B = 0.034, P > 0.05) on Authorization Factor were not significant.

6.4.3.3 The effect of top management support, technology competence and readiness for mobile distribution systems on mobile commerce use

Table 6.10 shows the path coefficient, the P-value and its significance level for the interaction effects of Top Management Support, Technology Competence and Readiness for Mobile Distribution Systems on Mobile Commerce Use.

Results of the interactions shown in Table 6.10 indicate that the effect of Top Management Support (B = 0.175, P < 0.001) and Technology Competence (B = 0.184, P < 0.01) on Mobile Commerce Use were all positive and significant. The strong and significant relationship

between Top Management Support and Mobile Commerce Use is supported by previous studies (Chandra & Kumar 2018:247). These results show that as high the top management support for the technology is, so is the use of this technology. It was found that when the organisation's top management is willing to confront the risks involved in using m-commerce, the use increases.

The positive significant link between Technology Competence and Mobile Commerce Use informs us that when the organisation has the necessary resources and/or continuously focuses on the integration of new technologies and the employment of candidates who have technological skills, the possibilities of this organisation to adopt and use m-commerce are high. These findings are consistent with prior studies (Zhu & Kraemer, 2005:77; Wang et al., 2016:168; Chandra & Kumar 2018:247)

Table 6.10: Top management support, technology competence and readiness for mobile distribution system effects on m-commerce use

Paths	Path coefficient	P-value	Significance Level
Top Management Support (TMS) → Mobile Commerce Use (MCU)	0.175	0.001	***
Technology Competence (TCO) → Mobile Commerce Use (MCU)	0.184	0.004	**
Readiness for Mobile Distribution Systems (MDS) → Mobile Commerce Use (MCU)	-0.252	0.001	***

* P < 0.05; ** P < 0.01; *** P < 0.001; NS = Not Significant

Table 6.10 shows a negative score (-0.252) and significant regression (P < 0.001) for the interaction between Readiness for Mobile Distribution Systems and Mobile Commerce Use. The results reveal that when Mobile Commerce Use decreases, Readiness for Mobile Distribution Systems increases. It can also be interpreted as respondents who thought very highly of the Mobile Commerce Use and rated high, were more likely to rate low in the Readiness for Mobile Distribution Systems. Furthermore, these results could also mean that respondents who mostly use the m-commerce systems were more likely to be unsatisfied with the home delivery services and the product return processes of m-commerce distribution systems adopted by their organisation. They may feel that their organisation is not fully prepared for m-commerce distribution services. In contrast, those who rated high and are satisfied with Readiness for Mobile Distribution Systems are more likely to use less of the m-commerce systems.

Research Question 2:

What is the nature of the new added value that aligns with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailers?

6.4.3.4 Interaction between relative advantage and mobile commerce use

The use of m-commerce has intrinsic value for organisations. The results in Table 6.11 indicate whether the value of m-commerce is advantageous to retailers using the Relative Advantage construct of the technological context. The results reflect that Relative Advantage (B = 0.257, P < 0.001) had a positive, strong and significant effect on Mobile Commerce Use. These results are consistent with prior research (Picoto et al., 2014:580; Chandra & Kumar 2018:247) and suggest that the more that respondents recognise that m-commerce may help their organisation to increase market share, lower business costs, increase the quality of customer service or speed up the sales process, the more they will use the m-commerce systems. These added values suggest a positive synergy between m-commerce and retailer, which will outweigh a single traditional sales channel. The results are consistent with other studies that found that m-commerce provides traditional businesses with a more strategic approach to gaining market share (Swilley et al., 2012:1; Verkijika, 2018:1665). They are able to add value to sales services that meet consumers' personal needs or requirements and seamless shopping experiences (Cousins & Robey, 2015:46).

Table 6.11: Interaction effects of Relative Advantage on Mobile Commerce Use

Paths	Path coefficient	P-value	Significance Level
Relative Advantage (RA) → Mobile Commerce use	0.257	0.001	***

* P < 0.05; ** P < 0.01; *** P < 0.001; NS = Not Significant

Research Question 3:

What are the required features and characteristics of m-commerce systems for brick-and-mortar retailers?

6.4.3.5 The interaction between functionalities of mobile commerce systems and task-technology fit dimensions

Table 6.12 below indicates whether the functionalities of m-commerce systems are suitable for the retailers' personnel task requirements using four out of eight dimensions of task-technology fit. The results of interaction between the Mobile Notification, Mobile Information Exchange,

Mobile Information Search, Mobile Data Processing and Reliability Factor, Quality Factor, Compatibility Factor and Locatability Factor are shown in Table 6.12; the table also provides the path coefficient, the P-value and its significance level.

Table 6.12 indicates that Mobile Information Exchange (B = 0.197, P < 0.001) is the only functionality of m-commerce systems that had a significant positive effect on the Reliability Factor. This informs us that the higher respondents perceive the fit of the Reliability Factor, the more they use the Mobile Information Exchange functionality of m-commerce systems. The results further reveal that Mobile Data Processing (B = -0.042, P > 0.05) had the least negative effect on the Reliability Factor. This implies that when Mobile Data Processing increases, the Reliability Factor will decrease.

Three functionalities of m-commerce systems significantly affected the Quality Factor. Results in Table 6.12 show that Mobile Information Exchange (B = 0.089, P < 0.05), Mobile Information Search (B = 0.128, P < 0.01) and Mobile Data Processing (B = 0.148, P < 0.01) had significant positive effects on Quality Factor. That is, the more respondents perceive that the m-commerce systems provide data and information that are current enough or maintained at an appropriate level of detail, the more they will use its Mobile Information Exchange, Mobile Information Search and Mobile Data Processing functionalities.

The results in Table 6.12 also show three functionalities that significantly affected the Compatibility Factor—the Mobile Notification (B = 0.183, P < 0.01), Mobile Information Exchange (B = 0.143, P < 0.05) and Mobile Data Processing (B = 0.143 P < 0.05) had significantly positive interaction effects on the Compatibility Factor. The results suggest that the Mobile Notification, Mobile Information Exchange and Mobile Data Processing functions are highly used when workers perceive that the m-commerce system is compatible, i.e. very consistent and consolidated with their tasks. Furthermore, the results also show a strong predictive effect of Mobile Notification (B = 0.155, P < 0.01) and a good effect of Mobile Information Search (B = 0.134, P < 0.05) on Locatability Factor (see Table 6.12 below). However, the other functionalities were not significant.

Table 6.12: Interaction effects of functionalities of m-commerce systems on Reliability, Quality, Compatibility and Locatability Factors

Paths	Path coefficient	P-value	Significance Level
Mobile Notification (MNO) → Reliability Factor (RF)	0.009	0.892	NS
Mobile Information Exchange (MIE) → Reliability Factor (RF)	0.197	0.001	***
Mobile Information Search (MIS) → Reliability Factor (RF)	0.077	0.249	NS
Mobile Data Processing (MDP) → Reliability Factor (RF)	-0.042	0.527	NS
Mobile Notification (MNO) → Quality Factor (QF)	0.067	0.143	NS
Mobile Information Exchange (MIE) → Quality Factor (QF)	0.089	0.035	*
Mobile Information Search (MIS) → Quality Factor (QF)	0.128	0.006	**
Mobile Data Processing (MDP) → Quality Factor (QF)	0.148	0.002	**
Mobile Notification (MNO) → Compatibility Factor (CF)	0.183	0.003	**
Mobile Information Exchange (MIE) → Compatibility Factor (CF)	0.143	0.012	*
Mobile Information Search (MIS) → Compatibility Factor (CF)	0.017	0.782	NS
Mobile Data Processing (MDP) → Compatibility Factor (CF)	0.143	0.020	*
Mobile Notification (MNO) → Locatability Factor (LF)	0.155	0.010	**
Mobile Information Exchange (MIE) → Locatability Factor (LF)	0.072	0.191	NS
Mobile Information Search (MIS) → Locatability Factor (LF)	0.134	0.026	*
Mobile Data Processing (MDP) → Locatability Factor (LF)	0.083	0.167	NS

* P < 0.05; ** P < 0.01; *** P < 0.001; NS = Not Significant

The results in Table 6.13 below indicate whether the functionalities of m-commerce systems are suitable for the retailers' personnel task requirements using the other four dimensions of task-technology fit. These results reflect paths effects of the Mobile Notification, Mobile Information Exchange, Mobile Information Search and Mobile Data Processing on Production Timeliness, Relationship with User, Ease of Use and Authorization Factor. Table 6.13 provides the path coefficient, the P-value and its significance level, and the Coefficient of determination.

Table 6.13 indicates significant positive interaction effects of Mobile Information Exchange ($B = 0.116$, $P < 0.05$) and Mobile Notification ($B = 0.124$, $P < 0.05$) on Production Timeliness. These results imply that when respondents increasingly recognise the fit of Production Timeliness, they are more likely to deploy the Mobile Notification and the Mobile Information Exchange functionalities of m-commerce systems to perform tasks. That is, respondents associate Mobile Notification and the Mobile Information Exchange with the functionalities of m-commerce systems that provide task-related information in a timely manner and run other business activities on time.

The interaction between Mobile Data Processing ($B = 0.173$, $P < 0.01$), Mobile Notification ($B = 0.137$, $P < 0.05$) and the Relationship with User, indicated in Table 6.13, were all positively significant. These results show that when m-commerce business personnel take cognizance of a convenient and user-friendly m-commerce system, they mostly deploy its Mobile Data Processing and Mobile Notification functions.

Table 6.13 also shows that two functionalities, Mobile Notification ($B = 0.153$, $P < 0.05$) and Mobile Data Processing ($B = 0.183$, $P < 0.01$), each had positive and significant effects on Ease of Use and Authorization Factor, respectively. That is, one out of four functionalities significantly affected those criteria. These results mean that the more business personnel perceived the fit of Ease of Use, the more they used the Mobile Notification functionality of the m-commerce systems. The more the business personnel perceived the fit of Authorization Factor, the more they used the Mobile Data Processing.

Amongst the factors with not significant effects, the Mobile Information Search ($B = -0.006$) had the least negative effect on Ease of Use, and the Mobile Notification ($B = 0.018$, $P > 0.05$) and the Mobile Information Exchange ($B = 0.017$, $P > 0.05$) had the least effect on Authorization Factor.

Table 6.13: Interaction effects of functionalities of m-commerce systems on Production Timeliness, Relationship with User, Ease of Use and Authorization Factor

Paths	Path coefficient	P-value	Significance Level
Mobile Notification (MNO) → Production Timeliness (PT)	0.124	0.048	*
Mobile Information Exchange (MIE) → Production Timeliness (PT)	0.116	0.042	*
Mobile Information Search (MIS) → Production Timeliness (PT)	-0.002	0.977	NS
Mobile Data Processing (MDP) → Production Timeliness (PT)	0.105	0.090	NS
Mobile Notification (MNO) → Relationship with User (RU)	0.137	0.026	*
Mobile Information Exchange (MIE) → Relationship with User (RU)	0.079	0.155	NS
Mobile Information Search (MIS) → Relationship with User (RU)	0.088	0.150	NS
Mobile Data Processing (MDP) → Relationship with User (RU)	0.173	0.005	**
Mobile Notification (MNO) → Ease of Use (EU)	0.153	0.017	*
Mobile Information Exchange (MIE) → Ease of Use (EU)	0.053	0.370	NS
Mobile Information Search (MIS) → Ease of Use (EU)	-0.006	0.928	NS
Mobile Data Processing (MDP) → Ease of Use (EU)	0.067	0.293	NS
Mobile Notification (MNO) → Authorization Factor (AF)	0.018	0.762	NS
Mobile Information Exchange (MIE) → Authorization Factor (AF)	0.017	0.765	NS
Mobile Information Search (MIS) → Authorization Factor (AF)	0.103	0.091	NS
Mobile Data Processing (MDP) → Authorization Factor (AF)	0.183	0.003	**

* P < 0.05; ** P < 0.01; *** P < 0.001; NS = Not Significant

6.4.3.6 Interaction between task-technology fit dimensions, data security, and mobile commerce use

The interaction between task-technology fit dimensions, Data Security, and Mobile Commerce Use are shown in Table 6.14 below. Results indicate that two out of eight dimensions of TTF, i.e. Quality Factor (B = 0.250, P < 0.01) and Ease of Use (B = 0.171, P < 0.05), had positive and significant effects on Mobile Commerce Use. The interaction effects of Authorization Factor (B = 0.146) Reliability Factor (B = 0.025) and Relationship with User (B = 0.003) on Mobile Commerce Use were not significant. Similarly, the interaction between Compatibility Factor (B = -0.040), Production Timeliness (B = -0.041), Locatability Factor (B = -0.056) and Mobile Commerce Use were negative and not significant. Strong support for the use of m-commerce would require a positive interaction effect and a significant P-value of most of the task-technology fit dimensions. The results in Table 6.14 show little support for the interaction between task-technology fit dimensions and M-commerce Use. That is, weak support for the hypothesised positive relationship. This weak relationship between task-technology fit dimensions and utilisation of the technology is supported by previous studies (Goodhue & Thompson, 1995:227; Dishaw & Strong, 1999:16).

Furthermore, the results show that Data Security (B = 0.142, P < 0.05) also had a positive and significant effect on Mobile Commerce Use. That is, when Data Security increases, so does Mobile Commerce Use. Respondents are more likely to use the m-commerce systems when they feel that it operates in an encrypted way, uses authentication and imposes strict control over information access. Thus, Proposition 4 is supported. Relative advantage is also one of the characteristics of technological context. It was discussed above to explain Research Objective 2.

Table 6.14: Interaction effects of task-technology fit dimensions and data security on mobile commerce use

Paths	Path coefficient	P-value	Significance Level
Reliability Factor (RF) → Mobile Commerce Use (MCU)	0.025	0.648	NS
Quality Factor (QF) → Mobile Commerce Use (MCU)	0.365	0.002	**
Compatibility Factor (CF) → Mobile Commerce Use (MCU)	-0.040	0.613	NS
Locatability Factor (LF) → Mobile Commerce Use (MCU)	-0.056	0.496	NS
Production Timeliness (PT) → Mobile Commerce Use (MCU)	-0.041	0.600	NS
Relationship with User (RU) → Mobile Commerce Use (MCU)	0.003	0.959	NS
Ease of Use (EU) → Mobile Commerce Use (MCU)	0.171	0.003	**
Authorization Factor (AF) → Mobile Commerce Use (MCU)	0.146	0.069	NS
Relative Advantage (RA) → Mobile Commerce use	0.257	0.001	***
Data Security (DS) → Mobile commerce use	0.142	0.011	*

* P < 0.05; ** P < 0.01; *** P < 0.001; NS = Not Significant

Research Question 5:

What support is required for the use of m-commerce by brick-and-mortar retailers?

6.4.3.7 The effects of constructs of the environmental context on mobile commerce use

In Table 6.15, the path coefficient, the P-value and its significance level for the interaction effect of Policies and Regulations, Technological Cooperative Institutions, Operator Network, Mobile Payment Gateway, Competitive Pressure, Critical Mass Factor and Mobile Commerce Use, are provided.

Contrary to all expectations, the results in Table 6.15 show that none of the environmental context constructs had a significant effect on Mobile Commerce Use. The results indicate that

the interaction effects of Mobile Payment Gateway (B = -0.026, P > 0.05) and Competitive Pressure Factor (B = -0.139, P > 0.05) on Mobile Commerce Use were negative and not significant. These results reflect that there is no influence of Competitive Pressure or Mobile Payment Gateway on Mobile Commerce Use. When the effects of Competitive Pressure and Mobile Payment Gateway increase the Mobile Commerce Use decreases. The results from the interview inform us that due to the lack of other payment options in the Angolan market, such as mobile money and online credit/debit card payment, the m-commerce businesses were using traditional methods to do financial transactions. Thus, the positive effect of the hypothesised relationship between Mobile Payment Gateway and Mobile Commerce Use is counteracted by the study results.

The effects of Technological Cooperative Institutions, Policies and Regulations, Operator Network and Critical Mass Factor, coefficient of correlation equal 0.009, 0.047, 0.054 and 0.184 respectively, on Mobile Commerce Use were low and not significant (P > 0.05). These results show that government Policies and Regulations, i.e. electronic business laws, had no significant effects on Mobile Commerce Use. The results are also supported by the literature reviewed in Chapter 2, which indicates that Angola does not yet have policies and laws on electronic commerce. Thus, online businesses are operating based on the existing traditional business laws.

The insignificant effects of Critical Mass on M-Commerce Use indicate that m-commerce businesses are not strongly pressurised by their customers or potential consumers to use m-commerce. Similarly, the insignificant effects of Technological Cooperative Institutions on Mobile Commerce Use can be associated with the lack of support from the institutions in the market whereby apart from the support for m-commerce applications, results of the interviews reveal that m-commerce businesses do not receive the financial and managerial support which they require.

In relation to the interaction between the Operator Network and Mobile Commerce Use, the results from Dataset I reflect that although the Operator Network services are conducive for the use, respondents filed similar complaints alleging that the network services required to be reliable in terms of network signals and coverage. Thus, the weak effect of Operator Network on Mobile Commerce Use is associated with the lack of network reliability and the resultant complaints. The typical characteristics of mobile operators' network services are adequate availability of network bandwidth independently of subscribers' national and international positions, fast interconnectivity across different networks, affordability and efficient client support service (Wamuyu & Maharaj, 2011:55; Maritz, 2014; Picoto et al., 2014:582; Poulson, 2014; GSMA, 2015; Kamble et al., 2019:165).

Table 6.15: The effects of environmental context on mobile commerce Use

Paths	Path coefficient	P-value	Significance Level
Policies and Regulations (PAR) → Mobile Commerce Use (MCU)	0.047	0.672	NS
Technological Cooperative Institutions (TCI) → Mobile Commerce Use (MCU)	0.009	0.840	NS
Operator Network (ON) → Mobile Commerce Use (MCU)	0.054	0.407	NS
Mobile Payment Gateway (MPG) → Mobile Commerce Use (MCU)	-0.026	0.637	NS
Competitive Pressure Factor (CPF) → Mobile Commerce Use (MCU)	-0.139	0.210	NS
Critical Mass Factor (CMF) → Mobile Commerce Use (MCU)	0.184	0.138	NS

* P < 0.05; ** P < 0.01; *** P < 0.001; NS = Not Significant

6.4.3.8 Dataset II: Findings

Interaction between Relative Advantage and Mobile Commerce Use

The Relative Advantage effect on Mobile Commerce Use is very strong and significant. This perception fully affects the use of m-commerce by retailers. This finding informs us that the Mobile Commerce Use is fully dependent on the Relative Advantage characteristics of the technological context. M-commerce enables retailers to increase market share, lower business costs, increase the quality of customer service or speed up the sales process, as they use more and more m-commerce systems. The proposed relationship between Relative Advantage and Mobile Commerce Use is completely supported (**Proposition 3**). Therefore, the perception of Relative Advantage of m-commerce is requisite for its use by brick-and-mortar retailers.

Interaction between task characteristics and functionalities of m-commerce systems and task-technology fit dimensions

Considering the four task characteristics, one of the tasks (Task Interdependence) has significant effects on six out of eight dimensions of task-technology fit. Another task (Time Criticality) has significant effects on four out of eight factors of task-technology fit. These findings indicate moderate support for the proposed relationship between task characteristics and task-technology fit (**Proposition 5**). Furthermore, the findings show that one (Mobile Notification) out of four functionalities of m-commerce systems has significant effects on five

out of eight factors of task-technology fit. They also show that two (Mobile Information Exchange and Mobile Data Processing) out of four functionalities of m-commerce systems have significant effects on four out of eight factors of task-technology fit. These findings indicate moderate support for the proposed relationship between the functionalities of m-commerce systems and task-technology fit (**Proposition 1**).

Interaction effect on Reliability Factor

Task Interdependence and Mobile Information Exchange are the only task characteristics and functionality of m-commerce systems, respectively, that have significant effects on Reliability Factor. They have a full and positive effect on Reliability Factor. This finding indicates that the higher the perception of the fit of Reliability Factor, the higher the Mobile Information Exchange functionality of m-commerce systems will be used to perform the Task Interdependence. The perception of fit between Mobile Information Exchange and Task Interdependence stops any negative perception of the fit of Reliability Factor. This study has not found significant effects of Time Criticality, Mobility Task, Task Non-routineness, Mobile Notification, Mobile Information Search and Mobile Data Processing on Reliability Factor. Therefore, these findings inform us that the Reliability Factor received very weak support from most of its antecedents.

Interaction effect on Quality Factor

Task Interdependence, Mobile Information Exchange, Mobile Information Search and Mobile Data Processing have significant effects on Quality Factor. These findings show that Task Interdependence has a full effect, Mobile Information Exchange has a moderate effect, and both Mobile Information Search and Mobile Data Processing have a partial effect on Quality Factor. The higher the perception of the fit of Quality Factor, the higher the Mobile Information Exchange, Mobile Information Search and Mobile Data Processing functionalities are used to perform the Task Interdependence requirements. Therefore, the perception of fit between these functionalities and Task Interdependence puts an end to any negative perception of the fit of Quality Factor. Time Criticality, Task Non-routineness, Mobility Task and Mobile Notification did not have significant effects on Quality Factor.

Interaction effects on Compatibility Factor

The findings indicate that Mobility Task and Task Non-routineness have significant effects on Compatibility Factor. The findings also indicate that Mobile Notification, Mobile Information Exchange and Mobile Data Processing have a significant effect on Compatibility Factor. These findings show that the Compatibility Factor received partial support from most of the functionalities of m-commerce systems and moderate support from task characteristics. Only one function does not have a significant effect, while two out of four characteristics do not have significant effects. The perceived fit between Mobile Notification, Mobile Information Exchange, Mobile Data Processing, Mobility Task, and Task Non-routineness quash any negative perceptions of the fit of Compatibility Factor.

Interaction effects on Locatability Factor

There are two task characteristics—Task Interdependence and Task Non-routineness—that have full and significant effects on Locatability Factor, and one task characteristic, Time Criticality has a partial effect on Locatability Factor. The findings also indicate that Mobile Notification has a partial and significant effect, and Mobile Information Search has a moderate and significant effect on Locatability Factor. Three out of four task characteristics highly support Locatability Factor, whereas just two out of four functionalities of m-commerce systems support it. The findings inform us that the more the fit of Locatability Factor is perceived, the more the Mobile Notification and the Mobile Information Search functions are used to execute Task Interdependence, Task Non-routineness and Time Criticality.

