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Research Report

Determinants of mobile commerce adoption by consumers in South Africa: A UTAUT2 and TPB Perspective

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ABSTRACT

The proliferation of mobile device use, greatly influenced by high internet permeation, has strongly encouraged mobile commerce adoption in developed nations. However, the lag in mobile commerce adoption in developing nations is deeply concerning; extant literature has shown that most African nations are yet to adopt or fully utilise the trillion-dollar mobile commerce market.

The purpose of the study was to investigate the factors influencing m-commerce adoption in South Africa. Previous studies on m-commerce adoption, in an African context, appear to be scant. The novelty of this research is that mobile commerce adoption is studied from a South African consumer perspective using constructs that measure behavioural intention. Open-ended questions were also used to obtain additional factors from consumers.

A conceptual model made of UTAUT2 and TPB constructs, and two additional constructs (i.e. perceived financial resources and institution-based trust) was used to investigate adoption. Twelve hypothesis statements from the model's constructs were proposed, under a positivist research paradigm. An online survey was used to obtain data from 358 people (random sample) living in South Africa. The data was analysed using the IBM SPSS.

The number of people who are using or have used the technology was used to determine adoption. The conceptual model and hypotheses were evaluated using multiple regression and correlation analysis, respectively. Performance expectancy, hedonic motivation, facilitating conditions, perceived behavioural control, attitude towards behaviour and perceived financial resources were shown to positively and significantly influence m-commerce adoption. Additional factors (e.g. delivery to remote areas, reliable shipping, shopping convenience, data and device access, product variety and product availability) influencing m-commerce adoption in South Africa were also identified from the qualitative data analysis. Perceived risk was identified as a barrier to adoption.

This study contributes to theory and practice by identifying the UTAUT2 and TPB factors that significantly influence m-commerce adoption in a South African context. In addition, additional factors that influence m-commerce adoption, as well as m-commerce marketplaces in South Africa, were identified.

Keywords: B2C Mobile Commerce; Adoption; Theory of Planned Behaviour; Unified Theory of Acceptance and Use of Technology; Information Systems

1 INTRODUCTION

The background section discusses the electronic commerce (e-commerce) divide, challenges faced by m-commerce retailers, the recently unveiled VodaPay app, and gives motivation for undertaking the study. The problem statement is largely based on data that states that African countries are not benefitting from the trillion-dollar e-commerce/m-commerce business. Different researchers have advocated for mobile commerce (m-commerce) adoption studies to be undertaken in other developing nations; in addition, it is not clear how the factors influencing m-commerce adoption in other countries influence adoption in South Africa. Furthermore, different researchers have used different theories to study m-commerce adoption resulting in a theoretical tension. The research objectives are meant to answer the issues raised in the problem statement and this is done by undertaking a study that determines the factors influencing m-commerce adoption in South Africa. The delimitations and intended contributions to practice and theory are also discussed in this section.

1.1 Background

Electronic commerce is a trillion-dollar industry that is a key measure of economic development, and it is projected to grow at an exponential rate, especially given the coronavirus (COVID-19), which has resulted in an upsurge in global online shopping (Barnes, 2020; Mohtaramzadeh et al., 2017). However, the fact that Africa, the Middle East, and Latin America are still falling behind in terms of e-commerce permeation is concerning (Alsaad & Taamneh, 2019; Barnes, 2020; Mohtaramzadeh et al., 2017; UNCTAD, 2020).

Africa and the Middle East had a combined market-share of barely 2.5 percent in global electronic commerce (e-commerce) trade in 2017, and African nations are not listed on the “top ten e-commerce sales by country” United Nations Conference on Trade and Development (UNCTAD) report; the top ten nations account for more than 82 percent of global e-commerce sales (Botting, 2019; CBInsights, 2017; Global Info Cloud, 2018; Mohtaramzadeh et al., 2017; Sawatzky, 2017; UNCTAD, 2020). In addition, a recent UNCTAD report stated that there was an enormous e-commerce divide as most developing countries (particularly in Africa) had between 0-20% of their population shopping online whereas most developed and semi-developed countries had over 50-80% of their population shopping online (Barayre, 2018; UNCTAD, 2018 as cited by Barayre, 2018). Hence, research on e-commerce adoption from an African perspective is required to identify the inhibitors and enablers of e-commerce adoption.