Interaction effects on Production Timeliness

The relationships between Mobility Task and Production Timeliness, and Time Criticality and Production Timeliness are significant. These task characteristics have a partial effect on Production Timeliness. The relationships between Task Non-routineness and Production Timeliness, and Task Interdependence and Production Timeliness, are not significant. Furthermore, the findings indicate that there is a significant relationship between Mobile Information Exchange and Production Timeliness, and Mobile Notification and Production Timeliness. These functionalities have a moderate effect on Production Timeliness. The relationships between Mobile Information Search and Production Timeliness, and Mobile Data Processing and Production Timeliness are not significant. The findings reflect that when the fit of Production Timeliness is increasingly recognised, Mobile Notification and Mobile Information Exchange functionalities of m-commerce systems are increasingly deployed to perform Mobility Task and Time Criticality. Thus, Production Timeliness is moderately supported by the functionalities of m-commerce systems and task characteristics.

Interaction effects on Relationship with User

The effects of Task Interdependence, Time Criticality, Mobile Data Processing and Mobile Notification on Relationship with User are significant. The findings indicate that Relationship with User is fully affected by Task Interdependence, partially affected by Time Criticality and Mobile Data Processing and moderately affected by Mobile Notification. Furthermore, the study found that the effects of Mobility Task, Task Non-routineness, Mobile Information Exchange and Mobile Information Search on Relationship with User are not significant. These findings inform us that Relationship with User gets weakened by these insignificant relationships, meaning that the Relationship with User is moderately supported by its predictors.

The interaction effect on Ease of Use

The findings indicate that three task characteristics—Task Non-routineness, Task Interdependence and Time Criticality—have significant effects on Ease of Use. The findings

reflect that only one functionality of m-commerce systems, the Mobile Notification, has a significant effect on Ease of Use. These findings inform us that the higher the perception of the fit of Ease of Use, the higher the Mobile Notification functionality is used to perform Task Non-routineness, Task Interdependence and Time Criticality. The perception of the correspondence between Mobility Task, Task Non-routineness, Task Interdependence and Time Criticality aborts any negative perception of the fit of Ease of Use. However, these findings reveal that the Ease of Use has weak support for the functionalities of m-commerce systems but is partially supported by the task characteristics.

Interaction effect on Authorization Factor

Task Interdependence and Mobility Task have a significant effect on Authorization Factor. Mobile Data Processing has a significant effect on Authorization Factor. The findings indicate that the Task Independence has a full effect, the Mobile Data processing has a partial effect and Mobility Task has a moderate effect on Authorization Factor. These findings show that the higher the perceived fit of Authorization Factor is, the higher the Mobile Data Processing is used for performing the Task Interdependence and Mobility Task. The perception of the fit between the Mobile Data Processing functionality and the Task Interdependence, and Mobility Task stops any negative perception of the fit of Authorization Factor. The effects of Time Criticality, Task Non-routineness, Mobile Notification, Mobile Information Exchange, and Mobile Information Search on Authorization Factor are not significant.

The interaction between task-technology fit dimensions, Data Security, and Mobile Commerce Use

The findings indicate that two out of eight dimensions of task-technology fit have a significant effect on Mobile Commerce Use. That is, the effect of both the fit of Quality Factor and the fit of Ease of Use on Mobile Commerce Use were statistically significant. The use of m-commerce partially depends on the Quality Factor of the correspondence between the functionalities of m-commerce systems and task characteristics. Similarly, the use of m-commerce partially depends on the Ease of Use of the correspondence between the functionalities of m-commerce systems and task characteristics.

The effects of Reliability Factor, Compatibility Factor, Locatability Factor, Production Timeliness, Relationship with User, Authorization Factor on Mobile Commerce Use are not significant. These findings show that Mobile Commerce Use received very weak support from the task-technology fit dimensions. Therefore, perception of the task-technology fit is not a requisite for the use of m-commerce by retailers (**Proposition 2**).

Furthermore, findings indicate that the effect of Data Security on Mobile Commerce Use is significant. The perception of the Data Security characteristics of m-commerce systems moderately affect the use of m-commerce. In regard to the Data Security characteristics, brick-

and-mortar retailer must ensure that the m-commerce systems operate in an encrypted way, uses authentication and imposes strict control over information access. These findings inform us that there is moderate support for the proposed relationship between Data Security and Mobile Commerce Use (**Proposition 4**). Therefore, the perception of the Data security characteristics is a requisite for the adoption and use of m-commerce by retailers.

The effect of Top Management Support, Technology Competence and Readiness for Mobile Distribution System on Mobile Commerce Use

The Top Management Support, Technology Competence and Readiness for Mobile Distribution Systems have a significant effect on Mobile Commerce Use. The findings show that the use of m-commerce is fully affected by and dependent on both the Top Management Support and Readiness for Mobile Distribution Systems. The findings further show that the use of m-commerce is partially affected by and dependent on the Technology Competence. Therefore, the findings fully support the proposed relationship between Top Management Support and Mobile Commerce Use (**Proposition 6**); and Readiness for Mobile Distribution Systems and Mobile Commerce Use (**Proposition 8**). They partially support the proposed relationship between Technology Competence and Mobile Commerce Use (**Proposition 7**).

The effects of constructs of the environmental context on M-commerce Use

Policies and Regulations, Technological Cooperative Institutions, Operator Network, Critical Mass Factor, Mobile Payment Gateway and Competitive Pressure Factor did not have significant effects on Mobile Commerce Use. These findings inform us that the use of m-commerce is not supported by any construct of the environmental context. Therefore, the findings indicate weak support for the proposed relationship between Policies and Regulations and Mobile Commerce Use (**Proposition 9**); Technological Cooperative Institutions and Mobile Commerce Use (**Proposition 10**); Operator Network and Mobile Commerce Use (**Proposition 11**); Critical Mass Factor and Mobile Commerce Use (**Proposition 12**); Mobile Payment Gateway and Mobile Commerce Use (**Proposition 13**); and Competitive Pressure Factor and Mobile Commerce Use (**Proposition 14**).

Table 6.16 below shows the Squared Multiple Correlations (R^2). The R^2 predicts the quality of the proposed relationship between the independent variables and dependent variable. In another word, it indicates the proportion of variance in a criterion variable that its predictors are accounted for. The predictive accuracy for the Reliability Factor, Quality Factor, Compatibility Factor, Locatability Factor, Production Timeliness, Relationship with User, Ease of Use, Authorization Factor, Mobile Commerce Use, of the structural model, were assessed. The R^2 values shown in Table 6.16 vary from 189 to 353. However, the R^2 for Mobile Commerce Use (R^2 = 353), Production Timeliness (R^2 = 338) and Authorization Factor (R^2 = 336) are the most significant, across the criteria variables. Furthermore, the R^2 for the Relationship with User (R^2 = 189) is the lowest, with a weak estimate.

Table 6.16: Coefficient of determination

Squared Multiple Correlations (R^2)				
Reliability Factor (RF)	Quality Factor (QF)	Compatibility Factor (CF)	Locatability Factor (LF)	Production Timeliness (PT)
0.202	0.254	0.267	0.247	0.338
Relationship with User (RU)	Ease of Use (EU)	Authorization Factor (AF)	Mobile Commerce Use (MCU)	
0.189	0.252	0.336	0.353	

The results of the empirical test of the model are summarised in Table 6.17 below.

Table 6.17: Summary of the propositions

Proposition	**Test results**
P1. The perception of functionalities of m-commerce systems positively influences the task-technology fit.	Partially Supported
P2. The perception of good task technology fit is a requisite for the use of m-commerce in brick-and-mortar retailers.	Not Supported
P3. The perception of relative advantage of m-commerce is a requisite for the use of m-commerce in brick-and-mortar retailers.	Supported
P4. Data security is a requisite for the use of m-commerce.	Supported
P5. The task characteristics positively affect the task-technology fit.	Partially Supported
P6. The top management support is a requisite for the use of m-commerce.	Supported
P7. Business technology competence is a requisite for the use of m-commerce.	Supported
P8. The brick-and-mortar retailer's readiness for mobile distribution systems is a requisite for the use of m-commerce.	Supported
P9. The availability of policy and regulation is a requisite for the use of m-commerce by brick-and-mortar retailers.	Not Supported
P10. The availability of technological cooperative institutions is a requisite for the use of m-commerce by brick-and-mortar retailers.	Not Supported
P11. The availability of adequate mobile operator network is a requisite for the use of m-commerce by brick-and-mortar retailers.	Not Supported
P12. The availability of critical mass is a requisite for the use of m-commerce by brick-and-mortar retailers.	Not Supported
P13. The availability of mobile payment gateway is a requisite for the use of m-commerce by brick-and-mortar retailers.	Not Supported
P14. The availability of competitive pressure is a requisite for the use of m-commerce in brick-and-mortar retailers.	Not Supported

6.4.4 Dataset III: Results

The results from the questionnaire (quantitative data) administered to the brick-and-mortar business owner/managers, i.e. the perceptions of non-users of m-commerce, are presented and analyzed in this section. The results are related to the following research question:

Research Question 4:
What factors within the brick-and-mortar retailer setup will impede the use of m-commerce?

6.4.4.1 Business internal variables

The results in Figure 6.3 show that the lack of experience as an impediment to the adoption and use of m-commerce received significant support from brick-and-mortar business owners/managers. Results inform us that there is more agreement (36.5% agree, 18.8% somewhat agree and 12.2% strongly agree) than disagreement (13% disagree, 8.2% somewhat disagree and 5.5% strongly disagree) for the lack of experience as an impediment to the adoption of m-commerce. These results are supported by earlier research (Kapurubandara & Lawson, 2006; Siwundla, 2013:v; Chang & Dasgupta, 2015:26). Previous experience in using m-commerce is critical, and in its absence, proper training on digital business should be received. Inability to use m-commerce technology will lead to the failure of adopting and using it (Chang & Dasgupta, 2015:26).

Furthermore, the results inform us that the majority of conventional business leaders have trust in m-commerce. Although a considerable proportion of brick-and-mortar business owners/managers agreed (21.6% agree, 7.5% somewhat agree and 6.3% strongly agree), results show that there was a high proportion of business owners/managers who disagreed (31% disagree, 27% strongly disagree and 4% somewhat disagree) that they lack trust in mobile transactions. These results also reveal that the albeit low but considerable proportion of respondents who agreed that they lack trust in m-commerce also still believe that electronic commerce business models are not safe and reliable.

The results in Figure 6.3 indicate that other factors such as the cost of m-commerce infrastructure, the lack of personnel with IT skills, and the lack of adequate skills to configure forward and backward distribution systems, were greatly supported by brick-and-mortar business owners/managers as impediments to adopt and use.

Results inform us that more conventional business leaders agreed (33.7%), somewhat agreed (24%) and strongly agreed (23%) than those who disagreed (8.6%), somewhat disagreed (6%) and strongly disagreed (4%) with the cost of m-commerce infrastructure as an impediment to adopt and use. These results are supported by prior research (Mallat & Tuunainen, 2008:43; EY, 2015:7; Jokonya, 2019:104). The barrier's perspective on infrastructure costs is that the SMEs, in general, operate with a very narrow profit margin, which may result in the lack of

financial resources as well as basic ICT infrastructure for the use of m-commerce. The adoption and use of m-commerce will involve high initial costs and high operating costs to succeed (Mallat & Tuunainen, 2008:43; Jokonya, 2019:104).

The results further show that 36% of brick-and-mortar business owners/managers agreed, 22% somewhat agreed and 18% strongly agreed that the lack of personnel with IT skills has been an impediment to use, while 11% disagreed, 7% somewhat disagreed and 4% strongly disagreed. In-house technological skills are critical for the effective adoption and use of m-commerce. Thus, the lack of personnel or management who have IT skills will be an additional barrier to the deployment of m-commerce. These results are supported by prior research (Kapurubandara & Lawson, 2006; Chang & Dasgupta, 2015:32; Jokonya, 2019:103).

The results show that there was more agreement (51% agree, 19% strongly agree and 18% somewhat agree) than disagreement (3% disagree and 3% somewhat disagree) for the lack of adequate skills to configure a forward distribution system. Similarly, there was more agreement (42% agree, 24% strongly agree and 22.7% somewhat agree) than disagreement (1.6% disagree, 1% strongly disagree and 4% somewhat disagree) for the lack of adequate skills to configure a backward distribution system for the m-commerce strategies. These results are supported by prior research (Hübner et al., 2016:255; Caro et al., 2020:52). Conventional business owners/managers' inability to develop mobile distribution systems will lead to a barrier to using m-commerce. Mobile retailers' forward and backward distribution systems, particularly groceries, must ensure same-day delivery to multiple destinations and return of products from multiple starting points. Thus, the complexities surrounding the design of forward and backward distribution systems are the biggest challenge faced by retailers (EY, 2015:2; Hübner et al., 2016:280; Song et al., 2019:527).

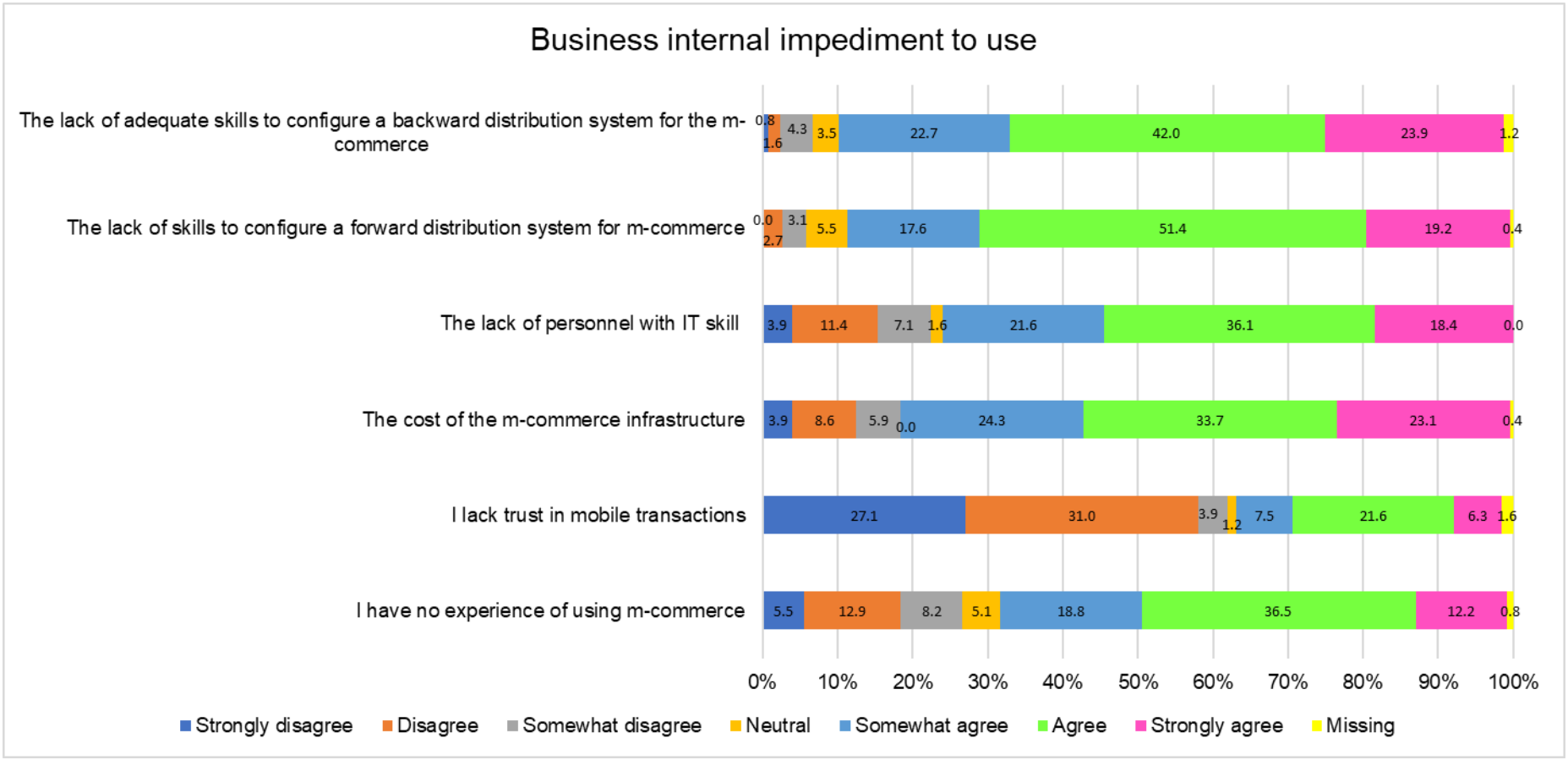

Figure 6.3: Impediment to use mobile commerce in the business internal environment

Moreover, more brick-and-mortar business owners/managers disagreed (39%), strongly disagreed (30%) and somewhat disagreed (12.5%) than agreed (7.5%), strongly agreed (4.3%) and somewhat agreed (2%) that m-commerce would not contribute to the profit margin (see Figure 6.4). These results inform us that a very large proportion of brick-and-mortar business owners/managers believe that m-commerce can contribute to their business profit margin. This variable was very weakly supported as an impediment to use.

The results in Figure 6.4 indicate that there was more disagreement (32.9% disagreed, 32.5% strongly disagreed and 17.3% somewhat disagreed) than agreement (5.9% strongly agree, 4.3% agree and 2.4% somewhat agree) to the statement 'm-commerce would not contribute to our business sales increases". These results show that brick-and-mortar business owners/managers believe that the use of m-commerce can contribute to the increase in sales. That means integrating m-commerce into brick-and-mortar retailers will boost sales, which yields a positive synergy. These results are supported by prior research (Pozzi, 2013:569; Huang et al., 2016:265).

Similarly, 33.3% of brick-and-mortar business owners/managers strongly disagreed, 27.8% disagreed and 9.8% somewhat disagreed with the statement "the use of m-commerce will not create competitive advantage", while 8.6% somewhat agreed, 7.8% strongly agreed and 7.1% agreed (see Figure 6.4). These results inform us that majority of brick-and-mortar business owners/managers believe that m-commerce will give a competitive advantage to their traditional business. These results, therefore, have very weak support as an impediment to use. Brick-and-mortar retailers may be forced to adopt and use m-commerce due to the belief that they can stay ahead (Chandra & Kumar 2018:244).

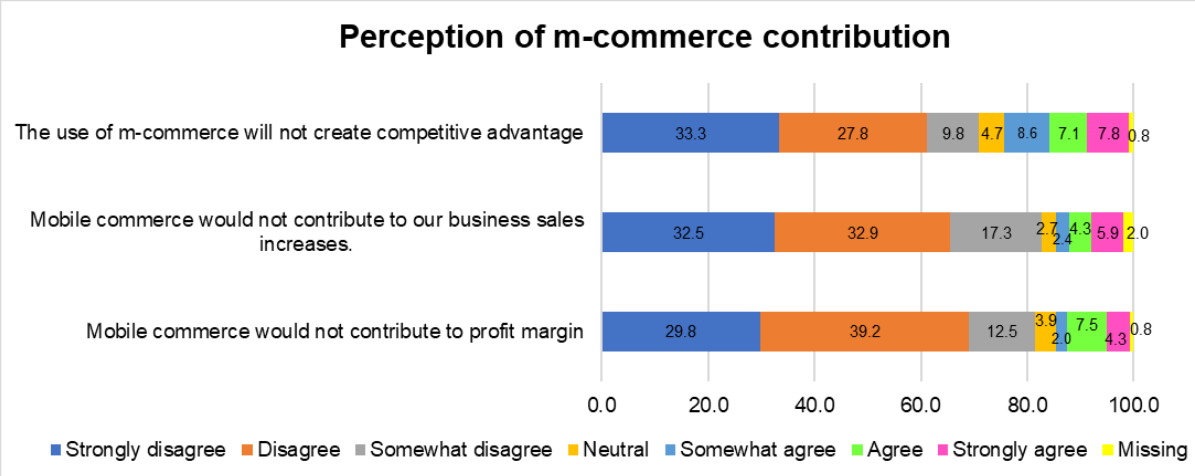

Figure 6.4: The perception of mobile commerce as an impediment to use

6.4.4.2 External variables

Figure 6.5 indicates that 35% of conventional business leaders agreed, 20% somewhat agreed and 13% strongly agreed that the lack of governmental policies and regulations has been an impediment to m-commerce adoption and use. In contrast, 14% disagreed, 10% somewhat disagreed and 1.6% strongly disagreed and 5% of respondents remained neutral. These results inform us that most brick-and-mortar business owners/managers were in agreement with the lack of policies and regulations as a barrier to the adoption and use of m-commerce by their businesses. These results are supported by the findings of Dataset I (interviews with m-commerce business managers and professionals). M-commerce business managers expect that policymakers should establish procedures for being in m-commerce business and have laws to protect privacy and enforce security. These results are supported by prior studies (Zhu et al., 2006b:1569). In previous studies, the need for policymakers' interventions was also found to be critical, particularly for developing countries (Zhu & Kraemer, 2005:80; Kamble et al., 2019:165). It suggests that in the initiation stage of the technology integration, potential users tend to gather and evaluate valuable information about the technology. Thus, governmental policies and regulations are regarded as very important factors, particularly in developing countries in the initiation stage.

Figure 6.5 also shows that 42.4% of respondents agreed, 23.5% strongly agreed and 14.9% somewhat agreed that the lack of cybersecurity measures constitutes an impediment to the use of m-commerce, whilst 4.7% of respondents were neutral, 3.5% strongly disagreed 3.1% disagreed, 3.1% somewhat disagreed and 4.7% missed. These results inform us that the lack of cybersecurity measures, by common consent, is an additional barrier to adopt and use. Findings of Dataset I support that businesses engaging in m-commerce activities should be equipped with adequate protection and technical control over the data that are no longer needed, in transit and in a storage device.

Although 28% of brick-and-mortar business owners/managers strongly disagreed, 10% disagreed and 2% somewhat disagreed that poor performance of mobile operators' network services has been an impediment to use, there were 22%, 20% and 12% of respondents who agreed, strongly agreed and somewhat agreed, respectively. Thus, the results show that a slightly higher proportion of brick-and-mortar business owners/managers were in agreement with the poor performance of mobile operators' networks as an impediment to adopt and use. These results are supported by the findings of Dataset I, where respondents reported network failure and poor coverage as additional challenges to the continuation of m-commerce usage. Similarly, prior research found that the infrastructure of most mobile operators in developing countries is not up to scratch, which constitutes a barrier to the adoption and use of m-

commerce (Maritz, 2014; Poulson, 2014; The Earth Institute & Ericsson, 2016:10; Kamble et al., 2019:165).