E-commerce is a business model that enables companies and customers to buy or sell goods through the internet (BigCommerce, 2022, Chen et al., 2008). According to BigCommerce (2022), the e-commerce business models that are most frequently used are B2B (Business-to-business), C2B (Consumer-to-business), B2B2C (Business-to-business-to-consumer), D2C (Direct-to-consumer), B2G (Business-to-government),

B2C (Business-to-consumer), and C2C (Consumer-to-consumer). A company sells goods or services to another company under a business-to-business (B2B) model (BigCommerce, 2022; Chen et al., 2008). B2B2C refers to a business strategy where a corporation partners with another organization to market its goods or services to end users (BigCommerce, 2022). In the business-to-government (B2G) e-commerce model, a company markets and sells its goods to public agencies or government bodies. Individuals are able to offer products and services to businesses through consumer-to-business (C2B) firms (BigCommerce, 2022; Chen et al., 2008). A direct-to-consumer (D2C) firm sells its own goods without the assistance of online merchants or wholesalers (BigCommerce, 2022). Online marketplaces and C2C e-commerce companies connect customers to trade products and services, and they often recoup their costs by charging transaction or listing fees (BigCommerce, 2022; Chen et al., 2008).

Business-to-Consumer (B2C) e-commerce is an online business model that allows organisations to sell goods to consumers using several electronic market systems (Campbell et al., 2013; Chang et al., 2020; Pala et al., 2019; Son & Benbasat, 2007; Wang et al., 2020). B2C e-commerce has the potential to exponentially increase sales however, this will only be possible if consumers are comfortable purchasing goods from unknown merchants over the medium (McKnight et al., 2002). In addition, “attracting new online customers and retaining existing ones” (Devaraj et al., 2002, p. 316) are major challenges in B2C e-commerce (Devaraj et al., 2002).

A significant increase in mobile phone usage in recent years has given rise to mobile commerce (Rajabion, 2015; Sadi & Noordin, 2011; Tarhini et al., 2019; Zamil et al., 2020). B2C mobile commerce (m-commerce), which extends B2C e-commerce, offers consumers the convenience of shopping online, from any geographical location, using wireless terminals such as tablets and smart phones, and a network or other internet connection (Rajabion, 2015; Tarhini et al., 2019; Zamil et al., 2020). Mobile commerce offers consumers shopping convenience, and the personalisation of transactions (Deng et al., 2010; Rajabion, 2015; Tarhini et al., 2019; Wang et al., 2006). M-commerce capabilities have grown rapidly over the years however, it is concerning that m-commerce has been adopted at low rates in developing countries (Deng et al., 2010; Sadi & Noordin, 2011; Tarhini et al., 2019).

According to Adjust (2022), m-commerce can be broken into three main categories (i.e. mobile banking, mobile payments, and mobile shopping). Mobile commerce applications include: m-commerce for hotel reservations, m-commerce for finance (e.g. mobile banking), virtual marketplace apps like Amazon, and e-hailing apps; m-commerce for mobile ticketing (e.g. air tickets), in-app purchasing (such as buying clothes via a retail app), digital wallets (like Apple Pay), m-commerce for retail and after sale services, and other online services where customers transact with organisations (or other customers) using mobile devices (AccountLearning, 2022; Adjust, 2022).