The results inform us that there was more agreement (38.8% agree, 23.5% strongly agree and 9% somewhat agree) than disagreement (6.7% disagree, disagree, 5.5% somewhat and 2.7% strongly disagree) that the lack of financial support is an impediment to adopt and use (see Figure 6.5). Unexpectedly, 13% of respondents remained neutral on this notion. The findings of Dataset I also supported that the lack of financial assistance from the government and financial institutions was a challenge in Angola. However, one would want to discover more about the respondents who remained neutral, whether they believed that there was financial support in the market or not but in either event, it was not high enough to cause a barrier to use.

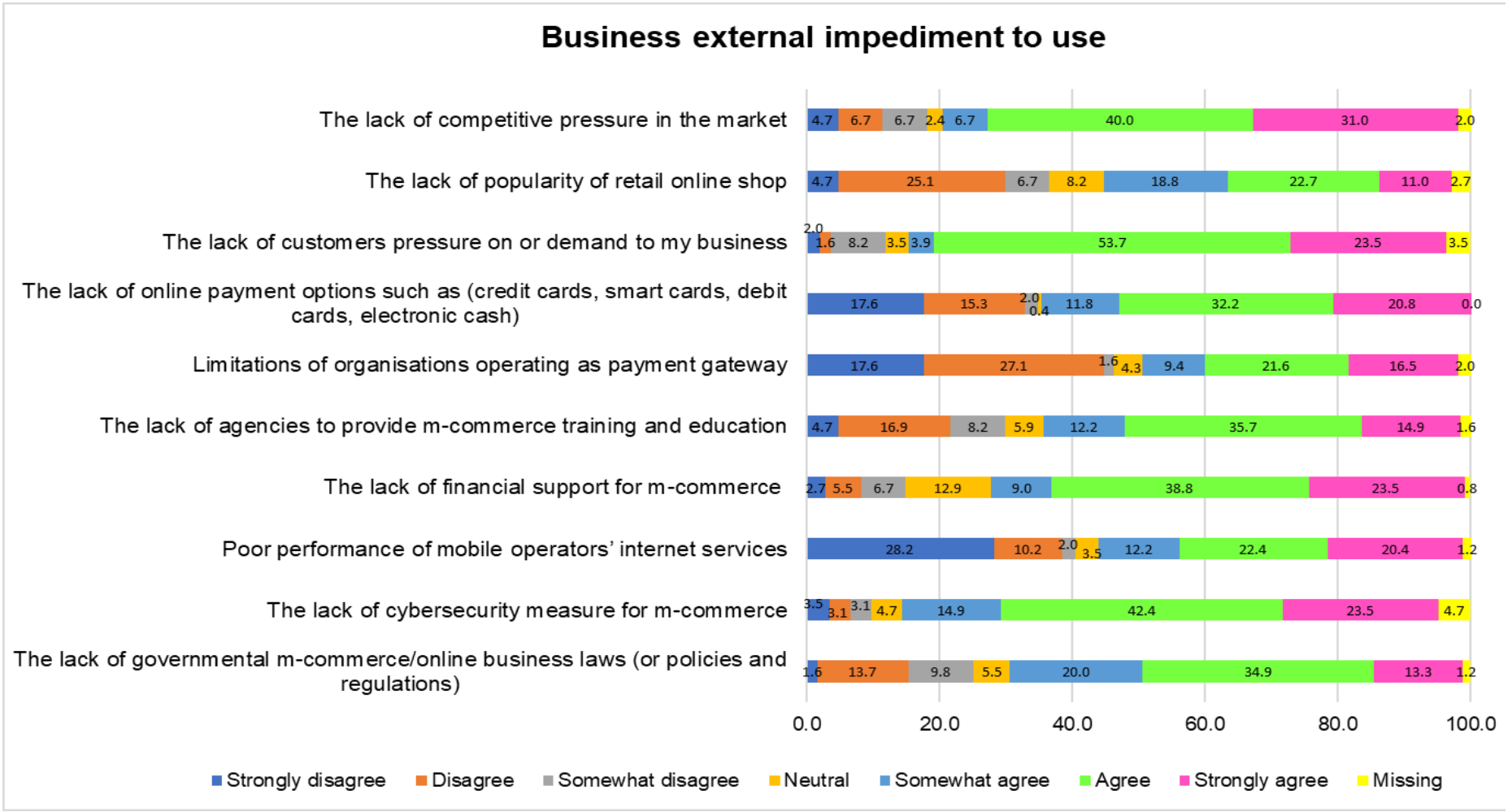

Figure 6.5: Impediment to use m-commerce in the business external environment

The results in Figure 6.5 above indicate that 35.7% of brick-and-mortar business owners/managers agreed, 15% strongly agreed and 12% somewhat agreed that the lack of agencies to provide m-commerce training and education was an impediment, while 16.9% disagreed, 8.2% somewhat disagreed and 4.7% strongly disagreed. These results inform us that there was more agreement than disagreement about the lack of agencies to provide conventional business owners/managers with m-commerce training and education. These results are supported by the findings of Dataset I, which revealed that m-commerce businesses have not received enlisted support other than support for m-commerce applications. Similarly, prior research supports that the lack of institutions that subsidise the IT or m-commerce infrastructure and training of personnel of the business and/or promote science, technology and innovation may cause barriers to the adoption and use of m-commerce by small and medium enterprises (Siwundla, 2013:vi; Chang & Dasgupta, 2015:32).

Furthermore, the results show that there was no significant difference between the proportion of brick-and-mortar business owners/managers that disagreed (27% disagreed, 17.6% strongly disagreed and 1.6% somewhat disagreed) and agreed (21.6% agreed, 16.5% strongly agreed and 9.4% somewhat agreed) that lack of organisations which operate as payment gateways is an impediment to adopt and use m-commerce. That is, the variable received moderate support. In contrast, the lack of online payment options variable received high support as an impediment to adopt and use m-commerce by brick-and-mortar business owners/managers. The results indicate that 32.2% of respondents agreed, 20.8% strongly agreed and 11.8% somewhat agreed that the lack of online payment options such as credit cards, smart cards, debit cards and electronic cash was an impediment to use, while 17.6% strongly disagreed, 15.3% disagreed and 2% somewhat disagreed. The findings of Dataset I support these results. The findings reflect that the Angolan market expects mobile money and online credit/debit card payment options to be available for m-commerce businesses.

The results in Figure 6.5 show that the lack of customer pressure or demand on the business was highly supported by brick-and-mortar businesses as an impediment to the adoption and use of m-commerce. The results indicate that there was more agreement (53.7% agreed, 23.5% strongly agreed and 4% somewhat agreed) than disagreement (8.2% somewhat disagree, 2% strongly disagree and 1.6 disagree) for the lack of customer pressure or demand on the business. The findings of Dataset II support these results and show that there was no significant effect of Critical Mass on Mobile Commerce Use, that is, there was weak pressure from customers or potential consumers to use m-commerce.

Moreover, although, there was slightly more agreement (22.7% agree, 18.8% somewhat agree and 11% strongly agree) than disagreement (25% disagree, 6.7% somewhat disagree and 4.7% strongly disagree) for the lack of popularity of retail online shop as an impediment of use,

the results were a little skewed, in that a significant proportion of respondents disagreed and some remained neutral (8.2%). However, these results show moderate support for the variable. These results are supported by prior research (Kapurubandara & Lawson, 2006; Mallat & Tuunainen, 2008:45). When technology has very low popularity, a business faces no pressure to adopt and use the technology until its popularity increases.

Figure 6.5 indicates that more brick-and-mortar business owners/managers agreed (40%), strongly agreed (31%) and somewhat agreed (6.7%) than disagreed (6.7%), strongly disagreed (4.7%) and somewhat disagreed (6.7%) with lack of competitive pressure as an impediment to adopt and use. These results are supported by prior research, where weak competitive pressure was associated with the failure to use (Lu et al., 2015:294).

Other factors that would impede the adoption and use include the lack of m-commerce application that is readily available and bureaucratic processes of legalising an m-commerce business. However, the findings of Dataset I revealed that m-commerce businesses get support for m-commerce application (software) from private technological cooperative institutions. Thus, the lack of m-commerce applications indicated in these results could be associated with a low awareness of m-commerce and lack of understanding of its environment (Chang & Dasgupta, 2015:26). The bureaucratic process of legalising an m-commerce business is supported by the findings of Dataset I. It was found that the government is too involved in private business affairs which does not make things easy.

6.4.4.3 Dataset III: Findings

The findings of Dataset III indicate that:

- 68% revealed that they lack experience in the use of m-commerce;
- 62% of brick-and-mortar business owners/managers had a difference of opinion about the lack of trust in mobile transactions as an impediment to adopt and use;
- 81% reported the cost of m-commerce infrastructure as an impediment to adopt and use;
- 76% affirmed that the lack of personnel with IT skills has been impediment to use;
- 88% disclosed that they lack skills to configure forward distribution systems;
- 89% disclose that they lack skills to configure backward distribution systems;
- 82% had a difference of opinion about the lack of a contribution to profit margin in the use of commerce;
- 83% had a difference of opinion about the lack of a contribution to sales increases in the use of m-commerce;
- 71% had a difference of opinion about the lack of competitive advantage in the use of m-commerce;

- 68% of brick-and-mortar business owners/managers disclosed that the lack of governmental online business policies and regulations has been an impediment to the adoption and use of m-commerce;
- 81% revealed that the lack of cybersecurity measures constitutes an impediment to the adoption and use of m-commerce;
- 54% affirmed that mobile operators' network failure and poor coverage have been an impediment to using m-commerce;
- 71% marked the lack of financial support as an impediment to adopt and use;
- 63% reported that the lack of agencies to provide m-commerce training and education has been an impediment to use;
- 65% of brick-and-mortar business owners/managers affirmed that the lack of online payment options such as credit cards, smart cards, debit cards, electronic cash constitute an impediment to adopt and use;
- 81% marked the lack of customers pressure or demand on their business as an impediment to the adoption and use of m-commerce;
- 52% stated that the lack of popularity of retail online shops has been an impediment to the adoption and use of m-commerce; and
- 78% disclosed the lack of competitive pressure as an impediment to use.

6.5 Findings

This section provides a synthesis of the findings of Dataset I, Dataset II and Dataset III. Table 6.18 below contains the research questions and research objectives with their associated findings. Given the analysis of the three sample groups' responses, all independent data collected for the same research objective is consolidated in the discussions and findings.

Two typical types of support are identified for the adoption and use of m-commerce by brick-and-mortar retailers, which are the business' internal and external support. The internal variables that support the use of m-commerce involve task characteristics, Top Management Support, Technology Competence and Readiness for Mobile Distribution Systems. The results show that these variables positively influence a brick-and-mortar business to adopt and use m-commerce. Before a conventional business starts using m-commerce, the Task Characteristics should be established. A brick-and-mortar business must have tasks that fit the functionalities of m-commerce systems. The lack of business-related tasks to be performed on the mobile channel means no fit between the technology and the business. Top management support is another critical determinant of the use of m-commerce. When an organisation's top management provides support for the adoption and use of m-commerce, they confront all the risks involved. That is, with the support of senior management, employees are motivated to

use the technology and the inflow of resources that are lacking in the business becomes easier. Technology Competence implies that when the organisation has the necessary resources such as mobile information systems infrastructure and employees with IT skills, the organisation is able to adopt and use m-commerce without much impediment.

The conventional business' readiness to accept the complexities of and engage in m-commerce distributions has an impact on the adoption and use of m-commerce. When a brick-and-mortar retailer shows a willingness to develop an m-commerce distribution system for delivery and return of goods, they can strongly support the integration of the conventional business distribution systems with the mobile systems.

Table 6.18: Findings summary

Research question	Research objective	Findings
Qs1. What different contexts of the use of m-commerce align with the brick-and-mortar retailer business lines and capabilities?	**Ob1**. To investigate the different contexts of interrelated components that create the right environment for the use of m-commerce by brick-and-mortar retailers.	The TOE framework was integrated with the TTF model and extended to a general framework supported by 15 constructs that better explain the linkage between m-commerce usage and brick-and-mortar retailers. The 15 constructs are a synthesis of environmental context, organisational context, technological context and m-commerce use. The functionalities of m-commerce systems, task-technology fit, Relative Advantage, Data Security, task characteristics, Top Management Support, Technology Competence and Readiness for Mobile Distribution Systems were empirically supported.
Qs2. What is the nature of new added value that aligns **with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailer**s**?**	**Ob2.** To investigate the nature of new added value that aligns with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailers.	Mobile commerce yields cashless value to customers and enables customers to draw a lump sum of money to make payments while shopping online in contrast to getting cash at the bank. Mobile commerce enables customers to minimize the risk of moving around with a large sum of money/cash. Mobile commerce enables customers to shop with ease. Mobile commerce contributes to the reduction in the amount of time customers need for shopping. Mobile commerce business creates job opportunities for society.

Research question	Research objective	Findings
		Mobile commerce enables businesses to meet consumers' needs/wants and new experiences. Mobile commerce enables retailers to increase market share, lower business costs, speed up the sales process and increase the quality of customer service.
Qs3. What are the required features and characteristics of m-commerce systems for brick-and-mortar retailers**?**	**Ob3.** To determine the features and characteristics of m-commerce systems for brick-and-mortar retailers.	Brick-and-mortar retailers must be aware of the data security and data privacy issues of m-commerce systems. Brick-and-mortar retailers must use procedures for appropriate data treatment and equipment for adequate protection and technical control over the data. Brick-and-mortar retailers must have appropriate personnel and provide them with technical training to deal with issues around m-commerce systems. Four typical functionalities of m-commerce systems, the Mobile Notification, Mobile Information Exchange, Mobile Information Search and Mobile Data Processing, were identified to be suitable for task-related m-commerce for brick-and-mortar retailers. The perception of task-technology fit, the interaction between the functionalities of m-commerce systems and task characteristics, is not a requisite for the use of m-commerce. Data Security is a requisite for the adoption and use of mobile commerce systems, so brick-and-mortar retailer must ensure that the m-commerce systems operate in an encrypted way, uses authentication and imposes strict control over information access.
Qs4. What factors within the brick-and-mortar retailer setup will impede the use of m-commerce?	**Ob4.** To determine the factors within the brick-and-mortar retailer setup that are an impediment to the use of m-commerce.	Conventional business leaders feel discouraged from using m-commerce due to a lack of governmental online business policies and regulations, cybersecurity measures to reduce cybercrime and poor performance of mobile operators' networks. There is a lack of agencies providing m-commerce training, education, financial support as well as secure online

Research question	Research objective	Findings
		payment methods for both brick-and-mortar and m-commerce businesses. The lack of customer demand for and trust in m-commerce prevents its adoption and use by businesses. The lack of affordable Internet data service to the population and the popularity of retail online shops lead to a limited customer base and inhibit businesses from using m-commerce. Businesses do not face competitive pressure to use m-commerce. Conventional business owners/managers lack experience in the use of m-commerce as well as skills to configure forward and backward mobile distribution systems. The cost of m-commerce infrastructure and the lack of personnel with IT skills are deterring traditional businesses from using m-commerce. Traditional businesses do not support that m-commerce fails to contribute to profit margin and sales increases. Traditional businesses do not support that they lack trust in mobile transactions and that m-commerce does not give a competitive advantage.
Qs5. What support is required for the use of m-commerce by brick-and-mortar retailers?	**Ob5**. To determine the nature of support that is requisite for the use of m-commerce in brick-and-mortar retailers.	Brick-and-mortar retailers need financial support, managerial support and technical support for the adoption and continuation of the use of m-commerce.

6.6 Chapter summary

This chapter presented, discussed and analyzed the data collected through the interviews (Dataset I) and the survey questionnaires (Dataset II and Dataset III). Triangulation between methods was applied to ensure concurrent validity. The chapter consolidated data from independent data collection instruments using the qualitative instrument (interview results) to validate the quantitative instruments (questionnaire results). The different approaches used to analyze the results of qualitative data, quantitative data as well as consolidated data, helped

to strengthen the interpretation of data and give an overall picture of the use of m-commerce for brick-and-mortar retailers.

This chapter reviewed the conceptual framework proposed in Chapter 4 and presented and discussed its test results. The findings inform us that the adoption and use of m-commerce by retailers depends on three broader settings, which are the organisational context, the technological context and m-commerce use. The environmental context does not have significant effects on the use of m-commerce for retailers in Angola. The findings show that m-commerce provides customers with cashless value, a new channel to shop with ease and reduction in the time needed for shopping; community with employment; and business with relative advantage. The findings also show that brick-and-mortar businesses continue to struggle to adopt and use m-commerce as a result of a lack of skills, necessary resources and external support.

CHAPTER 7
CONCLUSION

7.1 Introduction

In the previous chapter, Chapter 6, the test results of the proposed framework for the use of m-commerce by brick-and-mortar retailers were discussed and analyzed.

This chapter provides a synopsis of each chapter. The chapter also makes recommendations and suggests directions for further research.

7.2 Conclusion

Chapter 1: Introduction. This chapter introduced the study and stated the research problem and research objectives. The research problem is “The lack of a dependable framework for using m-commerce to manage brick-and-mortar retailer stakeholders' priorities continues to be a concern for conventional business leaders, who continue to struggle to incorporate productivity-enhancing technologies into their businesses”. The study’s main research objective reads: “To investigate the underlying factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers”. Furthermore, this chapter provided an overview of the research philosophical perspective (i.e. positivist and interpretive paradigms), the research approach (i.e. mixed methods) and the strategy adopted to address the research problem stated above. It also introduced the rational course of actions adopted for both data collection and data analysis.

Chapter 2: Literature review. The two broad concepts of brick-and-mortar retailers and m-commerce were defined. This chapter explored the different patterns of m-commerce to align with the brick-and-mortar retailer business lines and capabilities. It identified different interrelated components that can create the right environment for the adoption and use of m-commerce. In most cases, interrelated components can be observed in the context of m-commerce business stakeholders, business capability, m-commerce systems, and multi-channel management skills.

Furthermore, Chapter 2 discussed the benefits of using m-commerce. In the context of brick-and-mortar retailers, it was argued that the use of m-commerce can be critical for a business’ operations and customers. It was revealed that the variables preventing the adoption and use of m-commerce by conventional businesses can be associated with the potential adopter, the technology, the macro environment and the market environment of the business.

Chapter 3: Literature review. Given the literature reviewed in Chapter 2, a literature review on the theoretical underpinning of the study was undertaken in Chapter 3. The TOE framework and the TTF model were taken as the lens underpinning the explanation and understanding of

the adoption or use of m-commerce by brick-and-mortar retailers. An extensive literature review on the basic constructs of the TTF and TOE, the different integrations across the TTF and the TOE was conducted. Hence, the constructs that are requisite for the use of m-commerce in brick-and-mortar retailers were identified.

Both Chapter 2 and Chapter 3 offered grounds for the development of the proposed theoretical framework presented in Chapter 4. The TTF model constructs, the TOE framework and other components identified in Chapter 2 were found suitable for the explanation and understanding of the use of m-commerce by brick-and-mortar retailers. This integration led to the extension of the TOE framework and the TTF model to the proposed theoretical framework founded on three contexts and 15 constructs. These constructs are functionalities of m-commerce systems, data security, task technology fit, relative advantage (for the technological context), task characteristics, top management support, technology competence, readiness for mobile distribution systems (for the organisational context), policies and regulations, mobile network infrastructure, technological cooperative institutions, critical mass, mobile payment gateway competitive pressure (for the environmental context) and the m-commerce use.

Chapter 4: Conceptual framework. This chapter presented the development of the integrated framework proposed in the study. Chapter 4 also discussed the relationship among the constructs and developed the propositions that were tested.

Chapter 5: Research strategy and methodology. This chapter discussed the research methodology. The positivist and interpretive philosophical perspective, the mixed methods (the qualitative and quantitative) approach and the cross-sectional study design adopted to address the research problem were extensively discussed. Two techniques, the structured questionnaire (quantitative) and the semi-structured interview (qualitative) were found suitable as data collection instruments. SPSS software and the AMOS software were selected for the quantitative data analysis. In this chapter, the test results of the measurement model fit and constructs internal consistency reliability, the convergent validity and discriminant validity were discussed. The GFI reported by the AMOS structural equation model package was discussed. Furthermore, Chapter 5 clarifies the methods that were adopted to analyze the quantitative data, which are the descriptive analysis and statistical multiple regression equations. The methods adopted to analyze the qualitative data were initial coding and content analysis. It was argued that triangulation of quantitative and qualitative data should be applied for the data analysis. The triangulation of the two forms of data would strengthen the interpretation of data and give an overall picture of the use of m-commerce for brick-and-mortar retailers.

Chapter 6: Data presentation, discussion and analysis. The two forms of data collected were presented and discussed in three groups, namely, Dataset I, Dataset II and Dataset III. Dataset I analyzed the data and results from the semi-structured interviews. Dataset II

analyzed the data and results from the questionnaire administered to the m-commerce business personnel and Dataset III analyzed the data and results from the questionnaire administered to the brick-and-mortar business leaders. In this chapter, the proposed theoretical conceptual framework proposed in Chapter 4 was revisited and its test results were presented and discussed. For the data analysis, techniques such as descriptive analysis method, statistical multiple regression equations and coding of data and content analysis approaches were used. Although the study employed a multi-method approach to the research problem, the quantitative method was the main method guiding the research. The qualitative data was used to validate the quantitative data. These independent data that were collected to answer each of the research objectives, then had to converge on the discussions and findings.

The next section addresses the findings of the study as relevant to the research objectives provided in Chapter 1.

7.3 Research objectives revisited

Research Objective 1:

To investigate the different contexts of interrelated components that create the right environment for the use of m-commerce by brick-and-mortar retailers.

In Chapter 4, the study integrated the TTF model and the TOE framework and extended their basic constructs to a 15-dimensional construct to better explain the linkage between m-commerce usage and brick-and-mortar retailers. The 15 constructs were aligned with three major contexts—the environmental context, organisational context and technological context, and m-commerce use. The 15 constructs are functionalities of m-commerce systems—Relative Advantage, Data Security, task characteristics, Top Management Support, Technology Competence, Readiness for Mobile Distribution Systems, Policies and Regulations, Technological Cooperative Institutions, Operator Network, Mobile Payment Gateway, Competitive Pressure, Critical Mass Factor and Mobile Commerce Use. The functionalities of m-commerce systems consist of four functions—Mobile Notification, Mobile Information Exchange, Mobile Information Search and Mobile Data Processing. The task characteristics consist of four typical characteristics—Time Criticality, Mobility Task, Task Non-routineness and Task Interdependence.

The test and analysis of the framework revealed that two out of three contexts of interrelated components determine the use of m-commerce in Angola. These contexts are the organisational context and the technological context. The constructs that lend significant support to the use of m-commerce are the task characteristics, Top Management Support, Technology Competence and Readiness for Mobile Distribution Systems. These constructs are associated with business context. The results further show that the functionalities of m-

commerce, Relative advantage and Data Security constructs associated with the technological context also significantly support the use of m-commerce. Other variables are associated with the external factors, which are financial support, managerial support and technical support that retailers expect from the support agencies. However, all the above were identified as the requisite support that brick-and-mortar retailers need for the successful implementation of m-commerce.

Research Objective 2:

To investigate the nature of new added value that aligns with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailers.

M-commerce has novelty value for retailers, customers and society at large. It is established that the contributions of m-commerce to brick-and-mortar retailers in Angola lie in the m-commerce Relative Advantage. M-commerce enables retailers to increase market share, lower business costs, speed up the sales process and increase the quality of customer service. It enables businesses to meet consumers' needs/wants and new experiences. The value of increases in sales, profit margin and competitive advantage were found to be very appealing to brick-and-mortar retailers.

It was established that m-commerce serves the interests of customers and the government. It provides customers with cashless value which minimizes certain risks and enables them to pay a lump sum of money while shopping online, as opposed to drawing cash from a bank. M-commerce enables customers to shop with ease and contributes to a reduction in the time they need for shopping.

While bringing about economic reform, m-commerce business creates job opportunities and economic wealth that are aligned with the interests of the government and society.

Research Objective 3:

To determine the features and characteristics of m-commerce systems for brick-and-mortar retailers.

Four typical functionalities of m-commerce systems, Mobile Notification, Mobile Information Exchange, Mobile Information Search and Mobile Data Processing, were identified as suitable for tasks related to m-commerce. These functionalities can assist brick-and-mortar retailers with the execution of m-commerce business' task characteristics.

Data security and privacy are one of the main features of m-commerce systems. Therefore, it is important to stress that m-commerce systems should operate in an encrypted way, use authentication and impose strict control over information access. Brick-and-mortar retailers must be aware of data security and privacy issues around m-commerce systems and use appropriate procedures to ensure the secure treatment of data. Brick-and-mortar retailers need to be equipped with resources that guarantee that the business and its partners'

information/data are safe and secure. Furthermore, retailers must either bring new skills on board or have their personnel appropriately trained to deal with data security and privacy issues.

Research Objective 4:

To determine the factors within the brick-and-mortar retailer setup that are an impediment to the use of m-commerce.

Brick-and-mortar retailers encounter difficulties in the adoption and use of m-commerce in Angola for various reasons. Their lack of experience in the implementation of effective and efficient m-commerce systems are one of the primary reasons for their failure to use m-commerce. The implementation and use of forward and backward distribution systems are still complex tasks for them. However, these results illustrate that conventional business leaders struggle on with the use, partly due to a lack of ability around m-commerce. This lack of ability is extended to conventional business personnel. As was reviewed in Chapter 2, this study's test results concur with the literature that the lack of personnel with IT skills and the cost of m-commerce infrastructure are impediments to the use of m-commerce by brick-and-mortar retailers.

Conventional business leaders feel discouraged from adopting and using m-commerce due to a lack of governmental online business regulations and agencies providing m-commerce training, education and financial support. The government policies and regulations and support agencies do not have a significant effect on the actual use of m-commerce. That is, they are treated as unimportant in the actual usage but the potential entrants regard them as an impediment to use.

The reliability issue of mobile operator networks should be given more attention. For the adoption and continuation of the use of m-commerce, mobile operator networks need to be reliable. Network signals and coverage require improvement because they present problems for m-commerce businesses.

The findings revealed that data security is a matter of great concern for online business in that the lack of it inhibits the potential entrant from using m-commerce and its availability influences the actual user to continue using the m-commerce. Data security is an important feature of m-commerce systems, which help safeguard against unauthorised access to data or cybercrime.

The lack of secure online payment options affects potential entry to m-commerce. Both the lack of an affordable Internet data service to the population as well as the lack of popularity of retail online shops explain the lack of customer demand for m-commerce, which results in a limited customer base that inhibits brick-and-mortar businesses from using m-commerce.

Potential entrants should be very involved in the promotion of m-commerce, building customers' trust as well as expanding the customer base.

Research Objective 5:

To determine the nature of support that is requisite for the use of m-commerce in brick-and-mortar retailers.

The external variables that support the adoption and use of m-commerce involves financial support, managerial support, and technical support. These supports are mostly required by the potential entrants. They are identified as the requisite support brick-and-mortar retailers need for the successful implementation of m-commerce.

7.4 Contributions

7.4.1 Theoretical contributions

The theoretical contribution is that this study developed and empirically tested a framework for the use of m-commerce by brick-and-mortar retailers. Figure 7.1 (also discussed in Chapter 4) illustrates the test results of the proposed general framework. The integration of the TTF model and the TOE framework and their extension to a proposed general framework provides a comprehensive structural design within the alignment of brick-and-mortar retailer operations and m-commerce practices. The proposed general framework is supported by 15 constructs. This study led to the development of instruments to measure the Mobile Information Exchange, Readiness for Mobile Distribution Systems and Mobile Payment Gateway. These constructs were validated in this study. Marketing researchers can use these constructs in conjunction with other constructs proposed in this study to conceptualise the integration of the TTF model and the TOE framework.

Further contribution from this study to the theory is related to the integration of the TOE framework and the TTF model. The integration of these two different theoretical perspectives gives additional insight into the use of m-commerce for business. The two theoretical perspectives have proven to be significantly useful for investigating and understanding the factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers. In brief, the TOE framework and the TTF model enabled the researcher to combine both determinants of business' adoption and use of m-commerce in a single study and give a full perspective on the implementation of m-commerce specifically in the retail business context. Such results could possibly not be achieved if the integration of the TOE framework and the TTF model had not been considered.

In this study, the task characteristics construct of the TTF model was fitted into the business context of the TOE framework, and the functionalities of m-commerce systems and the task-technology fit constructs were fitted into the technological context of the TOE framework. Thus,

the way the constructs of the TTF model were examined in this study is a unique contribution that emerged from the integration of the two theoretical perspectives. Each of these constructs was an integral element of a cohesive setting that determine the use of m-commerce by retailers.

Furthermore, another contribution made to the theory is in light of the findings. The interaction effects of Policies and Regulations, Competitive Pressure Factor, Technological Cooperative Institutions, Mobile Payment Gateway, Operator Network and Critical Mass Factor on the actual use of m-commerce were not significant. These findings unveil that despite the reported variables that significant influence the actual use of m-commerce, the proposed general framework has also been proven useful for understanding and explaining the critical factors that are unavailable in Angola. However, it is important to emphasise that, due to the unavailability of some of independent variables in a developing country such as Angola, it is envisaged that the proposed general framework may further provide useful insight into m-commerce usage in a developed country where each of the variables is normally available.

7.4.2 Methodological contributions

This study combined the positivist and interpretive paradigms and followed a cross-sectional study design. By adopting the two paradigms, triangulating the quantitative method with the qualitative method was considered appropriate for collecting data and analysing the results of the proposed theoretical framework for the use of m-commerce by conventional retailers. Using triangulation between methods, the word-based data (qualitative) was used to inform the numerical data (quantitative). By assessing the validity and reliability of numerical measures, the concurrent validity was also met (using the word-based data to validate the numerical data). Thus, the methodological contribution is how the use of triangulation between methods and concurrent validity gave different practical and theoretical meanings. It proved to be a useful means for the collection of data and evaluation of the proposed theoretical framework for the use of m-commerce by brick-and-mortar retailers. Most earlier studies have used a single method rather than a multiple-method approach to test the TOE framework or the TTF model.

7.4.3 Practical contributions

This study's results cast light on the typical task characteristics (Time Criticality, Mobility Task, Task Non-routineness and Task Interdependence) and functionalities of m-commerce systems (Mobile Notification, Mobile Information Exchange, Mobile Information Search and the Mobile Data Processing), which can enable conventional businesses to determine the nature of m-commerce tasks that fit the m-commerce functions before the application and use of the mobile systems. Furthermore, the results may help conventional businesses to understand and identify other requisite factors in the adoption and use of m-commerce along the lines of

Relative Advantage, Data Security, Top Management Support, Technology Competence and Readiness for Mobile Distribution Systems. By considering the requisite factors for the use of m-commerce found in this research, it is envisaged that it may increase the likelihood of the business getting off to a good start.

To the business supporters, the general framework (see Figure 7.1) that was proposed in this study may also assist in the process of technological innovation transfer to retailers. The main results of this study can help promote the applications of m-commerce, particularly in developing countries where the adoption or use of technology by SMEs is undervalued. The proposed general framework may serve to strengthen the brick-and-mortar retailer for full participation in the digital ecosystem. These results may support the evaluation and application of the use of m-commerce by businesses.

7.5 Recommendations

The recommendations made in this section are derived from the factors within the brick-and-mortar retailer setup that impede the adoption and use of m-commerce in Angola.

7.5.1 Conventional business leaders

Selling goods or services to the final consumer through two or more channels requires multi-channel integration and management skills. M-commerce integration with brick-and-mortar retail stores requires an understanding of resources in line with m-commerce as well as a range of skills in the management of the digital business environment. Therefore, traditional business leaders should have personal knowledge or acquire specialist knowledge of relevant resources to the application and use of m-commerce, and skills to build m-commerce distribution systems, manage m-commerce transactions, warehousing, inventory, delivery, return and other personalised client services. The business leader should have a vision that incorporates m-commerce and be surrounded by personnel who have IT-related skills and can instil m-commerce business confidence into the public.

7.5.2 Policymakers

Since one of the major roles of government economic policies and regulations in an economy is to create a structured environment for businesses, customers and society. It is therefore crucial that policymakers put in place electronic commerce policies and regulations. Such action may boost confidence in conventional businesses and accelerate the adoption and use of m-commerce.

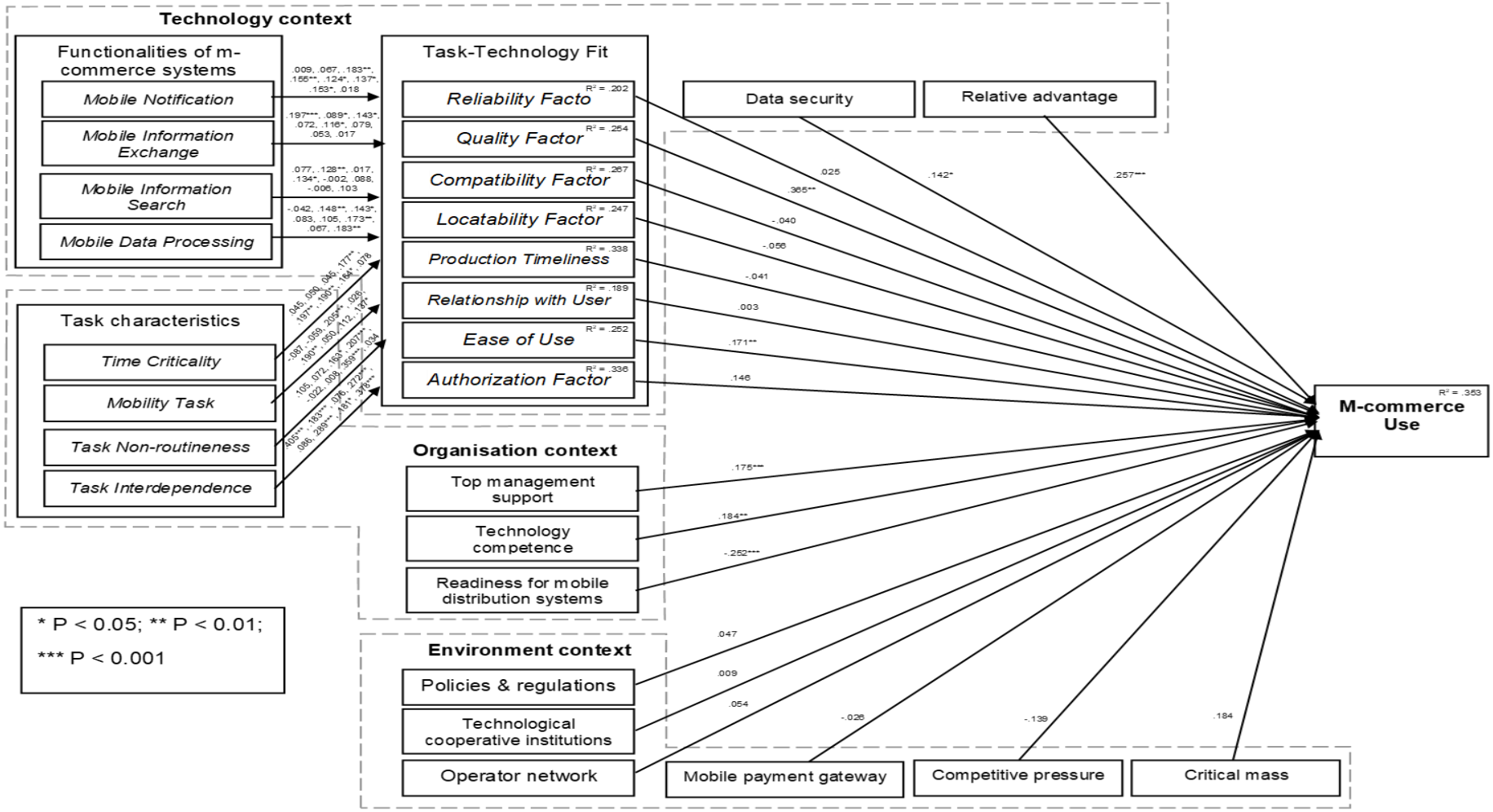

Figure 7.1: A framework for mobile commerce adoption and use in brick-and-mortar retailers – path effects

7.5.3 Support agencies

In general, SMEs have a limited number of workers and often lack financial resources and basic ICT infrastructure (Siwundla, 2013:v; EY, 2015:7; Prasanna et al., 2019:1). Usually, their continuation or expansion into the market is supported by government business and large private companies. The Angolan government should set up support organisations/agencies that are able to assist businesses when they call for financial support, managerial guidance on digital business models and technical support. Such support organisations should promote science, technology and innovation, and exercise elements of online business control and arbitration.

7.5.4 Network

There is a low opinion of the reliability of mobile operators' networks in Angola. Mobile operators are expected to improve their network signals and coverage and provide affordable mobile broadband Internet services to businesses and the public.

7.6 Limitations and future research

This study was conducted in Angola, where the application and use of m-commerce is one of the latest innovations in the retail sector. The study was delimited by investigating factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers in the Angolan province of Luanda. Thus, the findings of the study should not be generalised to other contexts. Being aware that the use of m-commerce has also been a new sales channel to brick-and-mortar businesses in other developing countries, the framework established in this study should be further tested in different settings. This is because the contexts and the determinants of the use of m-commerce tend to vary according to different business environments and conditions. However, the proposed framework also offers sufficient grounds for explaining and evaluating the adoption and use of m-commerce in other contexts such as developed countries. The researcher's expectations are that the retail sector should be, on occasion, provided with new developments in the determinants of the use of m-commerce.

This study adopted fit as correspondence to assess the correspondence (Reliability Factor, Quality Factor, Compatibility Factor, Locatability Factor, Production Timeliness, Relationship with User, Ease of Use and Authorization Factor) between the task Characteristics and Functionalities of m-commerce systems.

Future studies on the adoption and use of m-commerce by conventional businesses should consider the application of the framework proposed in Chapter 4 but evaluate another fit perspective. This way, the task-technology fit construct may be integrated with the TOE framework from another perspective.

Furthermore, the proposed theoretical framework was specially developed to explain the use of m-commerce by retail stores. Some of the variables developed and tested in the present study might not be compatible with other industries. For example, a construct like Readiness for mobile distribution systems would not fit into the service industries such as financial and electricity. Therefore, future studies can explore other constructs that are compatible with the industry being evaluated.

REFERENCE LIST

Abbas, S.K., Hassan, H.A., Iftikhar, S. & Waris, A. 2018. Assimilation of TTF and UTAUT for mobile banking usage. *International Journal of Advanced Engineering, Management and Science,* 4(4):305-308.

Almalki, S. 2016. Integrating quantitative and qualitative data in mixed methods research – challenges and benefits. *Journal of Education and Learning*, 5(3):288-296.

Almeida, É.D.C.D. 2019. *E-commerce readiness in Angola: the case of SOBA e-Store*. Master's dissertation, Univesidade Católica Portuguesa, Lisboa. http://hdl.handle.net/10400.14/29006

Amos, T., Pearse, N., Ristow, L. & Ristow, A. 2016. *Human resource management*. 4th ed. Lansdowne: Juta.

Angola. Diário da República. 2011a. Lei No. 30/11 de 13 de Setembro, Lei das Micro, Pequenas and Medias Empresas. *Diário da República*, 1(176):4294-4301, Setembro 2.

Angola. Diário da República. 2011b. Decreto presidencial n.o 201/11 de 20 de Julho, A Política National de Ciência, Tecnologia e Inovação. *Diário da República*, 1(137):3569-3592.

Anic, I.D., Škare, V. & Milaković, I.K. 2019. The determinants and effects of online privacy concerns in the context of e-commerce. *Electronic Commerce Research and Applications*, *36*:100868.

Asia-Pacific Economic Cooperation (APEC). 2015. *APEC Privacy Framework*. https://www.apec.org/Publications/2017/08/APEC-Privacy-Framework-(2015) [6 November 2019].

Badenhost, C.J., Ferreira, E.J., Groenewald, D., Joubert, H.J., Marcus, J.S.F., Steenekamp, S., Swanepoel, F., van den Berg, A., van Heerden, A. & van Rooyen, A.W.P. 2005. *Business and office administration: An outcomes-based approach*. 2nd ed. Sandown: Heinemann.

Baker, J. 2011. The technology–organization–environment framework In Dwivedi, Y.K., Wade, M.R. & Schneberger, S.L. (eds.). *Information systems theory: Explaining and predicting our digital society.* New York: Springer: 231-245.

Bartlett, J.E., Kotrlik, J.W. & Higgins, C.C. 2001. Organizational research: Determining appropriate sample size in survey research. *Information Technology, Learning, and Performance Journal*, 19(1):43-50.

Basole, R.C. 2004. *The value and impact of mobile information and communication technologies*. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.590.2122&rep=rep1&type=pdf [12 September 2018].

Berglund, H. & Sandström, C. 2013. Business model innovation from an open systems perspective: structural challenges and managerial solutions. *Int. J. Product Development,* 18(3/4):274–285.

Bernard, H.R. 2006. *Research methods in anthropology: qualitative and quantitative approaches.* Oxford: Alta Mira Press. http://www.antropocaos.com.ar/Russel-Research-Method-in-Anthropology.pdf [12 February 2018].

Bezovski, Z. 2016. The future of the mobile payment as electronic payment system. *European Journal of Business and Management*, *8*(8):127-132.

Bhattacherjee, A. 2012. *Social science research: principles, methods and practices*. University of South Florida. Florida. http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1002&context=oa_textbooks [18 September 2014].

Blem, N. 2007. *Achieving excellence in selling: A South African approach*. Cape Town: OUP Southern Africa.

Bless, C., Higson-Smith, C. & Sithole, S.L. 2013. *Fundamental of social research methods: an African perspective*. 5th ed. Cape Town: Juta.

Botha, S. & Musengi, S. (eds.). 2013. *Introduction to business management 1B: Fresh perspective*. Cape Town: Pearson.

Boysen, N., de Koster, R. & Füßler, D. 2020. The forgotten sons: Warehousing systems for brick-and-mortar retail chains. *European Journal of Operational Research*, 288(2):361-381.

Bradlet, T. 2007. *Essential statistics for economics, business and management*. Chichester: John Wiley.

Bryman, A. 2004. *Social research methods*. 2nd ed. New York: Oxford University Press.

Camponovo, G. & Pigneur, Y. 2003. Business model analysis applied to mobile business. *ICEIS*, 4:173–183.

Cao, L & Li, L. 2018. Determinants of Retailers' Cross-channel Integration: An Innovation Diffusion Perspective on Omni-channel Retailing. *Journal of Interactive Marketing*, 44:1–16.

Caro, F., Kök A.G. & Martínez-de-Albéniz, V. 2020. The Future of Retail Operations. *Manufacturing & Service Operations Management*, 22(1):47-58. https://doi.org/10.1287/msom.2019.0824

Čater, B., Marinšek, D., Čerenak, L., Devič, S. & Runov, K. 2018. Brick-and-Mortar vs Online Retail. *Shaping the Future: Opportunities and Challenges of E-commerce, Časnik Finance*, 189-207.

Chandra, S. & Kumar, K.N. 2018. Exploring factors influencing organisational adoption of augmented reality in e-commerce: empirical analysis using technology-organisation-environment model. *Journal of Electronic Commerce Research*, 19(3):237-265.

Chang, J.L. & Dasgupta, B. 2015. An investigation of the barriers to e-business implementation in small and medium-sized enterprises. *International Journal of Economics and Management Engineering*, *2*(1):26-36.

Chau, N.T. & Deng, H. 2018a. Critical determinants for mobile commerce adoption in Vietnamese SMEs: A Preliminary Study. *ACIS 2018 Proceedings*, 13. https://aisel.aisnet.org/acis2018/13

Chau, N.T. & Deng, H. 2018b. Critical determinants for mobile commerce adoption in Vietnamese SMEs: A conceptual framework. *Procedia computer science*, 138:433-440.

Chen, L. 2017. Understanding mobile work continuance of Chinese knowledge workers. *In Proceedings of the 50th Hawaii International Conference on System Sciences*, 5793-5801. https://pdfs.semanticscholar.org/65ce/af9b4bac49c088209cd784b72c47950503a0.pdf [16 June 2018].

Clarke, I. 2001. Emerging value propositions for m-commerce. *Journal of Business Strategies*, 18(2):133-148.

Cohen, L., Manion, L. & Morrison, K. 2007. *Research methods in education*. 6th ed. Milton Park, Abingdon: Routledge. http://doha.ac.mu/ebooks/Research%20Methods/Research-Methods-in-Education-sixth-edition.pdf [26 November 2016].

Cossengue, P.R. 2020. An epistemological study on the impact of covid-19 on Angola´ s business environment. *RAC: Revista Angolana de Ciências*, 2(2):1-18.

Cousins, K. & Robey, D. 2015. Managing work-life boundaries with mobile technologies: An interpretive study of mobile work practices. *Information Technology & People*, 28(1):34–71.

Culley, J. 2020. *An empirical investigation into the changes in the grocery retailing landscape-A Helsinki Metropolitan Region case study*. Doctoral Dissertation, Aalto University.

Daft, R.L. & Macintosh, N.B. 1981. A tentative exploration into the amount and equivocality of information processing in organizational work units. *Administrative Science Quarterly*, 26(2):207-224.