Vodacom recently unveiled the VodaPay “super app” in South Africa; the mobile commerce app, which helps consumers increase their market access and accelerates their digital engagement, leverages on world-class technology (Ayugi, 2021; Tech Central, 2021; Sharma, 2021; Vodacom Group, 2021). The app (VodaPay), that was designed in partnership with Alipay (a fintech services platform owned by the Alibaba Group), is set to drive and revolutionise South Africa's financial inclusion and economic growth (Ayugi, 2021; Tech Central, 2021; Sharma, 2021; Vodacom Group, 2021). By collaborating with all stakeholders to establish an inclusive mobile payments ecosystem, Vodacom hopes to transform the country’s economic landscape for the good of all (Joosub, 2021 as cited by Vodacom Group, 2021, Vodacom, 2021). In addition, Vodacom wishes to avail the features of the VodaPay mini programs to both large and small businesses in a variety of industries (Joosub, 2021 as cited by Vodacom Group, 2021). So far, seventy (70) large and small businesses have made a commitment to build their mini programs on the app (Ayugi, 2021; Sharma, 2021; Vodacom, 2021 as cited by Tech Central, 2021; Vodacom Group, 2021). Consumers will be able to use the app to transact (e.g. to pay bills, send money, and order takeaways) and even play games (Ayugi, 2021; Sharma, 2021; Tech Central, 2021; Vodacom Group, 2021). In light of this ground-breaking app, which is set to revolutionise how South African consumers buy goods and pay bills online, and which is powered by the Alibaba group; it would be interesting to see how many consumers would be willing to adopt VodaPay. Statistics have shown that less than 10 percent of South Africans shop online (Barayre, 2018; UNCTAD, 2018 as cited by Barayre, 2018) therefore, this means that the investments that Vodacom, and other businesses, have put on VodaPay may yield minimal return on investment (ROI) hence, a study on the factors that contribute to mobile commerce adoption in a South African context would help organisations, like Vodacom, to put measures in place that would ensure that the majority of South Africans adopt VodaPay and m-commerce in general.

The research on B2C mobile commerce adoption was carried out in South Africa; the study's findings could shed light on why Africa is still lagging behind in terms of B2C m-commerce adoption. Regulatory authorities, professionals, organisations, and consumers will be guided to make decisions that will boost South Africa's B2C m-commerce international market share after the factors driving B2C mobile commerce adoption are identified; and according to Mohtaramzadeh et al. (2017), this will result in economic growth in Africa.

Adoption is the decision to fully implement a new technology after determining that it is better than other options (Rogers, 1983) therefore, in this study, m-commerce adoption is defined as a person’s decision to implement, accept, and use m-commerce after exhausting all other possibilities (Pavlou & Fygenson, 2006; Rogers, 1983).

1.2 Problem Statement

Globally, trillions of dollars are realised from mobile commerce sales however, African companies and consumers are still lagging behind in terms of adopting m-commerce (Alsaad & Taamneh, 2019; Deng et al., 2010; Guo et al., 2018). Furthermore, while a lot of empirical research on m-commerce adoption in developed and semi-developed countries exists; there are still only a few such studies in an African context (Alsaad & Taamneh, 2019; Qi et al., 2020; Tarhini et al., 2019). From the literature review, it was discovered that most of the research on m-commerce adoption was conducted in Asia, America, and the Middle East (Blaise et al., 2018; Mahatanankoon & Vila-Ruiz, 2007; Sadi & Noordin, 2011; Tarhini et al., 2019; Zamil et al., 2020), and only a few studies were conducted on the African continent. The examined literature has not demonstrated to what degree the factors driving mobile commerce adoption in industrialised nations are applicable to m-commerce adoption in developing nations in Africa, and the extent to which each factor (for example, hedonic motivation) influences mobile commerce adoption in a South African context remains speculative. In addition, the reviewed literature predominantly used positivism to study adoption (Sadi & Noordin, 2011; Tarhini et al., 2019; Venkatesh et al., 2012) however, this study fills a theoretical gap by studying adoption primarily using the positivist method with two additional open-ended (interpretivist) questions. Several researchers have investigated the elements that drive mobile commerce adoption using various theories, resulting in theoretical tension (Sadi & Noordin, 2011; Saprikis et al., 2021; Tarhini et al., 2019; Wang et al. 2006). Hence, this study utilised two of the main theories and several factors, used in extant literature, to study m-commerce adoption, in a single study. The best designed mobile commerce business models will fall apart if m-commerce is not widely adopted (Wang et al., 2006) hence, the need to research on the factors that influence m-commerce adoption. South African companies that want to trade online and South African consumers who want to adopt m-commerce do so at their own risk as they are largely unaware of the factors influencing adoption therefore, they are likely to fail hence, the need for this study. Accordingly, the following research question is raised:

RQ1: *What are the factors influencing business to consumer mobile commerce adoption by consumers in South Africa?*

1.3 Research Objectives

The purpose of this research is to determine the extent to which various factors from the Unified Theory of Acceptance and Use of Technology (UTAUT2) model, Theory of Planned Behaviour (TPB) and the two additional factors (i.e. perceived financial resources and institution-based trust) impact the adoption of B2C mobile commerce in South Africa. It is anticipated that this combination of theories will provide a more comprehensive perspective of the factors that influence m-commerce adoption by individuals in South Africa. Through the application of the aforementioned theoretical

underpinnings, the study proposes a novel concept in studying m-commerce adoption in an African context. In addition, the study also seeks to discover, through open-ended questions, additional factors influencing mobile commerce adoption in South Africa. The research would help to inform theory and practice on the elements that influence B2C m-commerce adoption in a South African context, and inform the research community on the degree to which each factor contributes to adoption. Information on popular m-commerce categories (or marketplaces) will also be given.

1.4 Intended Contribution of the Study

It is envisaged that the study will contribute to practice and theory by providing information on the factors driving B2C m-commerce adoption in South Africa, and explain the degree to which each factor leads to adoption. There were no m-commerce adoption studies in the literature that combined these theories (i.e. UTAUT2 and TPB) with the perceived financial resource (PFR) and institution-based trust constructs in a single study to examine the adoption of mobile commerce in developing or other nations. Most of the studies in the reviewed literature were conducted in the period of 2000 to 2021, and ScienceDirect, Google Scholar, Research Gate, JSTOR, and prominent Information Systems journals (e.g. the Journal of Strategic Information Systems and MIS Quarterly) databases were consulted. A study like this one does not appear to have been conducted, particularly in Africa. The study would fill a gap in the literature by employing this theoretical model to better understand B2C m-commerce adoption. Similar studies were undertaken in the past however, the research context, the research methods used, government regulations, the m-commerce model (i.e. Business-to-Consumer), and other factors may be different. For example, Tarhini et al. (2019) conducted their research on mobile commerce adoption in Oman; their research differs from this study in terms of geographic location, and whereas Tarhini et al. (2019) utilised UTAUT2 and SERVQUAL in their research, this study combined the UTAUT2 model with TPB, and two other constructs. The outcomes of the research would help corporate managers, regulatory authorities, professionals, as well as other decision-makers make judgments that would encourage rather than hinder m-commerce adoption.

1.5 Delimitations of the Study

The following are the delimitations of the study:

- The objective of the research is to identify the factors influencing B2C m-commerce adoption by South African consumers only; consumers residing outside South Africa are excluded from the study.
- Only B2C mobile commerce market places are included in the research i.e. Business-to-Business (B2B) and other types of electronic markets are excluded from the research.
- The research will be conducted at the individual level, rather than at the organisational, national, societal, or group levels.

- The study is only focusing on m-commerce (retail only).
- Only the variables identified within the UTAUT2 model, TPB, and the perceived financial resources and institution-based trust constructs were employed in the study i.e. factors other than those mentioned in UTAUT2 and TPB (with the exception of institution-based trust, and perceived financial resources) are excluded from the study however, research participants were also asked to respond to a few open-ended questions and enter their comments at the end of the questionnaire.

1.6 Research Report Structure

Section 2 of this study (i.e. the literature review) classifies past studies on mobile commerce adoption into categories (e.g. theories and context of studies); the research findings and the studies' limitations are also explored.

Section 3 describes the theories that were drawn from literature, these theories were used to identify the factors influencing B2C mobile commerce adoption by South African online shoppers. In this section, the hypotheses (as well as the arguments supporting the hypothesised correlations) are given together with conceptual descriptions of the constructs. The research model is also illustrated.