Debus, M. 1990. *Handbook for excellence in focus group research*. Washington DC: Academy of Educational Development Healthcom.

Dishaw, M.T. & Strong, D.M. 1999. Extending the technology acceptance model with task–technology fit constructs. *Information & Management*, 36(1):9-21.

EuroCommerce. 2017. *Contribution of retail and wholesale SMEs to the EU economy.* https://www.eurocommerce.eu/media/135423/contribution_of_retail_and_wholesale_smes_to_the_eu_economy.pdf [12 September 2020].

EY. 2015. *Re-engineering the supply chain for the omni-channel of tomorrow: global consumer goods and retail omni-channel supply chain survey*. http://www.ey.com/Publication/vwLUAssets/EY-reengineering-the-supply-chain-for-the-omni-channel-of-tomorrow/$FILE/EY-re-engineering-thesupply-chain-for-the-omni-channel-of-tomorrow.pdf [15 April 2020].

Eze, S., Chinedu-Eze, V., Bello, A., Inegbedion, H., Nwanji, T. & Asamu, F. 2019. Mobile marketing technology adoption in service SMEs: a multi-perspective framework. *Journal of Science and Technology Policy Management*, 10(3):569-596.

Ferreira, E.J. & Groenewald, D. 2016. *Administrative management*. 4th ed. Cape Town: Juta

Finotto, V., Christine, M. & Procidano, I. 2020. Factors influencing the use of e-commerce in the agri-food sector: an analysis of Italian consumers. *Department of Management, Università Ca'Foscari Venezia Working Paper*, 1.

Flick, U. 2007. *Designing qualitative research*. London: SAGE.

Frolick, M.N. & Chen, L. 2004. Assessing M-commerce opportunities. *Information Systems Management*, 21(2):53-61.

Gamser, M. & Chenevix, M. 2020. *How members are getting SMEs online – and out of danger*. https://www.smefinanceforum.org/post/how-members-are-getting-smes-online%E2%80%93and-out-of-danger [19 May 2020].

Gangwar, H., Date, H. & Ramaswamy, R. 2015. Understanding determinants of cloud computing adoption using an integrated TAM-TOE model. *Journal of Enterprise Information Management*, 28(1):107-130.

Gatara, M. & Cohen, J.F. 2014. The mediating effect of Task-Technology Fit on mHealth Tool use and community health worker performance in the Kenyan context. *Proceedings of the 8th International Development Informatics Association Conference, Port Elizabeth, South Africa*, 323-336. http://www.developmentinformatics.org/conferences/2014/papers/25-Gatara-Cohen.pdf [8 July 2018].

Gatara, M.C. 2016. *Mobile technology-enabled healthcare service delivery systems for community health workers in Kenya: a technology-to-performance chain perspective*. Unpublished PhD thesis, Johannesburg: University of the Witwatersrand.

Gauri, D.K., Jindal, R.P., Ratchford, B., Fox, E., Bhatnagar, A., Pandey A., Navallo, J.R., Fogarty, J., Carr, S. & Howerton, E. 2020. Evolution of retail formats: Past, present, and future. *Journal of Retailing*, https://doi.org/10.1016/j.jretai.2020.11.002 [21 January 2021].

Gebauer, J. & Shaw, M.J. 2004. Success factors and impacts of mobile business applications: results from a mobile e-procurement study. *International Journal of Electronic Commerce*, 8(3):19-41.

Gebauer, J. 2008. User requirements of mobile technology: a summary of research results. *Information Knowledge Systems Management*, 7:101–119.

Gebauer, J., Shaw, M.J. & Gribbins, M.L. 2010. Task-Technology Fit for mobile information systems. *Journal of Information Technology*, 25(3):259-272.

Goddard E. 2020. The impact of COVID-19 on food retail and food service in Canada: Preliminary assessment. *Canadian Journal of Agricultural Economics*, 1–5. https://doi.org/10.1111/cjag.12243

Goodhue, D. 1997. The model underlying the measurement of the impacts of the IIC on the end-users. *Journal of the American Society for Information Science*, 48(5):449-453.

Goodhue, D.L. & Thompson, R.L. 1995. Task-Technology Fit and individual performance. *MIS Quarterly*, 19(2):213-236.

Grant, A. M., Fried, Y. & Parker, S. K. 2009. Redesigning work design theories: the rise of relational and proactive perspectives. *Academy of Management Annals*, 3:317–375.

Gravetter, F.J. & Forzano, L.B. 2009. *Research methods for the behavioural sciences.* 3rd ed. South Melbourne: Wadsworth.

Greener, S. 2008. *Business research methods*. Frederiksburg: Ventus Publishing. http://kosalmath.files.wordpress.com/2010/08/introduction-to-research-methods.pdf [19 September 2018].

Groupe Speciale Mobile Association (GSMA). 2015. *The Mobile Economy: Sub-Saharan Africa 2015*. https://www.gsma.com/mobileeconomy/archive/GSMA_ME_SubSaharanAfrica_2015.pdf [25

Groupe Speciale Mobile Association (GSMA). 2020a. *Global Mobile Trends 2021: Navigating Covid-19 and beyond*. https://data.gsmaintelligence.com/api-web/v2/research-file-download?id=58621970&file=141220-Global-Mobile-Trends.pdf [9 March 2021].

Groupe Speciale Mobile Association (GSMA). 2020b. *The Mobile Economy: Sub-Saharan Africa 2020. https://www.gsma.com/mobileeconomy/wp-content/uploads/2020/09/GSMA_MobileEconomy2020_SSA_Eng.pdf* [8 March 2021].

Guy, C.M. 1998. Classifications of retail stores and shopping centres: some methodological issues. *GeoJournal*, 45(4):255-264.

Hamunyela, M. 2012. *Educational research*. Windhoek: Center for Open, Distance and e-Learning University of Namibia.

Helm, S., Kim, S.H. & Van Riper, S. 2018. Navigating the 'retail apocalypse': a framework of consumer evaluations of the new retail landscape. *Journal of Retailing and Consumer Services*, 54. https://doi.org/10.1016/j.jretconser.2018.09.015.

Hossain, T.M.T., Akter, S., Kattiyapornpong, U. & Dwivedi, Y.K. 2019. Multichannel integration quality: A systematic review and agenda for future research. *Journal of Retailing and Consumer Services,* 49:154–163.

Huang, L., Lu, X. & Ba, S. 2016. An empirical study of the cross-channel effects between web and mobile shopping channels. *Information & Management*, *53*(2):265-278.

Hübner, A., Holzapfel, A. & Kuhn, H. 2016. Distribution systems in omni-channel retailing. *Business Research*, *9*(2):255-296.

Humphrey, S.E., Nahrgang, J.D. & Morgeson, F.P. 2007. Integrating motivational, social, and contextual work design features: a meta-analytic summary and theoretical extension of the work design literature. *Journal of Applied Psychology*, 92:1332–1356.

INAPEM (Instituto Nacional de Apoio as Micro, Pequenas e Médias Empresas). 2018. *Área de certificação: Estatística Por Província (Total Global)*. http://www.portal.inapem.gov.ao/arqEmpresaCertificada/EstatisticaporProvincia.JPG [11 March 2019].

Irefin, I. A., Abdul-Azeez, I. A. & Tijani, A. A. 2012. An investigative study of the factors affecting the adoption of Information and Communication Technology in small and medium scale enterprises in Nigeria. *Australian Journal of Business and Management Research,* 2(2):01-09.

Jain, M., Le, A.N.H., Lin, J.Y.C. & Cheng, J.M.S. 2011. Exploring the factors favoring M-commerce adoption among Indian MSMEs: A TOE perspective. *Tunghai Management Review*, 13(1):147-188.

Jokonya, O. 2019. Investigating the barriers of M-commerce adoption within SMMEs. *In Digital innovation and transformation conference*, 96-109.

Junglas, I. & Watson, R. 2003. U-commerce: a conceptual extension of E-commerce and M-commerce. *International Conference on Information Systems*, 667-677.

Junglas, I.A. 2003. *U-commerce: an experimental investigation of ubiquity and uniqueness*. Unpublished PhD thesis. Athens, GA: University of Georgia.

Kalaivani, K.N. 2020. Impact of mobile commerce on customers' purchase decision - with reference to retail sector in Bangalore. *ISSN*, 68(1):5938-5949.

Kalbande, J. 2019. Ecommerce transactions: secure gateway in payment system. *International Research Journal of Engineering and Technology*, 6(6):421-427.

Kamble, S.S., Gunasekaran, A., Parekh, H. & Joshi, S. 2019. Modeling the internet of things adoption barriers in food retail supply chains. *Journal of Retailing and Consumer Services*, *48*:154-168.

Kapurubandara, M. & Lawson, R. 2006. Barriers to Adopting ICT and e-commerce with SMEs in developing countries: an exploratory study in Sri Lanka. *University of Western Sydney, Australia*, *82*(1):2005-2016.

Khan, H., Talib, F. & Faisal, M.N. 2015. An analysis of the barriers to the proliferation of M-commerce in Qatar: A relationship modeling approach. *Journal of Systems and Information Technology*, *17*(1):54-81.

Kumar, J. 2011. *Research methodology: a step-by-step guide for beginners*. 3rd ed. London: Sage.

Lamb, C.W., Hair, J.F., McDaniel, C., Boshoff, C. & Terblanche, N.S. 2008. *Marketing*. 3rd ed. Cape Town: OUP.

Laudon, K.C. & Laudon, J.P. 2016. *Management information systems: managing the digital firm*. 14th ed. Boston, MA: Pearson.

Lee, C.C., Cheng, H.K. & Cheng, H.H. 2007. An empirical study of mobile commerce in insurance industry: Task-Technology Fit and individual differences. *Decision Support Systems*, 43(1):95-110.

Lee, K.C., Lee, S. & Kim, J.S. 2004. Analysis of mobile commerce performance by using the Task-Technology Fit. *In IFIP Working Conference on Mobile Information Systems*, 135-153.

Lembach, M. & Lane, M.S. 2011. The fit of mobile work support functionalities with pharmaceutical sales-force worker tasks. *In Proceedings of the 11th International Conference on Electronic Business*, 346-353. https://eprints.usq.edu.au/20141/5/Lembach_Lane_ICEB_2011_AV.pdf [5 July 2018].

Lewis, C. & Abrahams, L. 2013. *The SADC Communications Environment: An Assessment of Communications Policies, Laws and Regulations in SADC Member States*. https://www.wits.ac.za/media/migration/files/cs-38933-fix/migrated-pdf/pdfs-5/SADCCommsEnvironmtAssessmtAngola.pdf [21 April 2021].

Liang, T., Huang, C., Yeh, Y. & Lin, B. 2007. Adoption of mobile technology in business: a fit-viability model. *Industrial Management & Data Systems*, 107(8):1154-1169.

Liang, T.P. & Wei, C.P. 2004. Introduction to the special issue: mobile commerce applications. *International Journal of Electronic Commerce*, 8(3):7-17.

Lin, K.Y. 2016. User communication behavior in mobile communication software. *Online Information Review*, 40(7):1071-1089.

Lippert, S.K. & Govindarajulu, C. 2006. Technological, Organizational, and Environmental Antecedents to Web Services Adoption. *Communications of the IIMA*, 6(1):147-159.

Lopperi, K. & Sengupta, S. 2004. Are we ready? The state of wireless e-business in the USA. *Information Systems and e-Business Management,* 2:293–307.

Lu, M.T., Hu, S.K., Huang, L.H. & Tzeng, G.H. 2015. Evaluating the implementation of business-to-business m-commerce by SMEs based on a new hybrid MADM model. *Management Decision*, 53(2):290-317.

Lucas, Jr., G.H., Bush, R.P. & Gresham, L.G. 1994. *Retailing*. Boston: Houghton Mifflin Company.

Mack, N., Woodsong, C., MacQueen, K.M., Guest, G. & Namey, E. 2005. *Qualitative research methods: a data collector's field guide*. North Carolina: Family Health International. http://www.fhi360.org/sites/default/files/media/documents/Qualitative%20Research%20Methods%20-%20A%20Data%20Collector's%20Field%20Guide.pdf [19 September 2018].

Mallat, N. & Tuunainen, V.K. 2008. Exploring Merchant Adoption of Mobile Payment Systems: An Empirical Study. *e-Service Journal*, 6(2):24-57.

Maritz, J. 2014. How we made it in Africa: growing appetite for tech products in Angola, says venture capital fund. https://www.howwemadeitinafrica.com/growing-appetite-for-tech-products-in-angola-says-venture-capital-fund/41797/ [21 June 2017].

Martin, K.D., Kim, J.J., Palmatier, R.W., Steinhoff, L., Stewart, D.W., Walker, B.A., Wang, Y. & Weaven, S.K.. 2020. Data privacy in retail. *Journal of Retailing*, 96(4):474-489.

Martín, S.S., López-Catalán, B. & Ramón-Jerónimo, M.A. 2012. Factors determining firms' perceived performance of mobile commerce. *Industrial Management & Data Systems*, 112(6):946-963. https://doi.org/10.1108/02635571211238536

Martins, S., Amorim, P. & Almada-Lobo, B., 2017. Delivery mode planning for distribution to brick-and-mortar retail stores: discussion and literature review. *Flexible Services and Manufacturing Journal*, 2017:1-28.

Marvasti, A.B. 2004. *Qualitative research in sociology: An introduction*. 1st ed. London: SAGE.

Masihuddin, M., Khan, B.U.I., Mattoo, M.M.U.I. & Olanrewaju, R.F. 2017. A survey on e-payment systems: elements, adoption, architecture, challenges and security concepts. *Indian Journal of Science and Technology*, 10(20):1-19.

Matikiti, R., Mpinganjira, M. & Roberts-Lombard, M. 2018. Application of the technology acceptance model and the technology-organisation-environment model to examine social media marketing use in the South African tourism industry. *South African Journal of Information Management*, 20(1):1-12.

Mauch, J.E. & Park, N. 2003. *Guide to the successful thesis and dissertation: A handbook for students and faculty.* 5 ed. New York: Marcel Dekker.

McGill, T.J. & Klobas, J.E. 2009. A Task-Technology Fit view of learning management system impact. *Computers and Education*, 52(2):496-508.

Ministério das Telecomunicações, Tecnologias de Informação e Comunicação Social (MINTTICS). 2001. *Basic Telecommunication Law*. https://ictpolicyafrica.org/api/documents/download?_id=5d9432b69b93fa001b804038 [21 April 2021].

Mirzabeiki, V. & Saghiri, S.S. 2020. From ambition to action: How to achieve integration in omni-channel? *Journal of Business Research,* 110:1–11.

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.

Muzima, J. & Gallardo, G. 2017. Angola 2017. *African Economic Outlook*. www.africaneconomicoutlook.org [08 September 2017].

Mwamba, O. & Qutieshat, A. 2021. The Future of Formal Retail in Sub-Saharan Africa: Brief Review and Opinion. *Open Journal of Business and Management*, 9:1563-1571.

Naeem, M., Hameed, M. & Taha, M.S. 2020. A study of electronic payment system. *In IOP Conference Series: Materials Science and Engineering*, 767.

Ngai, E.W. & Gunasekaran, A. 2007. A review for mobile commerce research and applications. *Decision support systems*, *43*(1):3-15.

Nieuwenhuizen, C. (ed.). 2015. *Business management for entrepreneurship*. 3rd ed. Cape Town: Juta.

Njenga, A.K., Litondo, K. & Omwansa, T. 2016. A Theoretical Review of Mobile Commerce Success Determinants. *Journal of Information Engineering and Applications*, *6*(5):13-23.

Oldham, G.R. & Fried, Y. 2016. Job design research and theory: past, present and future. *Organizational Behavior and Human Decision Processes*, 136:20–35.

Organisation for Economic Co-operation and Development (OECD). 2013. *The OECD Privacy Framework*. https://www.oecd.org/sti/ieconomy/oecd_privacy_framework.pdf [6 November 2019].

Pantano, E. & Timmermans, H. 2014. What is smart for retailing?. *Procedia Environmental Sciences*, 22:101-107.

Perrow, C. 1967. A framework for the comparative analysis of organizations. *American sociological review*, 32(2):194-208.

Piao, C., Li, X., Pan, X. & Zhang, C. 2016. User privacy protection for a mobile commerce alliance. *Electronic Commerce Research and Applications*, 18:58-70.

Picoto, W.N., Bélanger, F. & Palma-dos-Reis, A. 2014. An organizational perspective on m-business: usage factors and value determination. *European Journal of Information Systems*, 23:571-592.

Poulson, T.D.J.X. 2014. *FACRA: How investors can help build SMEs in Angola – the missing middle*. http://cfi.co/africa/2014/09/facra-how-investors-can-help-build-smes-in-angola-the-missing-middle/ [21 June 2018].

Pousttchi, K. & Thurnher, B. 2007. *Adoption and impact of mobile-integrated business processes: comparison of existing frameworks and analysis of their generalization potential*. https://mpra.ub.uni-muenchen.de/3243/ [20 September 2017].

Pozzi, A. 2013. The effect of Internet distribution on brick-and-mortar sales. *The Rand Journal of Economics*, *44*(3):569-583.

Prabowo, R.J., Hidayanto, A.N., Sandhyaduhita, P.I., Azzahro, F. & Chairunnisa, A. 2018. The Determinants of User's Intention to Adopt Hyper-Converged Infrastructure Technologies: An Integrated Approach. In *2018 International Conference on Information Technology Systems and Innovation (ICITSI),* 306-311. IEEE.

Prasanna, R.P.I.R., Jayasundara, J.M.S.B., Naradda Gamage, S.K., Ekanayake, E.M.S., Rajapakshe, P.S.K. & Abeyrathne, G.A.K.N.J. 2019. Sustainability of SMEs in the Competition: A Systemic Review on Technological Challenges and SME Performance. *Journal of Open Innovation: Technology, Market, and Complexity*, 5(4):1-18.

Prasarry, Y.V., Astuti, E.S. & Suyadi, I. 2015. Factors Affecting the Adoption of Mobile Commerce (A Study on SMEs in Malang). *European Journal of Business and Management*, 7(2):30-35. ISSN 2222-2839

Psyrris, A., Kargas, A. & Varoutas, D.A. 2020. A Review on the Technological Enablers of the Fifth Generation of Communications Networks (5G). SSRN: https://ssrn.com/abstract=3565976 [19 September 2018].

Quade, M.H. & Leimstoll, U. 2015. Mobile business with smartphones and tablets: Effects of mobile devices in SMEs. In *Proceedings Bled eConference*: 290-305.

Rahayu, R. & Day, J. 2017. E-commerce adoption by SMEs in developing countries: evidence from Indonesia. *Eurasian Bus Rev*, 7:25–41.

Rahman, M.M. 2013. Barriers to M-commerce adoption in developing countries–a qualitative study among the stakeholders of Bangladesh. *The International Technology Management Review*, *3*(2):80-91.

Richter, J., Lins, S., Wilms, B., Linden, R. & Basten, D. 2016. The relation between usage of mobile technologies and organizational agility: A quantitative survey among IT managers. *Pacific Asia Conference on Information Systems (PACIS)*, Chiayi, Taiwan.

Ritchie, J. & Lewis, J. (eds.). 2003. Qualitative research practice: *a guide for social science students and researchers*. London: Sage. http://mthoyibi.files.wordpress.com/2011/10/qualitative-research-practice_a-guide-for-social-science-students-and-researchers_jane-ritchie-and-jane-lewis-eds_20031.pdf [19 September 2018].

Rumsey, D.J. 2018. *How to interpret a correlation coefficient r*. http://www.dummies.com/education/math/statistics/how-to-interpret-a-correlation-coefficient-r/ [12 October 2018].

Saghiri, S., Wilding, R., Mena, C. & Bourlakis, M. 2017. Toward a three-dimensional framework for omni-channel. *Journal of Business Research,* 77:53–67.

Sarantakos, S. 1998. *Social research*. 2nd ed. South Yarra: Macmillan Education.

Savita, A. 2020. *Principais meios de pagamento para loja virtual em Angola*. https://xbytessolutions.com/meios-de-pagamento/ [28 September 2020].

Schwarz, A., Junglas, I., Krotov, V. & Chin, W.W. 2004. Exploring the role of experience and compatibility in using mobile technology. *Information Systems and e-Business Management*, 12:337–356.

Seegolam, A., Sukhoo, A. & Bhoyroo, V. 2015. ICT as an enabler to achieve sustainable development goals for developing countries: A proposed assessment approach. In *Proceedings of IEEE, eChallenges e-2015 Conference*: 1-11.

Shahzad, A., Chin, H.K., Altaf, M. & Anwar, F. 2020. Malaysian SMEs Performance and the use of E-Commerce: A Multi-Group Analysis of Click-and-Mortar and Pure-Play E-Retailers. *Pakistan Journal of Commerce and Social Sciences*, *14*(1):01-33.

Shih, A. 2011. *The contribution of mobile telecommunication technology to sustainable development in selected countries in Africa*. Unpublished Master's thesis, Cambridge, MA: Massachusetts Institute of Technology.

Shih, Y.Y. & Chen, C.Y. 2013. The study of behavioral intention for mobile commerce: via integrated model of TAM and TTF. *Quality & Quantity*, *47*(2):1009-1020.

Singh, A., Thakkar, J. & Jenamani, M. 2019. An integrated Grey-DEMATEL approach for evaluating ICT adoption barriers in manufacturing SMEs: Analysing Indian MSMEs. *Journal of Enterprise Information Management*.

Siwundla, S.E. 2013. *The Development of a Framework to Empower SME's in the Eastern Cape to Overcome Barriers in the Adoption of E-commerce.* Master's thesis, Nelson Mandela Metropolitan University.

Song, G., Song, S. & Sun, L. 2019. Supply chain integration in omni-channel retailing: a logistics perspective. *The International Journal of Logistics Management*, 30(2):527-548.

Spiegel, M.R. & Stephens, L.J. 2011. *Statistics*. 4th ed. New York: McGraw.

Stair, R., Reynolds, G. & Chesney, T. 2008. *Principles of business information systems*. Wellington: Bridget Williams Books.

Strydom, J.W. (ed.). 2011. *Principles of business management*. Cape Town: Oxford University Press.

Swilley, E., Hofacker, C.F. & Lamont, B.T. 2012. The evolution from e-commerce to m-commerce: pressures, firm capabilities and competitive advantage in strategic decision making. *International Journal of E-Business Research (IJEBR)*, 8(1):1-16.

Taheribakhsh, M., Jafari, A., Peiro, M.M. & Kazemifard, N. 2020. January. 5G Implementation: Major Issues and Challenges. *In 2020 25th International Computer Conference, Computer Society of Iran (CSICC)*, 1-5.