The research methodology that was employed to answer the research question is discussed in Section 4. Explanations for why the quantitative research approach was chosen for the study are provided, as well as information about research ethics, the sampling procedures, research instrument (i.e. the online survey) and approach, face and content validity, construct operationalisation, pre-tests and post-tests, data collection procedures, data analysis, and the references, from the literature, that support the questionnaire items are also given.

Section 5 discusses the threats to the research's external and internal validity, as well as how the research's reliability and validity were established; the study’s limitations are also explored. A sample of the research instrument (i.e. the survey / questionnaire) is provided in the Appendices section.

Sections 6 to 8 contain the conclusion which gives details of the research findings, study implications together with guidance for future research.

2 LITERATURE REVIEW

The main objective of this section is to identify and analyse relevant literature with regards to B2C mobile commerce adoption. The literature review was carried out carefully by following the eight phases of a methodical literature review (Okoli & Schabram, 2010). Prior to conducting the study, a research question (i.e. RQ1: “What are the factors influencing Business-to-Consumer (B2C) m-commerce adoption by consumers in South Africa?”) was developed. Google Scholar, Research Gate, and the top eight information systems journals were all searched. A concept-centric synthesis (Okoli & Schabram, 2010) was carried out by grouping the concepts derived from the research papers into themes; only publications that matched the inclusion criteria (those focusing on mobile commerce or mobile payment adoption) were considered for further evaluation. The literature review methodology flowchart is shown in Figure 1, and the Summary / Evidence table is shown at the end of this section. This section was then written with reference to the summary table.

Literature Review Methodology Flowchart

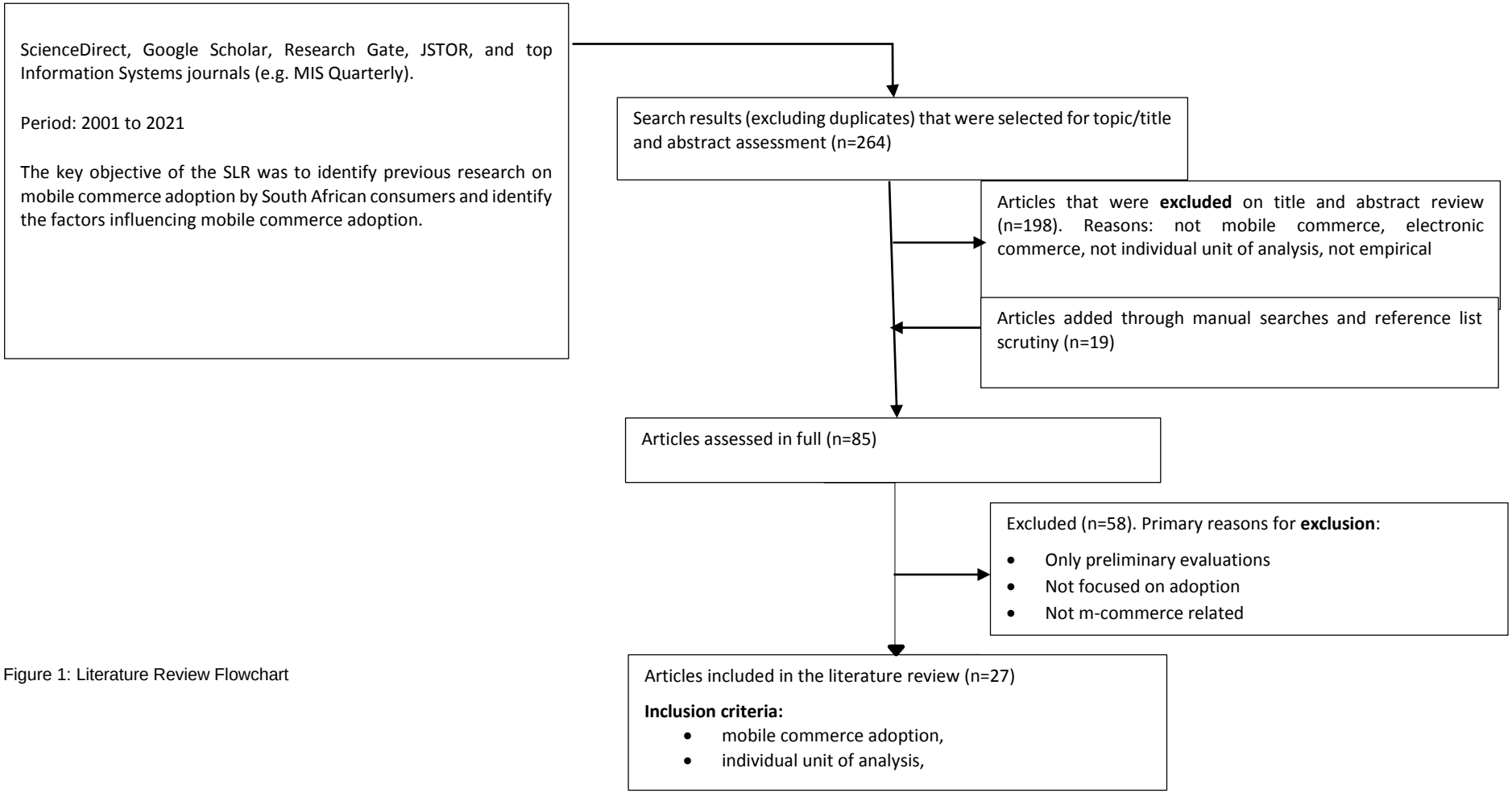


Figure 1: Literature Review Flowchart

2.1 Mobile Commerce Adoption Studies

Previous research on m-commerce adoption was conducted in industrialised countries namely, the United Kingdom, Greece, and the United States of America (Blaise et al., 2018; Mahatanankoon & Vila-Ruiz, 2007; Saprikis et al., 2021; Slade et al., 2015). Several studies were carried out in developing and semi-developed countries in Asia namely, China, Hong Kong, Iran, Jordan, Malaysia, Oman, Saudi Arabia, and Taiwan (Al-Saedi et al., 2020; Baabdullah et al., 2019; Deng et al., 2010; Rajabion, 2015; Sadi & Noordin, 2011; Sim et al., 2018; Tarhini et al., 2019; Venkatesh et al., 2012; Wang et al., 2006), and a few studies were conducted in South Africa (Joubert & Belle, 2013; Okonkwo et al., 2019).

Joubert and Belle (2013) conducted their study in South Africa however, their study differs from this research in several ways, for example, while Joubert and Belle (2013) used TAM, the Innovation Diffusion Theory (IDT) to produce a research model with various trust variables in their study, this study combined UTAUT2 and TPB; the target research participants, in the study conducted by Joubert and Belle (2013), were young call centre agents with an average age of twenty-two (22) whilst the research participants in this study were people from all age-groups and industries; and whilst the study done by Joubert and Belle (2013) was conducted in Cape Town, this study was conducted across South Africa.

The research done by Sadi and Noordin (2011) covered four cities in Malaysia, the study assessed the factors influencing mobile commerce adoption by Malaysian consumers. This suggests that studies on m-commerce adoption can be conducted across cities.

Overall, the studies were conducted at universities in one city or across cities, in classrooms and in a few industries (Joubert & Belle, 2013; Mahatanankoon & Vila-Ruiz, 2007; Zamil et al., 2020). This paper also includes a number of studies that were conducted at the individual level (Deng et al., 2010; Joubert & Belle, 2013; Rajabion, 2015; Sadi & Noordin, 2011; Sim et al., 2018). As a result, we may conclude that research on m-commerce adoption can be conducted at the individual level, within a single institution, across universities, within a single city, and across cities. This prompted the proposal to perform this study at the individual level and across South African cities.