Tang, A.K. 2019. A systematic literature review and analysis on mobile apps in m-commerce: Implications for future research. *Electronic Commerce Research and Applications*, *37*.

Taylor, P. 2015. The Importance of Information and Communication Technologies (ICTS): An integration of the extant literature on ICT adoption in small and medium enterprises. *International Journal of Economics, Commerce and Management*, 3(5):274-295.

Teo, T.S. & Men, B. 2008. Knowledge portals in Chinese consulting firms: a Task-Technology Fit perspective. *European Journal of Information Systems*, 17(6):557-574.

Thangamuthu, A.P. 2020. A survey on various online payment and billing techniques. *Shanlax International Journal of Arts, Science and Humanities*, 7(3):86–91.

The Earth Institute & Ericsson. 2016. *ICT & SDGs final report: how information and communications technology can accelerate action on the sustainable development goals*. https://www.ericsson.com/res/docs/2016/ict-sdg.pdf [8 January 2017].

Tornatzky, L.G. & Fleischer, M. 1990. *The Processes of Technological Innovation*. Lexington Books, Lexington, Massachusetts. 3:27-50.

United Nations. 2017. *Micro-, Small and Medium-sized Enterprises Day 27 June*. http://undocs.org/A/RES/71/279

Utami, H.N., Astuti, E.S., Ramadhan, H.M., Trialih, R. & Aprilian, Y.A. 2019. The interests of small-and medium-sized enterprises (SMEs) actor in using mobile commerce in effort to expand business network. *Journal of Science and Technology Policy Management*, 10(3):493-508.

Varshney, U. & Vetter, R. 2002. Mobile commerce: framework, applications and networking support. *Mobile networks and Applications*, *7*(3):185-198.

Verhoef, P.C., Kannan, P.K. & Inman, J.J. 2015. From multi-channel retailing to omni-channel retailing: introduction to the special issue on multi-channel retailing. *Journal of retailing*, *91*(2):174-181.

Verkijika, S.F. 2018. Factors influencing the adoption of mobile commerce applications in Cameroon. *Telematics and Informatics*, *35*(6):1665-1674.

Vongjaturapat, S. 2018. Application of the Task-Technology Fit model to structure and evaluation of the adoption of smartphones for online library systems. *Science & Technology Asia*, 23(1):39-56.

Wachter, K. 2016. *What are various categories/departments in retail?* https://www.researchgate.net/post/What_are_various_categories_departments_in_retail [30 January 2021].

Wamuyu, P.K. & Maharaj, M.S. 2011. Factors influencing successful use of mobile technologies to facilitate E-Commerce in small enterprises: The case of Kenya. *The African Journal of Information Systems*, 3(2):48-71.

Wang, Y., Li, H., Li, C. & Zhang, D. 2016. Factors affecting hotels' adoption of mobile reservation systems: A technology-organization-environment framework. *Tourism Management*, 53:163-172.

Wiener, M. Hoßbach, N. & Saunders, C. 2018. Omnichannel businesses in the publishing and retailing industries: Synergies and tensions between coexisting online and offline business models. *Decision Support Systems,* 109:15–26.

World Economic Forum (WEF). 2019. *The Blobal Competitiveness Report 2019*. https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf [03 February 2020]

Yamagata-Lynch, L.C., Cowan, J. & Luetkehans, L.M. 2015. Transforming disruptive technology into sustainable technology: understanding the front-end design of an online program at a brick-and-mortar university. *Internet and Higher Education*, 26:10-18.

Yang, J.H. & Lin, P.Y. 2018. A New Third-party Payment Scheme with Anonymity for Mobile Commerce. *Journal of Internet Technology*, *19*(6):1929-1934.

Yang, K.C. 2005. Exploring factors affecting the adoption of mobile commerce in Singapore. *Telematics and informatics*, *22*(3):257-277.

Yen, D.C., Wu, C.S., Cheng, F.F. & Huang, Y.W. 2010. Determinants of users' intention to adopt wireless technology: An empirical study by integrating TTF with TAM. *Computers in Human Behavior*, *26*(5):906-915.

Yin, R.K. 2011. *Qualitative research from start to finish. New York: The Guilford Press*. http://doha.ac.mu/ebooks/Research%20Methods/QualitativeResearch_2011_Robert_Yin.pdf [19 September 2017].

Yuan, Y., Archer, N., Connelly, C.E. & Zheng, W. 2010. Identifying the ideal fit between mobile work and mobile work support. *Information & Management*, 47(3):125-137.

Zheng, W. 2007. *The nature of mobile work and the needs for mobile work technology support: a Task-Technology Fit perspective*. Unpublished Doctoral thesis. Hamilton: McMaster University of Business Administration.

Zhu, K. & Kraemer, K.L. 2005. Post-Adoption Variations in Usage and Value of E-Business by Organizations. *Information Systems Research*, 16(1):61–84.

Zhu, K., Dong, S., Xu, S.X. & Kraemer, K.L. 2006a. Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies. *European Journal of Information Systems*, 15(6):601–616.

Zhu, K., Kraemer, K.L. & Xu, S. 2006b. The Process of Innovation Assimilation by firms in different countries: A technology diffusion perspective on E-business. *Management Science* 52(10):1557–1576.

Zigurs, I., Buckland, B.K., Connolly, J.R. & Wilson, E.V. 1999. A test of Task-Technology Fit theory for group support systems. *ACM SIGMIS Database: the DATABASE for Advances in Information Systems*, 30(3-4):34-50.

APPENDICES

APPENDIX A: CPUT ETHICAL CLEARANCE

Cape Peninsula University of Technology

P.O. Box 1906 • Bellville 7535 South Africa •Tel: +27 21 4603291 • Email: fbmsethics@cput.ac.za
Symphony Road Bellville 7535

Office of the Chairperson Research Ethics Committee	FACULTY: BUSINESS AND MANAGEMENT SCIENCES

The Faculty's Research Ethics Committee (FREC) on **20 October 2020**, ethics **Approval** was granted to **Mateus Justino (209111755)** for a research activity **D Com: Marketing** at Cape Peninsula University of Technology.

Title of dissertation/thesis/project:	**A framework for the use of m-commerce by brick-and-mortar retailers in Angola** Lead Supervisor (s): Prof R Tengeh and Dr M Twum-Darko

Comments:

Decision: APPROVED

	**21 October 2020**
Signed: Chairperson: Research Ethics Committee	**Date**

Clearance Certificate No | 2020FOBREC806

APPENDIX B1: COVERING LETTER TO M-COMMERCE BUSINESS PERSONNEL

TOPIC: A FRAMEWORK FOR THE USE OF MOBILE COMMERCE BY BRICK-AND-MORTAR RETAILERS IN ANGOLA

Dear Sir/Madam,

The objective of this study is to investigate the underlying factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers.

You are cordially invited to participate in this study by completing this survey questionnaire. To participate in this study, you must be an m-commerce business administrator or employee.

Your participation in this survey is completely voluntary. You have freedom of choice to complete the questionnaire or not, and you will suffer no risk, or any harm should you decide not to participate in the survey. In addition to the above, your privacy will be respected, and all information will remain confidential. You are not required to reveal your identity and the answers you provide will not be analyzed individually.

In case you feel discomfort or encounter difficulty in completing the questionnaire you can decide to stop or please contact by Cell phone or WhatsApp: (+244) 916 354 272; Email: manucht25@gmail.com

The survey should take between 10 to 15 minutes to complete. Reading the consent letter and completing the questionnaire implies that you consent that the data may be used for this research study.

Doctoral student	**Supervisor**	**Co-supervisor**
Mateus Vicente Justino *Cape Peninsula University of Technology, Cape Town, South Africa* *Department of Information & Technology* *209111755@mycput.ac.za*	*Prof Robertson K. Tengeh* *Cape Peninsula University of Technology, Cape Town, South Africa* *Department of Entrepreneurship* tengehr@cput.ac.za	*Dr Michael Twum-Darko* *Cape Peninsula University of Technology, Cape Town, South Africa* *Department Graduate Centre for Management* *darkom@cput.ac.za*

APPENDIX B2: QUESTIONNAIRE TO M-COMMERCE BUSINESS PERSONNEL

For office use only

Questionnaire number				

SECTION A – MOBILE COMMERCE BUSINESS EMPLOYEE PROFILE

Q.1 - Does your business use m-commerce?

Yes		No	

If your answer to question 1 is "No", please do not proceed.

Q.2 - Please indicate your gender by ticking the appropriate box.

Male	
Female	
Opt not to say	

Q.3 - Please indicate your age group by ticking the appropriate box.

Below 25		56 to 65	
25 to 35		66 above	
36 to 45		Opt not to say	
46 to 55			

Q4 - Please indicate your position.

Director/Manager		Accountant	
Digital marketing specialist		IT specialist	
Order processing assistant		Other, please indicate	
Deliveryman			

Q.5 - Please indicate your level of education by ticking the appropriate box.

Primary school	
Secondary school	
Post-Matric school certificate	
Undergraduate Diploma	

Bachelor's degree	
Postgraduate degree	
Opt not to say	

Q.6 - Please mark with an X the type of product your business sells.

Food products	
Clothing	
Shoes	
Furniture	
Books	

Music items	
Jewellery	
Toys	
Building materials	
Other, please specify …….	

SECTION B: BUSINESS CAPABILITY

Q.7.1 - Please think of a typical mobile electronic commerce task you execute and tick the number that expresses the extent to which you agree with the statements below.

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	It is very important for me to take immediate action on performing my m-commerce task.	1	2	3	4	5	6	7
	It is very important for me to promptly respond to emergencies (e.g. take responsibility to respond to any obstacle, provide timely services).	1	2	3	4	5	6	7
	It is very important for me to start my m-commerce tasks on time.	1	2	3	4	5	6	7
	I frequently perform m-commerce tasks in several places.	1	2	3	4	5	6	7
	I frequently perform my m-commerce tasks in any given place.	1	2	3	4	5	6	7
	I frequently have the freedom to choose a place to perform my m-commerce tasks.	1	2	3	4	5	6	7

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	I frequently perform my m-commerce tasks in one specific place.	1	2	3	4	5	6	7
	I often need to handle unexpected m-commerce tasks.	1	2	3	4	5	6	7
	I often need to deal with unstructured m-commerce tasks (e.g. order processing, delivery management, information searching, interactive transmission of data).	1	2	3	4	5	6	7
	I often need to solve difficult m-commerce tasks with no apparent solutions (e.g. data interpretation, data editing, document production, interacting with different business partners for online transaction problem-solving).	1	2	3	4	5	6	7
	I frequently need to obtain information from co-workers to complete my m-commerce tasks.	1	2	3	4	5	6	7
	I frequently need to share knowledge or information with co-workers.	1	2	3	4	5	6	7
	I frequently need to depend on the work of co-workers to complete my m-commerce task.	1	2	3	4	5	6	7
	I frequently need to deal with problems that involve efforts from other departments.	1	2	3	4	5	6	7

Q.7.2 - Please tick the number that expresses the extent to which you agree with the statements below regarding your organisation:

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	My organisation's top management is very encouraging and willing to invest funds in m-commerce.	1	2	3	4	5	6	7
	My organisation's top management is willing to confront the risks involved in using m-commerce.	1	2	3	4	5	6	7
	We have the relevant information and communication technology infrastructure for the use of m-commerce.	1	2	3	4	5	6	7

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	In general, our organisation employs candidates who have technological skills for m-commerce.	1	2	3	4	5	6	7
	Our organisation has necessary resources (e.g. financial, staff, equipment) to use m-commerce.	1	2	3	4	5	6	7

Q.7.3 - Please, think of typical mobile commerce distribution systems your organisation uses and indicate your answer by ticking the appropriate box.

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	My company has been prepared for the consolidation of online and offline inventories.							
	My company is ready to anytime m-commerce home delivery.							
	My company is willing to outsource some of the m-commerce home delivery services.							
	My organisation is prepared to receive customers' returns of goods in the store they were bought.							
	Our organisation is prepared to receive customers' returns of goods in any of our stores, or distribution centres, or return centres.							

SECTION C: MOBILE COMMERCE TECHNOLOGICAL CONTEXT

Q.8.1 - Please tick the number that expresses the extent to which you agree with the statements below regarding the relative advantage of using mobile commerce in your business.

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	Mobile commerce helps my organisation increase market share.	1	2	3	4	5	6	7
	We expect mobile commerce technologies to help lower business costs.	1	2	3	4	5	6	7
	Mobile commerce technologies help my organisation increase the quality of customer service.	1	2	3	4	5	6	7
	Mobile commerce helps my organisation speed up the sales process.	1	2	3	4	5	6	7

Q.8.2 - Please tick the number that expresses the extent to which you agree with the statements below regarding mobile commerce systems data security measures in your business.

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	The m-commerce systems I use, operate in an encrypted way and use authentication.	1	2	3	4	5	6	7
	The m-commerce systems I use, impose strict control over our organisation and business partners (e.g. customers) information access.	1	2	3	4	5	6	7

Q.8.3 - Please tick the number that expresses the extent to which you agree with the statements below regarding the functionalities of m-commerce systems you use.

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	The m-commerce systems I use work well in putting coworkers on the alert for an emergency or when time is critical.	1	2	3	4	5	6	7
	The m-commerce systems I use, works well in providing timely notification to business stakeholders (customers, suppliers, co-workers) of urgent intervention required.	1	2	3	4	5	6	7
	The m-commerce systems I use work well in providing timely notification of marketing localised campaigns.	1	2	3	4	5	6	7
	The m-commerce systems notify me of emergencies.	1	2	3	4	5	6	7
	Mobile commerce systems enable an easy sharing of information with other stakeholders.	1	2	3	4	5	6	7
	Mobile commerce systems effectively enable the provision of personalised services to customers.	1	2	3	4	5	6	7
	Mobile commerce systems enable reciprocal cooperation with coworkers.	1	2	3	4	5	6	7
	The m-commerce system is reliable in searching business-related information (e.g. sales, inventory, workers, customers, suppliers or industry information).	1	2	3	4	5	6	7
	M-commerce effectively compiles data from various sources.	1	2	3	4	5	6	7
	The m-commerce system makes information readily accessible in any place.	1	2	3	4	5	6	7
	The m-commerce systems I use, effectively monitor, track and report jobs assignments (e.g. information about sales, delivery, intelligent transport system).	1	2	3	4	5	6	7
	The m-commerce systems I use, effectively enable digital data entry/recording, editing, manipulating, and reporting.	1	2	3	4	5	6	7
	The m-commerce systems I use, effectively enable business transactions processing (e.g. online mobile payment, order placing, inventory processing, bar code scanning, signature processing).	1	2	3	4	5	6	7

Q.8.4 - Please tick the number that expresses the extent to which you agree with the statements below regarding m-commerce Task-Technology Fit in your business.

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	The m-commerce systems I use are usually up and accessible when I needed them.	1	2	3	4	5	6	7
	The m-commerce systems I use keep crashing and make it harder to accomplish my tasks.	1	2	3	4	5	6	7
	The data and information from the m-commerce systems I use are current enough to meet my business task requirements.	1	2	3	4	5	6	7
	The m-commerce systems I use to store and maintain the right data for my job.	1	2	3	4	5	6	7
	The data stored in m-commerce systems I use are maintained at an appropriate level of details.	1	2	3	4	5	6	7
	The mobile commerce systems I use provide us with consolidated data/information.	1	2	3	4	5	6	7
	The information I use on m-commerce systems is very consistent.	1	2	3	4	5	6	7
	It is easy to locate the particular data or information I need from the m-commerce systems.	1	2	3	4	5	6	7
	It is easy to find out and understand the definition of data I use for my tasks on the m-commerce systems.	1	2	3	4	5	6	7
	The m-commerce systems provide task-related information in a timely manner.	1	2	3	4	5	6	7
	The m-commerce systems run scheduled production, business-related reports and other activities on time.	1	2	3	4	5	6	7
	The m-commerce systems I use are user friendly and complement my department's day-to-day objectives and goals within the business.	1	2	3	4	5	6	7
	The m-commerce systems' supporting team provides consistent assistance when requested.	1	2	3	4	5	6	7
	Customers are generally satisfied with the service we offer through m-commerce.	1	2	3	4	5	6	7
	I find m-commerce convenient to do business in contemporary market.	1	2	3	4	5	6	7

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	I found it very easy to use m-commerce related technologies, including hardware and software.	1	2	3	4	5	6	7
	I get the necessary training to effectively use the m-commerce systems in my organisation.	1	2	3	4	5	6	7
	I am properly authorised to access, and download the data that is relevant to my tasks from the business database.	1	2	3	4	5	6	7
	I do not always have the Authorization to access the data that would be useful to complete my tasks.	1	2	3	4	5	6	7

SECTION D: ENVIRONMENTAL CONTEXT

Q.9 - Please, tick the number that expresses the extent to which you agree with the statements below regarding the factors of the external business environment that could influence your company to use m-commerce.

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	The existing electronic business laws in the country.	1	2	3	4	5	6	7
	Government incentive for the use of m-commerce.	1	2	3	4	5	6	7
	Government online customer information security and privacy protection laws.	1	2	3	4	5	6	7
	The ready availability of institutions providing technological training and education programs.	1	2	3	4	5	6	7
	Promotion of technological innovation and awareness of m-commerce usage in the country.	1	2	3	4	5	6	7
	The financial support or technological infrastructure subsidies from governmental cooperative institutions in the country.	1	2	3	4	5	6	7

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	The availability of mobile network bandwidth in the country.	1	2	3	4	5	6	7
	The mobile operators' internet services or broadband data packages' affordability.	1	2	3	4	5	6	7
	The mobile operators network consistent performance reliability.	1	2	3	4	5	6	7
	The availability of secure digital payment systems for wireless financial transactions' security and privacy protection in the country.	1	2	3	4	5	6	7
	The availability of online payment options such as (credit cards, smart cards, debit cards, electronic cash) in the country.	1	2	3	4	5	6	7
	The availability of organisations operating as payment gateway or providers of online payment methods in the country.	1	2	3	4	5	6	7
	Competitive pressure in local market.	1	2	3	4	5	6	7
	To avoid experiencing a competitive disadvantage in the near future.	1	2	3	4	5	6	7
	To avoid losing customers to our competitors.	1	2	3	4	5	6	7
	The increasing popularity of retail online shop in the market.	1	2	3	4	5	6	7
	Customers pressure on my company.	1	2	3	4	5	6	7
	Most of our potential customers use smartphones.	1	2	3	4	5	6	7

SECTION C: MOBILE COMMERCE USE

Q.10 - Please, tick the number that expresses the extent to which you agree with the statements below regarding the use of the functionalities of m-commerce systems in your company to perform your tasks or solve problems.

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	Mobile information search (e.g. for searching job dispatch information, information related to product, customer, delivery service, location) on business database or online.	1	2	3	4	5	6	7
	Mobile information exchange (e.g. for decision support, providing customer support, text message and e-mail writing enquiry, online chatting, sales problem-solving).	1	2	3	4	5	6	7
	Notification (e.g. to notifying customers of their order or transaction process, alert co-workers of an emergency, obstacles)	1	2	3	4	5	6	7
	Mobile data processing (e.g. for order processing, inventory management processing, delivery processing, appointment management, job dispatch, data editing, document production).	1	2	3	4	5	6	7

THANK YOU FOR YOUR TIME

APPENDIX C1: COVERING LETTER TO BRICK-AND-MORTAR RETAILER

A FRAMEWORK FOR THE USE OF MOBILE COMMERCE BY BRICK-AND-MORTAR RETAILERS IN ANGOLA

Dear Sir/Madam,

The objective of this study is to investigate the underlying factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers.

You are cordially invited to participate in this study by completing this survey questionnaire. To participate in this study your business must be a brick-and-mortar retail store, small or medium enterprise, operating in a specific place and providing face-to-face client experience. Your participation in this survey is completely voluntary. You have freedom of choice to complete the questionnaire or not, and you will suffer no risk, or any harm should you decide not to participate in the survey. In addition to the above, your privacy will be respected, and all information will remain confidential. You are not required to reveal your identity and the answers you provide will not be analyzed individually.

In case you feel discomfort or encounter difficulty in completing the questionnaire you can decide to stop or please contact by Cell phone or WhatsApp: (+244) 916 354 272; Email: manucht25@gmail.com.

The survey should take between 15 to 20 minutes to complete. Reading the consent letter and completion of the questionnaire implies that you consent that the data may be used for this research study.

Doctoral student	**Supervisor**	**Co-supervisor**
Mateus Vicente Justino *Cape Peninsula University of Technology, Cape Town, South Africa* *Department of Marketing* *209111755@mycput.ac.za*	*Prof Robertson K. Tengeh* *Cape Peninsula University of Technology, Cape Town, South Africa* *Department of Entrepreneurship* tengehr@cput.ac.za	*Dr Michael Twum-Darko* *Cape Peninsula University of Technology, Cape Town, South Africa* *Department Graduate Centre for Management* *darkom@cput.ac.za*

APPENDIX C2: QUESTIONNAIRE TO BRICK-AND-MORTAR RETAILERS

For office use only

Questionnaire number | | | |

SECTION A – BUSINESS MANAGER/OWNER PROFILE

Q.1 - Does your business use m-commerce?

Yes		No	

If your answer to question 1 is "Yes", please, do not proceed.

Q.2 - Do you intend to use m-commerce in your business?

Yes		No	

If your answer to question 2 is "no", please do not proceed.

Q.3 – Please, indicate your gender by ticking the appropriate box.

Male	
Female	
Opt not to say	

Q.4 – Please, indicate your age group by ticking the appropriate box.

Below 25	
25 to 35	
36 to 45	
46 to 55	

56 to 65	
66 above	
Opt not to say	

Q.5 – Please, indicate your level of education by ticking the appropriate box.

Primary school	
Secondary school	
Post-Matric school certificate	

bachelor's degree	
Post graduate degree	
Opt not to say	

Q.6 – Please, indicate how many employees your business has by ticking the appropriate box.

5 to 10 employees	
11 to 50 employees	
51 to 100 employees	

101 to 200 employees	
201 and above	
Opt not to say	

Q7. Please, mark with an X the type of product your business sells.

Food products	
Clothing	
Shoes	
Furniture	
Books	

Music items	
Jewellery	
Toys	
Building materials	
Other, please specify ……..	

SECTION B: BRICK-AND-MORTAR RETAILERS IMPEDIMENT TO USE

Q.8 - Please tick the number that expresses the extent to which you agree with the statements below regarding the business external factors that would be the impediment to use the m-commerce in your business.

External environment

Q. (office use only)	**Statements**	**Strongly disagree**	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat agree**	**Agree**	**Strongly Agree**
	The lack of governmental m-commerce/online business laws (or policies and regulations) has been an impediment to the use of m-commerce.	1	2	3	4	5	6	7
	The lack of cybersecurity measures for m-commerce in the industry has been an impediment to use.	1	2	3	4	5	6	7
	The poor performance of mobile operators' internet services has been an impediment to use.	1	2	3	4	5	6	7
	The lack of financial support for m-commerce has been an impediment to its use.	1	2	3	4	5	6	7
	The lack of agencies to provide m-commerce training and education has been an impediment to use.	1	2	3	4	5	6	7

	Limitations of organisations operating as payment gateway or providers of online payment methods in the country have been an impediment to use.	1	2	3	4	5	6	7
	The lack of online payment options such as (credit cards, smart cards, debit cards, electronic cash) has been an impediment to use.	1	2	3	4	5	6	7
	The lack of customer pressure on or demand to my business has been an impediment to use	1	2	3	4	5	6	7
	The lack of popularity of retail online shops has been an impediment to use m-commerce.	1	2	3	4	5	6	7
	The lack of competitive pressure in the market has been an impediment to use.	1	2	3	4	5	6	7

Q.8.1 - Please explain if other factors have not been clarified above and you think are an impediment to the use of mobile commercial channels in your company.

……

……

……

Q.9 - Please tick the number that expresses the extent to which you agree with the statements below regarding the business internal factors that would be the impediment to use the m-commerce in your business.

Business internal factors

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	I have no experience in using m-commerce.	1	2	3	4	5	6	7
	I lack trust in mobile transactions.	1	2	3	4	5	6	7
	The cost of the m-commerce infrastructure has been an impediment to use.	1	2	3	4	5	6	7
	The lack of personnel with IT skills has been an impediment to use.	1	2	3	4	5	6	7

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	The lack of adequate skills to configure a forward distribution system for the m-commerce strategies has been an impediment to use.	1	2	3	4	5	6	7
	The lack of adequate skills to configure a backward distribution system for the m-commerce strategies has been an impediment to use.	1	2	3	4	5	6	7

Q.10 - Please tick the number that expresses the extent to which you agree with the statements below regarding the perception of m-commerce valued contribution to a business.

Q. (office use only)	Statements	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree
	I believe that m-commerce would not contribute to profit margin.	1	2	3	4	5	6	7
	Mobile commerce would not contribute to our business sales increases.	1	2	3	4	5	6	7
	I believe that the use of mobile commerce will not create competitive advantage.	1	2	3	4	5	6	7

THANK YOU FOR YOUR TIME

APPENDIX D1: COVERING LETTER TO MOBILE COMMERCE BUSINESS MANAGERS AND PROFESSIONALS

TOPIC: ***A FRAMEWORK FOR THE USE OF MOBILE COMMERCE BY BRICK-AND-MORTAR RETAILERS IN ANGOLA***

Dear Sir/Madam,

The objective of this study is to investigate the underlying factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers.

You are cordially invited to participate in this study. Your participation in this interview is completely voluntary. You have freedom of choice to have or not the interview, and you will suffer no risk, or any harm should you decide not to have the interview. In addition to the above, your privacy will be respected, and all information will remain confidential. You are not required to reveal your identity and the answers you provide will not be analyzed individually.

In case you feel discomfort or encounter difficulty during the interview you can decide to stop or please contact by Cell phone or WhatsApp: (+244) 916 354 272/ (+264) 813970889; Email: manucht25@gmail.com/mvjmateus22@gmail.com.

The interview should take between 25 to 35 minutes to complete. Reading the consent letter and having the interview implies that you consent that the data may be used for this research study.

Doctoral student	**Supervisor**	**Co-supervisor**
Mateus Vicente Justino *Cape Peninsula University of Technology, Cape Town, South Africa* *Department of Information & Technology* *209111755@mycput.ac.za*	*Prof Robertson K. Tengeh* *Cape Peninsula University of Technology, Cape Town, South Africa* *Department of Entrepreneurship* tengehr@cput.ac.za	*Dr Michael Twum-Darko* *Cape Peninsula University of Technology, Cape Town, South Africa* *Department Graduate Centre for Management* *darkom@cput.ac.za*

APPENDIX D2: INTERVIEW GUIDE TO MOBILE COMMERCE BUSINESS MANAGERS

INTERVIEW GUIDE

Research objectives	**Interview guide questions**
Main research objective To investigate the underlying factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers.	
Demographic	1. To start, please provide us with an overview of the m-commerce activities performed in your organisation. 2. How long have you been operating the m-commerce business model?
Research sub-objective 2 To investigate the nature of new added value that aligns with overall stakeholders' interests to yield synergy between m-commerce and brick-and-mortar retailers.	1. What are the m-commerce most valued contributions to your business? 2. What are the most valued contributions from your m-commerce business model to society?
Research bub-objective 4 To determine the factors within the brick-and-mortar retailer setup that are an impediment to the use of m-commerce.	1. Explain the challenges you faced in starting the m-commerce business model for your business. 2. What are the challenges you currently face in running the m-commerce?
Research sub-objective 5 To determine the nature of support that is requisite for the use of m-commerce in brick-and-mortar retailers.	1. Have your m-commerce business enlisted any help or support from a private technological organisation, or government institution? If yes, which nature of support did you enlist? If no, why not? 2. What other kind of support do you currently need for your m-commerce business?

THANK YOU FOR YOUR TIME

APPENDIX E: INTERVIEW GUIDE TO BUSINESS PROFESSIONALS

INTERVIEW GUIDE

Research objectives	**Interview guide questions**
Main research objective To investigate the underlying factors that are requisite for the use of a framework for m-commerce in brick-and-mortar retailers.	
Demographic	1. Please, provide us with an overview of the services your organisation offers. 2. How many years have you been working with this organisation?
Sub-research objective 3 To determine the features and characteristics of m-commerce systems for brick-and-mortar retailers. Ob3.1. To investigate the variables required for m-commerce systems data security and privacy.	1. In your opinion, how would online businesses deal with data security and privacy issues of trading over the internet?
Sub-research objective 4 To determine the factors within the brick-and-mortar retailer setup that are an impediment to the use of m-commerce.	1. How do you describe the state of the mobile network services provided by network operators in Angola? * 2. Do you receive complaints from electronic commerce businesses about the mobile network services you provide to them? If yes, what nature of complaints did you receive? * 3. What kind of challenges do you think electronic commerce businesses are facing in Angola?
Sub-research objective 5 To determine the nature of support that is requisite for the use of m-commerce in brick-and-mortar retailers.	1. In your opinion, what widespread support received by electronic businesses do you think should also be available for m-commerce businesses in the Angolan market?

* = Question answered only by the mobile operator's survey security specialist

THANK YOU FOR YOUR TIME

APPENDIX F: DATA SCREENING - MISSING DATA

Questionnaire to the m-commerce business personnel data screening

Returned questionnaires from m-commerce business personnel were screened for defect and completeness. The data collection comprised of 263 administered questionnaire, and 240 returned questionnaires, which were screened for missing values. Then, the number of missing values for each individual case and variable's cases were identified. Missing data for a particular individual case or observation that occur in a random fashion and is less than ten percent of all the cases should be contained (Gallagher et al., 2008:262). There were 11 individual cases with non-random and a large number of missing values that were excluded. Although, the analysis can be run with cases that have missing values (incomplete data), the use of Structural Equation Modeling (SEM) requires complete datasets (Gallagher et al., 2008:262). Thus, it was preferable to use the substitution imputation approach to replace the missing values from each variable that had less than ten percent of missing values with the series mean. Table F1 shows the variables with missing values but were validated and their missing values were effectively replaced with series mean.

Table F1: Variables with missing data

Variables	Missing value	Variables	Missing value
TC2	2	MDP2	6
MT2	1	RF1	1
MT4	4	RF2	1
TN1	9	QF1	5
TN2	2	QF2	3
TN3	1	QF3	2
TI3	2	CF1	6
TI4	1	CF2	1
TCO1	1	LF1	2
TCO2	4	LF2	1
TCO3	1	PT1	2
RA1	1	RU2	2
RA2	7	EU1	7
DS1	1	EU2	8
DS2	4	AF1	1

Variables	Missing value	Variables	Missing value
MNO1	1	PAR3	2
MNO3	1	TCI1	1
MNO4	1	TCI3	2
MIE1	5	ON1	1
MIE2	3	CPF1	2
MIE3	2	CPF3	1
MIS2	6	MCU1	3
MIS3	11	MCU4	1
MDP1	2		
Sub-Total	73		61
Total	134		

F1. Data screening – Outlier detection

To identify the potential outliers, the data was converted into standardised (z) scores and the outliers were designated. The potential outliers were identified using the univariate detection. The individual case that got the standardised score above 4, i.e. the threshold for a large sample, was the potential outlier. Eight individual cases or observations, i.e. 25, 61, 157, 159, 160, 182, 204 and 210 (see Figure F1 and Figure F2), were, therefore, identified as potential outliers. These observations were then examined, and finally retained for further processes, as they have not exceeded the set of established scores.

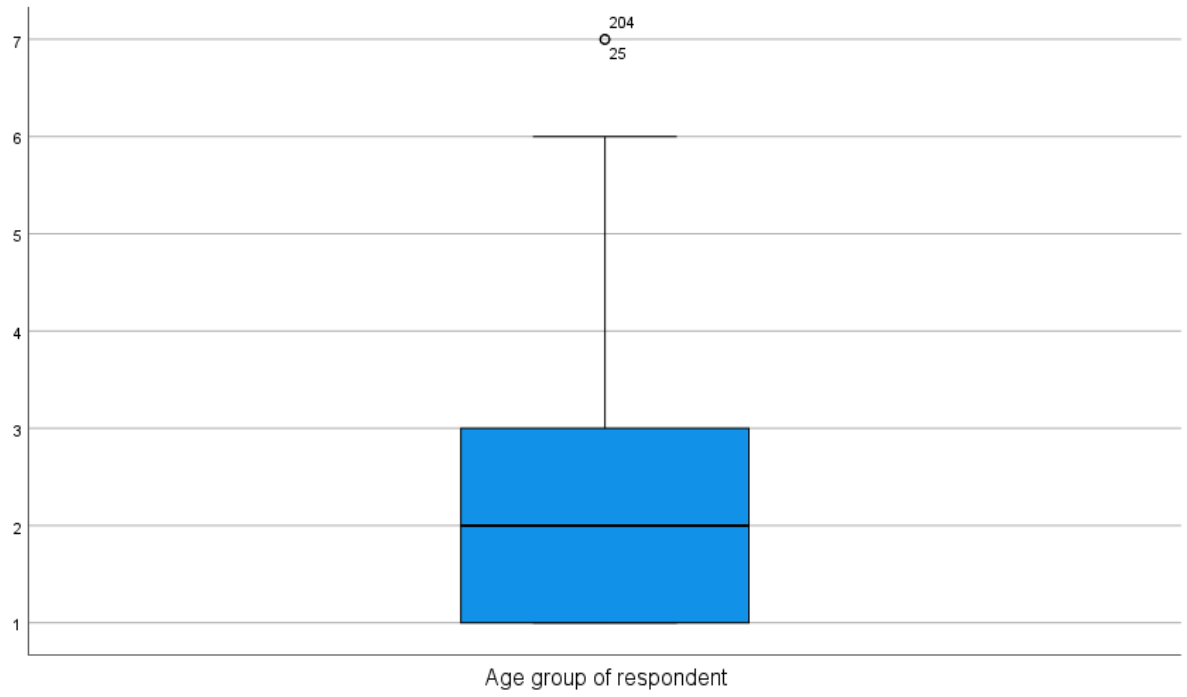

Figure F1: Univariable outlier detected - Age group

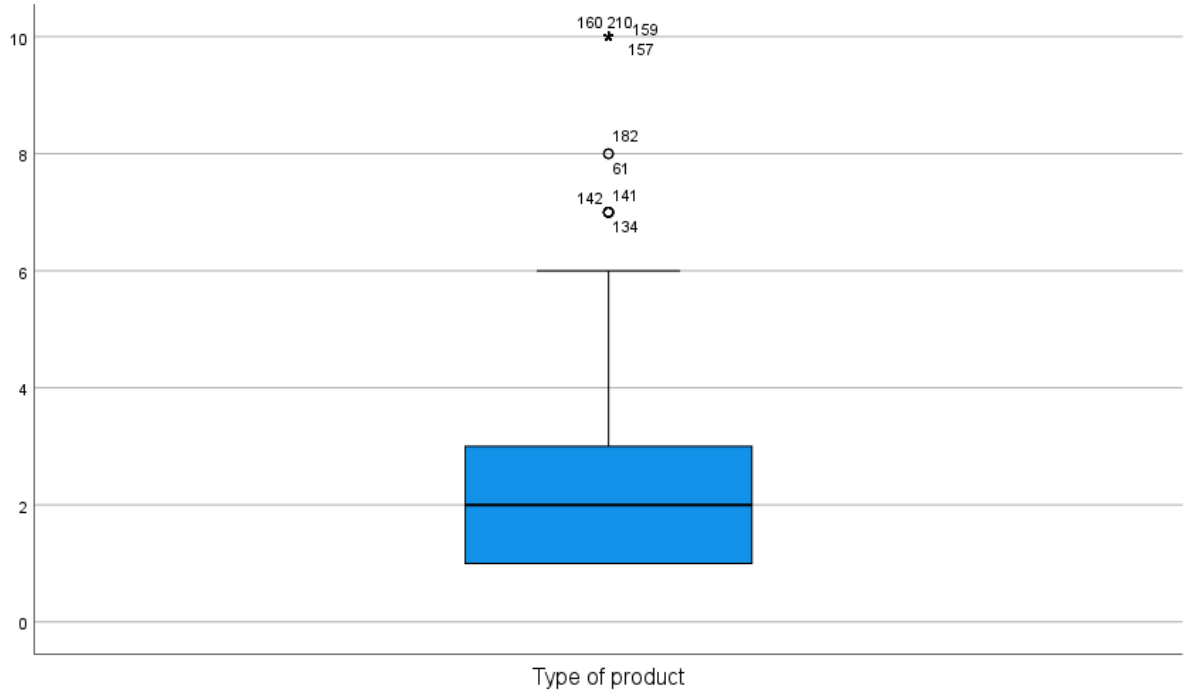

Figure F2: Univariable outlier detected - Type of product

APPENDIX G: MULTICOLLINEARITY

Multiple regressions amongst the dependent variables and independent variables were done prior the analysis to assess the model collinearity. Table G1 and Table G2 below shows that there is no independent variables with tolerance below 0.20, nor with Variance Inflation Factor (VIF) above 5. Thus, there was no concern about collinearity.

Table G1: Collinearity Test for Task-Technology Fit and its antecedents

Predictor	Criterion	Tolerance	VIF
Time Criticality	Task-Technology Fit	0.969	1.032
Mobility Task		0.757	1.322
Task Non-routineness		0.960	1.041
Task Interdependence		0.872	1.147
Mobile Notification		0.942	1.061
Mobile Information Exchange		0.926	1.080
Mobile Information Search		0.761	1.313
Mobile Data Processing		0.944	1.060

Table G2: Collinearity Test for mobile commerce use and its antecedents

Predictor	Criterion	Tolerance	VIF
Top Management Support	Mobile Commerce Use	0.916	1.092
Technology Competence		0.910	1.098
Readiness for Mobile Distribution Systems		0.891	1.122
Relative Advantage		0.883	1.132
Data Security		0.855	1.170
Reliability Factor		0.783	1.278
Quality Factor		0.760	1.316
Compatibility Factor		0.850	1.177
Locatability Factor		0.802	1.246
Production Timeliness		0.806	1.241
Relationship with User		0.765	1.307
Ease of Use		0.729	1.372

Predictor	Criterion	Tolerance	VIF
Authorization Factor		0.810	1.235
Policies and Regulations		0.486	2.060
Technological Cooperative Institutions		0.850	1.176
Operator Network		0.850	1.176
Mobile Payment Gateway		0.886	1.128
Competitive Pressure Factor		0.499	2.006
Critical Mass Factor		0.916	1.092

APPENDIX H: RELIABILITY AND CONVERGENT VALIDITY ASSESSMENT

The reliability and validity tests of the instrument's items and of the theoretical model's constructs were conducted. Thus, CFA was conducted. All measurement models were specified and the latent variables co-varied to assess their internal consistency reliability and the convergent validity and discriminant validity. For the internal consistency reliability, the composite reliability approach was used. Composite reliability reflects the shared variance among the elements or indicators of a latent variable. Values of 0.70 and above are widely considered acceptable indications of reliability, but values between 0.60 and 0.70 are also acceptable (Gallagher et al., 2008:267; Hair et al., 2011:145). Each indicator's factor loading should exceed 0.70. However, factor loadings between 0.50 and 0.70 with statistic significant should be acceptable only if they improve other measures of construct reliability and validity, i.e. composite reliability and AVE (Gallagher et al., 2008:267). To establish the construct validity the tests of the convergent validity and discriminant validity were assessed. Convergent validity evaluates the extent to which indicators of a construct converge or share a high proportion of variance in common. It provides indications of how close the indicators come together to determine the construct in which they are associated. However, to determine the convergent validity the AVE was assessed. AVE is the average of the squared factor loadings for each construct. AVE that exceed 0.50 are considered acceptable (Gallagher et al., 2008:267; Hair et al., 2011:145). Tables H1, H2, H3 and H4 show the factor loadings for each observed variable, and the composite reliability and AVE for each latent variable.

Table H1: Technological Context Variables – Loadings, Composite Reliability and AVE

Latent Variables	Observed Variables	Factor Loading	Composite reliability	Average Variance Extracted (AVE)
Relative Advantage	RA1	0.786	0.878	0.644
	RA2	0.853		
	RA3	0.809		
	RA4	0.759		
Data Security	DS2	1.000	1.000	1.000
Mobile Notification	MNO1	0.949	0.952	0.833
	MNO2	0.876		
	MNO3	0.892		
	MNO4	0.931		
Mobile Information Exchange	MIE1	1.000	1.000	1.000

Latent Variables	Observed Variables	Factor Loading	Composite reliability	Average Variance Extracted (AVE)
Mobile Information Search	MIS1	1.000	1.000	1.000
Mobile Data Processing	MDP1	0.823	0.933	0.825
	MDP2	0.941		
	MDP3	0.955		
Reliability Factor	RF2	1.000	1.000	1.000
Quality Factor	QF1	0.741	0.849	0.514
	QF2	0.804		
	QF3	0.589		
Compatibility Factor	CF1	1.004	0.827	0.715
	CF2	0.649		
Locatability Factor	LF1	0.938	0.803	0.677
	LF2	0.688		
Product Timeliness	PT1	0.854	0.785	0.647
	PT2	0.752		
Relationship with User	RU1	0.958	0.916	0.846
	RU3	0.880		
Ease of Use	EU2	1.000	1.000	1.000
Authorization Factor	AF1	0.828	0.766	0.622
	AF2	0.747		

Table H2: Retail Context Variables– Loadings, Composite Reliability and AVE

Latent Variables	Observed Variables	Factor Loadings	Composite reliability	Average Variance Extracted (AVE)
Time Criticality	TC1	0.914	0.911	0.775
	TC2	0.841		
	TC3	0.884		
Mobility Task	MT1	1.000	1.000	1.000
Task Non-routineness	TN1	0.857	0.930	0.817
	TN2	0.938		
	TN3	0.914		
Task Interdependence	TI1	0.892	0.945	0.811
	TI2	0.931		
	TI3	0.896		
	TI4	0.883		
Top Management Support	TMS2	1.000	1.000	1.000
Technology Competence	TCO2	0.831	0.870	0.771
	TCO3	0.923		
Readiness for mobile distribution systems	MDS2	0.872	0.898	0.747
	MDS3	0.889		
	MDS5	0.830		

Table H3: Environmental Context Variables– Loadings, Composite Reliability and AVE

Latent Variable	Observed variables	Factor Loadings	Composite reliability	Average Variance Extracted (AVE)
Policies and Regulation	PAR2	0.936	0.941	0.889
	PAR3	0.950		
Technological Cooperative Institutions	TCI1	0.730	0.826	0.708
	TCI2	0.940		
Operator Network	ON2	0.954	0.918	0.849
	ON3	0.888		
Mobile Payment Gateway	MPG2	1.000	1.000	1.000
Competitive Pressure Factor	CPF1	0.838	0.935	0.828
	CPF2	0.949		
	CPF3	0.939		
Critical Mass Factor	CMF2	0.943	0.910	0.836
	CMF3	0.885		

Table H4: Mobile commerce use Variables– Loadings, Composite Reliability and AVE

Latent Variable	Observed variables	Factor Loadings	Composite reliability	Average Variance Extracted (AVE)
Mobile Commerce Use	MCU1	0.866	0.903	0.700
	MCU2	0.824		
	MCU3	0.843		
	MCU4	0.813		

Table H5 below shows the indicators that failed to meet the internal consistency reliability and convergent validity of their associated construct. These items were excluded from the analysis.

Table H5: Observed variables that failed to meet the internal consistency of construct

Latent variable	Observed variables excluded	Total observed variables excluded
Mobility Task	MT2	3
	MT3	
	MT4	
Top Management Support	TMS1	1
Technology Competence	TCO1	1
Readiness for Mobile Distribution Systems	MDS1	2
	MDS4	
Data Security	DS1	1
Mobile Information Exchange	MIE2	1
Mobile Information Search	MIS2	1
Reliability Factor	FR1	1
Relationship with User	RU2	2
	RU4	
Ease of Use	EU1	1
Policies and Regulations	PAR1	1
Technological Cooperative Institutions	TCI3	1
Operator Network	ON1	1
Mobile Payment Gateway	MPG1	2
	MPG2	
Critical Mass Factor	CMF1	1

APPENDIX I: DISCRIMINANT VALIDITY

Discriminant validity reflects the degree of correlation or distinction between two constructs. It determines how the constructs (latent variables) are different, discriminated or deviated from each other. To assess discriminant validity, two approaches can be used:

1) by assessing the cross loadings of observed variables (indicators). An observed variable's factor loading on the associated latent variable must exceed all its factor loadings on dissociated latent variables (see Table I1)

2) by determining the square root of a construct's AVE and comparing it with its correlations (see Table I2). However, each construct's squared root of AVE should be greater than its correlations (Gallagher et al., 2008:268; Hair et al., 2008:145).

Table I1: Cross factor loadings of unobserved variables - Discriminant validity

	TC	MT	TN	TI	TMS	TCO	MDS	RA	DS	MNO	MIE	MIS	MDP	RF	QF	CF	LF	PT	RU	EU	AF	PAR	TCI	ONS	MPG	CPF	CMF	MCU
TC1	**0.914**	-0.035	0.074	0.061	0.070	-0.022	0.076	-0.012	-0.076	0.122	-0.047	-0.022	0.047	0.053	0.111	0.055	0.199	0.206	0.216	0.181	0.135	0.001	0.002	0.104	-0.02	-0.027	-0.042	0.116
TC2	**0.841**	-0.032	0.069	0.056	0.064	-0.021	0.070	-0.011	-0.070	0.112	-0.043	-0.020	0.043	0.049	0.102	0.051	0.183	0.189	0.199	0.167	0.124	0.001	0.002	0.096	-0.018	-0.024	-0.038	-0.106
TC3	**0.884**	-0.034	0.072	0.059	0.067	-0.022	0.073	-0.012	-0.074	0.118	-0.046	-0.021	0.045	0.052	0.107	0.053	0.193	0.199	0.209	0.175	0.13	0.001	0.002	0.101	-0.019	-0.026	-0.040	-0.112
MT1	-0.038	**1.000**	-0.011	0.234	-0.064	0.013	0.019	0.146	-0.003	0.039	-0.075	0.422	-0.089	0.017	0.027	0.247	0.182	0.233	0.136	0.135	0.284	-0.062	0.115	0.044	-0.016	-0.048	-0.075	0.065
TN1	0.07	-0.01	**0.857**	0.079	-0.010	0.034	0.112	0.035	0.080	0.128	-0.008	0.057	0.085	0.114	0.166	0.159	0.214	0.028	0.088	0.324	0.079	0.134	0.089	0.151	-0.041	0.077	0.048	0.101
TN2	0.076	-0.011	**0.938**	0.087	-0.010	0.038	0.123	0.038	0.087	0.140	-0.009	0.062	0.093	0.124	0.181	0.174	0.234	0.03	0.096	0.355	0.086	0.147	0.098	0.166	-0.045	0.084	0.053	0.111
TN3	0.074	-0.010	**0.914**	0.085	-0.010	0.037	0.119	0.037	0.085	0.136	-0.009	0.061	0.090	0.121	0.176	0.169	0.228	0.03	0.094	0.345	0.084	0.143	0.095	0.161	-0.043	0.082	0.051	0.108
TI1	0.059	0.209	0.083	**0.892**	0.012	-0.001	0.138	0.070	-0.028	0.106	0.108	0.100	0.125	0.332	0.305	0.212	0.29	0.193	0.336	0.231	0.441	0.055	0.160	0.103	-0.074	0.085	0.099	0.150
TI2	0.062	0.218	0.086	**0.931**	0.013	-0.001	0.144	0.073	-0.029	0.111	0.113	0.104	0.131	0.346	0.318	0.221	0.303	0.201	0.351	0.241	0.460	0.058	0.167	0.107	-0.077	0.088	0.103	0.157
TI3	0.060	0.210	0.083	**0.896**	0.012	-0.001	0.139	0.071	-0.028	0.106	0.109	0.100	0.126	0.334	0.307	0.213	0.292	0.194	0.338	0.232	0.443	0.056	0.161	0.103	-0.074	0.085	0.100	0.151
TI4	0.059	0.207	0.082	**0.883**	0.012	-0.001	0.136	0.070	-0.027	0.105	0.107	0.099	0.124	0.328	0.302	0.21	0.287	0.191	0.333	0.228	0.436	0.055	0.158	0.102	-0.073	0.084	0.098	0.149
TMS2	0.076	-0.064	-0.011	0.014	**1.000**	-0.116	0.088	-0.036	-0.130	0.073	0.049	0.248	-0.052	0.156	0.128	-0.089	0.002	0.103	0.060	0.044	-0.001	-0.064	-0.067	0.031	-0.072	-0.113	-0.02	0.183
TCO2	-0.020	0.011	0.033	-0.001	-0.096	**0.831**	0.124	-0.004	0.087	0.041	0.043	0.015	0.145	-0.036	-0.048	0.165	0.086	0.013	-0.028	0.122	0.086	0.196	0.136	0.076	0.088	0.118	0.077	0.179
TCO3	-0.023	0.012	0.037	-0.001	-0.107	**0.923**	0.137	-0.004	0.096	0.045	0.048	0.017	0.161	-0.040	-0.053	0.183	0.096	0.014	-0.031	0.135	0.096	0.217	0.152	0.084	0.098	0.131	0.086	0.199
MDS2	0.072	0.017	0.114	0.135	0.076	0.13	**0.872**	0.087	-0.014	0.057	0.043	0.013	0.075	0.114	0.020	0.060	0.076	0.061	0.147	0.148	0.07	0.036	0.031	-0.074	0.047	0.053	0.045	-0.090
MDS3	0.074	0.017	0.116	0.137	0.078	0.132	**0.889**	0.089	-0.015	0.058	0.044	0.013	0.077	0.117	0.020	0.061	0.077	0.062	0.15	0.151	0.071	0.037	0.032	-0.075	0.048	0.054	0.046	-0.092
MDS5	0.069	0.016	0.108	0.128	0.073	0.124	**0.830**	0.083	-0.014	0.054	0.041	0.012	0.072	0.109	0.019	0.057	0.072	0.058	0.14	0.141	0.067	0.034	0.030	-0.07	0.045	0.051	0.043	-0.086
RA1	-0.010	0.115	0.032	0.062	-0.028	-0.004	0.078	**0.786**	-0.165	0.148	-0.005	0.064	-0.083	0.003	-0.031	0.026	0.045	0.115	0.109	0.078	0.058	-0.056	-0.018	0.057	0.028	0.010	-0.035	0.136
RA2	-0.011	0.124	0.034	0.067	-0.031	-0.004	0.085	**0.853**	-0.179	0.161	-0.005	0.069	-0.090	0.003	-0.033	0.028	0.049	0.125	0.118	0.085	0.063	-0.061	-0.019	0.062	0.030	0.010	-0.038	0.147
RA3	-0.011	0.118	0.033	0.064	-0.029	-0.004	0.081	**0.809**	-0.170	0.153	-0.005	0.066	-0.085	0.003	-0.032	0.027	0.047	0.118	0.112	0.081	0.060	-0.058	-0.018	0.059	0.029	0.010	-0.036	0.140
RA4	-0.010	0.111	0.031	0.060	-0.027	-0.003	0.076	**0.759**	-0.159	0.143	-0.005	0.062	-0.080	0.003	-0.03	0.025	0.044	0.111	0.105	0.076	0.056	-0.054	-0.017	0.055	0.027	0.009	-0.033	0.131
DS2	-0.084	-0.003	0.093	-0.031	-0.130	0.104	-0.016	-0.210	**1.000**	-0.194	-0.031	0.036	0.116	0.083	0.050	-0.041	0.058	-0.078	-0.111	0.000	-0.082	0.190	-0.043	-0.009	0.071	0.199	0.136	0.129
MNO1	0.126	0.037	0.141	0.113	0.069	0.046	0.062	0.179	-0.184	**0.949**	-0.065	0.054	0.028	0.058	0.146	0.205	0.286	0.169	0.204	0.222	0.090	0.076	0.224	0.546	-0.038	0.038	0.080	0.193
MNO2	0.116	0.034	0.131	0.104	0.064	0.043	0.057	0.165	-0.170	**0.876**	-0.060	0.050	0.025	0.054	0.134	0.189	0.264	0.156	0.189	0.205	0.083	0.070	0.206	0.504	-0.035	0.035	0.074	0.178

	TC	MT	TN	TI	TMS	TCO	MDS	RA	DS	MNO	MIE	MIS	MDP	RF	QF	CF	LF	PT	RU	EU	AF	PAR	TCI	ONS	MPG	CPF	CMF	MCU
MNO3	0.119	0.035	0.133	0.106	0.065	0.043	0.058	0.168	-0.173	**0.892**	-0.061	0.051	0.026	0.055	0.137	0.193	0.268	0.159	0.192	0.209	0.085	0.071	0.210	0.513	-0.036	0.036	0.075	0.182
MNO4	0.124	0.036	0.139	0.111	0.068	0.045	0.060	0.176	-0.180	**0.931**	-0.064	0.053	0.027	0.057	0.143	0.201	0.280	0.166	0.200	0.218	0.088	0.075	0.219	0.536	-0.037	0.037	0.079	0.190
MIE1	-0.052	-0.075	-0.010	0.121	0.049	0.051	0.050	-0.006	-0.031	-0.069	**1.000**	-0.018	0.059	0.239	0.180	0.076	0.110	0.110	0.101	0.046	0.059	0.046	0.138	-0.121	0.033	0.061	0.047	0.084
MIS1	-0.024	0.422	0.066	0.112	0.248	0.018	0.014	0.081	0.036	0.057	-0.018	**1.000**	-0.138	0.088	0.179	0.120	0.195	0.090	0.131	0.078	0.200	-0.170	0.081	0.047	-0.044	-0.212	-0.111	0.165
MDP1	0.042	-0.073	0.081	0.116	-0.043	0.143	0.071	-0.087	0.095	0.024	0.049	-0.114	**0.823**	0.022	0.226	0.084	0.076	0.112	0.184	0.101	0.160	0.599	0.185	0.034	0.231	0.627	0.669	0.103
MDP2	0.048	-0.084	0.093	0.132	-0.049	0.164	0.081	-0.099	0.109	0.027	0.056	-0.130	**0.941**	0.025	0.258	0.096	0.086	0.128	0.210	0.115	0.183	0.684	0.212	0.039	0.264	0.716	0.765	0.118
MDP3	0.049	-0.085	0.094	0.134	-0.049	0.166	0.083	-0.101	0.110	0.028	0.056	-0.132	**0.955**	0.025	0.262	0.098	0.088	0.130	0.214	0.117	0.186	0.695	0.215	0.040	0.268	0.727	0.776	0.120
RF2	0.058	0.017	0.133	0.372	0.156	-0.043	0.131	0.004	0.083	0.061	0.239	0.088	0.027	**1.000**	0.376	0.032	0.041	0.180	0.197	0.181	0.269	0.019	0.091	0.034	-0.126	-0.008	0.040	0.136
QF1	0.090	0.020	0.143	0.253	0.095	-0.043	0.017	-0.029	0.037	0.114	0.134	0.132	0.204	0.279	**0.741**	0.045	0.158	0.315	0.145	0.116	0.186	0.113	0.111	0.051	0.035	0.129	0.156	0.207
QF2	0.098	0.022	0.155	0.275	0.103	-0.046	0.018	-0.032	0.040	0.123	0.145	0.144	0.221	0.303	**0.804**	0.049	0.172	0.342	0.158	0.125	0.202	0.123	0.120	0.055	0.038	0.140	0.169	0.225
QF3	0.071	0.016	0.114	0.202	0.076	-0.034	0.013	-0.023	0.03	0.090	0.106	0.105	0.162	0.222	**0.589**	0.036	0.126	0.251	0.116	0.092	0.148	0.090	0.088	0.040	0.028	0.103	0.124	0.165
CF1	0.061	0.248	0.186	0.238	-0.089	0.199	0.069	0.033	-0.041	0.217	0.077	0.120	0.103	0.032	0.061	**1.004**	0.115	0.160	0.211	0.043	0.041	0.159	0.193	0.188	0.019	0.053	0.010	-0.035
CF2	0.039	0.160	0.12	0.154	-0.058	0.129	0.044	0.022	-0.027	0.140	0.050	0.078	0.066	0.021	0.039	**0.649**	0.074	0.104	0.137	0.028	0.027	0.103	0.125	0.122	0.012	0.034	0.007	-0.023
LF1	0.204	0.171	0.234	0.305	0.002	0.097	0.081	0.054	-0.054	0.282	0.103	0.183	0.086	0.039	0.200	0.107	**0.938**	0.069	0.107	0.276	0.001	0.049	0.229	0.216	-0.003	-0.042	-0.036	0.045
LF2	0.15	0.126	0.172	0.224	0.002	0.072	0.060	0.040	-0.04	0.207	0.076	0.134	0.063	0.028	0.147	0.079	**0.688**	0.051	0.078	0.203	0.001	0.036	0.168	0.159	-0.002	-0.031	-0.026	0.033
PT1	0.192	0.199	0.028	0.185	0.088	0.013	0.060	0.125	-0.067	0.152	0.094	0.077	0.116	0.154	0.363	0.136	0.063	**0.854**	0.133	0.068	0.247	0.086	0.225	0.072	0.056	0.085	0.057	0.095
PT2	0.169	0.175	0.024	0.163	0.077	0.011	0.053	0.110	-0.059	0.134	0.083	0.067	0.102	0.135	0.32	0.120	0.055	**0.752**	0.117	0.060	0.217	0.076	0.198	0.063	0.049	0.075	0.050	0.084
RU1	0.226	0.130	0.098	0.361	0.058	-0.032	0.161	0.132	-0.107	0.206	0.096	0.126	0.214	0.189	0.188	0.201	0.109	0.15	**0.958**	0.021	0.257	0.109	0.221	0.014	0.061	0.092	0.109	0.106
RU3	0.208	0.120	0.09	0.332	0.053	-0.030	0.148	0.122	-0.098	0.190	0.089	0.116	0.197	0.173	0.173	0.185	0.100	0.138	**0.880**	0.019	0.236	0.100	0.203	0.013	0.056	0.084	0.100	0.098
EU2	0.198	0.135	0.378	0.259	0.044	0.146	0.170	0.100	0.000	0.234	0.046	0.078	0.122	0.181	0.156	0.043	0.295	0.079	0.022	**1.000**	0.253	0.139	0.066	0.329	-0.076	0.090	0.106	0.239
AF1	0.122	0.235	0.076	0.409	-0.001	0.086	0.066	0.061	-0.068	0.079	0.049	0.166	0.161	0.223	0.208	0.034	0.001	0.239	0.222	0.209	**0.828**	0.075	0.095	-0.008	0.028	0.116	0.152	0.222
AF2	0.110	0.212	0.069	0.369	-0.001	0.077	0.060	0.055	-0.061	0.071	0.044	0.149	0.145	0.201	0.188	0.031	0.001	0.216	0.200	0.189	**0.747**	0.068	0.085	-0.007	0.025	0.105	0.137	0.200
PAR2	0.001	-0.058	0.146	0.058	-0.060	0.22	0.039	-0.067	0.178	0.075	0.043	-0.159	0.681	0.018	0.143	0.149	0.049	0.094	0.107	0.13	0.085	**0.936**	0.097	0.084	0.301	0.711	0.718	0.132
PAR3	0.001	-0.059	0.149	0.059	-0.061	0.224	0.039	-0.068	0.181	0.076	0.044	-0.162	0.691	0.018	0.145	0.151	0.050	0.096	0.108	0.132	0.086	**0.950**	0.098	0.085	0.306	0.722	0.729	0.134
TCI1	0.002	0.084	0.076	0.131	-0.049	0.120	0.026	-0.016	-0.031	0.172	0.101	0.059	0.165	0.066	0.109	0.141	0.179	0.193	0.169	0.048	0.083	0.075	**0.730**	0.077	0.001	0.067	0.079	0.056
TCI2	0.002	0.108	0.098	0.168	-0.063	0.154	0.034	-0.021	-0.040	0.221	0.129	0.076	0.212	0.085	0.140	0.181	0.23	0.248	0.217	0.062	0.107	0.097	**0.940**	0.100	0.002	0.087	0.102	0.072
ONS2	0.109	0.042	0.168	0.110	0.029	0.087	-0.081	0.070	-0.009	0.549	-0.115	0.045	0.04	0.032	0.065	0.179	0.220	0.080	0.014	0.314	-0.009	0.085	0.101	**0.954**	-0.051	0.043	0.027	0.132

	TC	MT	TN	TI	TMS	TCO	MDS	RA	DS	MNO	MIE	MIS	MDP	RF	QF	CF	LF	PT	RU	EU	AF	PAR	TCI	ONS	MPG	CPF	CMF	MCU
ONS3	0.101	0.039	0.157	0.102	0.027	0.081	-0.075	0.065	-0.008	0.511	-0.107	0.042	0.037	0.030	0.061	0.166	0.205	0.074	0.013	0.292	-0.009	0.079	0.094	**0.888**	-0.048	0.04	0.025	0.123
MPG2	-0.022	-0.016	-0.048	-0.083	-0.072	0.106	0.054	0.035	0.071	-0.040	0.033	-0.044	0.281	-0.126	0.048	0.019	-0.003	0.065	0.063	-0.076	0.034	0.322	0.002	-0.054	**1.000**	0.315	0.286	-0.019
CPF1	-0.024	-0.040	0.075	0.080	-0.094	0.119	0.051	0.010	0.167	0.033	0.051	-0.178	0.638	-0.007	0.146	0.044	-0.037	0.083	0.080	0.075	0.117	0.637	0.077	0.038	0.264	**0.838**	0.651	0.072
CPF2	-0.028	-0.046	0.085	0.090	-0.107	0.134	0.058	0.012	0.189	0.038	0.058	-0.201	0.722	-0.008	0.166	0.050	-0.042	0.094	0.091	0.085	0.133	0.721	0.088	0.043	0.299	**0.949**	0.736	0.081
CPF3	-0.027	-0.045	0.084	0.089	-0.106	0.133	0.057	0.011	0.187	0.037	0.058	-0.199	0.715	-0.008	0.164	0.049	-0.042	0.093	0.090	0.084	0.131	0.714	0.087	0.042	0.296	**0.939**	0.729	0.081
CMF2	-0.043	-0.07	0.053	0.105	-0.019	0.087	0.049	-0.041	0.129	0.080	0.044	-0.105	0.766	0.037	0.198	0.010	-0.036	0.063	0.107	0.100	0.173	0.724	0.102	0.027	0.270	0.732	**0.943**	0.164
CMF3	-0.04	-0.066	0.050	0.098	-0.018	0.082	0.046	-0.039	0.121	0.075	0.042	-0.099	0.719	0.035	0.186	0.009	-0.034	0.059	0.101	0.094	0.163	0.680	0.096	0.025	0.253	0.687	**0.885**	0.154
MCU1	-0.110	0.056	0.102	0.146	0.158	0.187	-0.09	0.150	0.111	0.176	0.073	0.143	0.109	0.118	0.242	-0.030	0.041	0.097	0.096	0.207	0.232	0.122	0.067	0.120	-0.017	0.074	0.151	**0.866**
MCU2	-0.104	0.054	0.097	0.139	0.150	0.178	-0.085	0.142	0.106	0.168	0.070	0.136	0.104	0.112	0.230	-0.029	0.039	0.092	0.091	0.197	0.221	0.116	0.063	0.114	-0.016	0.071	0.144	**0.824**
MCU3	-0.107	0.055	0.100	0.142	0.154	0.182	-0.087	0.146	0.108	0.172	0.071	0.139	0.106	0.114	0.236	-0.029	0.040	0.094	0.094	0.201	0.226	0.119	0.065	0.117	-0.016	0.072	0.147	**0.843**
MCU4	-0.103	0.053	0.096	0.137	0.148	0.175	-0.084	0.140	0.105	0.165	0.069	0.134	0.102	0.110	0.227	-0.028	0.039	0.091	0.090	0.194	0.218	0.114	0.063	0.113	-0.016	0.070	0.142	**0.813**

Table I2: Construct' Square root of AVE - Discriminant validity

Construct	Square root of AVE	Construct	Square root of AVE	Construct	Square root of AVE	Construct	Square root of AVE
Technological context		**Organisational context**		**Environmental context**		**M-commerce Use**	
Relative Advantage	0.802	Time Criticality	0.880	Policies and Regulation	0.943	Mobile Commerce Use	0.836
Data Security	1.000	Mobility Task	1.000	Technological Cooperative Institutions	0.842		
Mobile Notification	0.912	Task Non-routineness	0.904	Operator Network	0.922		
Mobile Information Exchange	1.000	Task interdependence	0.901	Mobile Payment Gateway	1.000		
Mobile Information Search	1.000	Top Management Support	1.000	Competitive Pressure Factor	0.910		
Mobile Data Processing	0.908	Technology Competence	0.878	Critical Mass Factor	0.914		
Reliability Factor	1.000	Readiness for mobile distribution systems	0.864				
Quality Factor	0.717						
Compatibility Factor	0.845						
Locatability Factor	0.823						
Product Timeliness	0.805						
Relationship with User	0.920						
Ease of Use	1.000						
Authorization Factor	0.789						

APPENDIX J: THE MEASUREMENT MODEL GOODNESS-OF-FIT ANALYSIS

After specifying the measurement models and conducting the CFA, the GOF for the measurement models was assessed. The ratio of X^2/df or CMIN/df is considered critical for the fit assessment. It has been suggested that the ratio should not be greater than 3 (Gallagher et al., 2008:265). The CFI, which compares the null models to the theoretical model is also reported below. This measure has a 0.90 cut-off score, whereby a score of 1 indicates a perfect fit (Sharif & Nia, 2018). The Standardised Roots Mean Square Residual (SRMR) and Roots Mean Square Error of Approximation (RMSEA) assess the badness-of-fit and take into account lower values for the evaluation of a model, where a score of 0.0 is a perfect fit, scores that are less than 0.05 are indicators of good fit, and a scores between 0.05 and 0.08 are considered acceptable (Schermelleh-Engel et al., 2003:36; Gallagher et al., 2008:266; Sharif & Nia, 2018). Some of these absolute fit indices are very sensitive to sample size, like the CMIN and CMIN/df. However, the GFI is less sensitive to sample size, but they also tend to decrease with a smaller sample size and as the model complexity increases (Gallagher et al., 2008:265). Table J1 below indicates the results of the GOF indices for the measurement models.

Table J1: The measurement model's goodness-of-fit scores

GOF indices	Measurement Model value	Recommended value
Chi-square per degree of freedom (X^2/df)	1.649	≤ 3
Probability (P)	.000	> .05
Comparative Fit Index (CFI)	.905	> .900
Incremental Fit Index (IFI)	.909	> .900
Goodness-of-fit index (GFI)	.754	> .900
Standardised Roots Mean Square Residual (SRMR)	.039	< .080
Roots Mean Square Error of Approximation (RMSEA)	.053	< .080

APPENDIX K: GRAMMARIAN LETTER

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26 March 2022

LANGUAGE & TECHNICAL EDITING

Cheryl M. Thomson

A FRAMEWORK FOR THE USE OF M-COMMERCE BY BRICK-AND-MORTAR RETAIL STORES IN ANGOLA

Supervisor: Prof Robertson K. Tengeh

Co-supervisor: Dr Michael Twum-Darko

This is to confirm that I, Cheryl Thomson, executed the language and technical editing of the above-titled Doctoral thesis of **Mateus Vicente Justino, student number, 209111755**, at the CAPE PENINSULA UNIVERSITY OF TECHNOLOGY in preparation for submission of this thesis for assessment.

Yours faithfully

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