The research on mobile commerce adoption included diverse theories, which were frequently combined (Joubert & Belle, 2013; Sadi & Noordin, 2011; Slade et al., 2015; Tarhini et al. 2019). In certain studies, an integrated model of TAM and TRA components was built to investigate the factors influencing mobile commerce adoption; UTAUT, UTAUT2, TAM, TPB, TRA, DOI, and Extended UTAUT were among the theories and frameworks used in various studies (Sadi & Noordin, 2011; Slade et al., 2015; Tarhini et al. 2019; Venkatesh et al., 2012; Zamil et al., 2020; Zhao & Bacao,

2021). In addition, some studies used UTAUT and PEEIM as a key moderator in their study (Sim et al., 2018). The concept of merging many theories or models in a single study prompted the use of the UTAUT2 model with TPB in this research. The next section discusses the reasons for choosing the UTAUT2 model, the TPB theory, the perceived financial resource construct, and the institution-based trust construct.

In an effort to give a holistic examination of the elements that influence mobile commerce adoption, the Summary / Evidence Table (i.e. Table 1) summarises the studies that used the UTAUT/UTAUT2 model and those that combined this model with other theories. Some of the studies drew on the UTAUT2 model, and research confirms that UTAUT2 and TPB are suitable theories to use in researching mobile commerce adoption at individual level (Sadi & Noordin, 2011; Tarhini et al., 2019; Venkatesh et al., 2012; Wang et al., 2006). Ten dominant factors from UTAUT2 and TPB were discovered in the literature review and used as constructs in the research; these factors are effort expectancy, perceived risk, facilitating conditions, social influence, habit, hedonic motivation, price value, performance expectancy, perceived behavioural control, and attitude towards behaviour (Sadi & Noordin, 2011; Tarhini et al., 2019; Venkatesh et al., 2012).

Table 1 (i.e. the Summary / Evidence Table), lists the factors, under the Key Findings column, that were found to influence mobile commerce adoption. In two separate quantitative studies conducted in Oman; price value, effort expectancy, trust, habit, facilitating conditions, hedonic motivation, performance expectancy, social influence, and cost were found to significantly influence adoption (Al-Saedi et al., 2020; Tarhini et al., 2019). Several other studies of this nature have been carried out in various nations. The research on m-commerce adoption fills a literature gap by using quantitative (positivist) research methods together with two open-ended (qualitative) questions that allowed the respondents to give additional factors that may be unique to the South African context (e.g. poor transportation networks or the difficulties in delivering to remote areas). Attitude towards behaviour, perceived risk, and subjective norms were found to greatly influence online shopping decisions in Spain (Herrero-Crespo & Bosque, 2010); the limitations of the study conducted by Herrero-Crespo and Bosque (2010) was that subjective instead of objective (i.e. actual use) measures were used. Objective measures (i.e. actual use) are used as a measure of adoption in this study. UTAUT and UTAUT2 were strongly supported by empirical tests and UTAUT2 was shown to be a powerful framework (Venkatesh et al., 2003; Venkatesh et al., 2012). A key limitation of the study conducted by Venkatesh et al. (2012) was that the findings may not be generalisable to less technologically advanced countries (Venkatesh et al., 2012). This study fills a literature gap by conducting a study using UTAUT2 constructs in a developing country in Africa. In the research conducted in Malaysia by Sim et al. (2018), it was discovered that facilitating conditions, effort expectancy, trust, and performance expectancy significantly influenced m-commerce adoption. It is however, not known to what extent the research findings are generalisable to countries outside Malaysia hence, the findings of this study will fill this

gap. The UTAUT2 constructs were used in this study together with variables (i.e. institution-based trust, perceived risk, perceived behavioural control, perceived financial resources, and attitude towards behaviour) derived from TPB, and extant literature (Deng at al., 2010; Herrero-Crespo & Bosque, 2010; McKnight et al., 2002; Venkatesh et al., 2012; Wang et al., 2006). This research sought to combine UTAUT2, TPB, and additional constructs in order to enrich the study and give greater understanding of how mobile commerce is adopted in South Africa. The studies that used variations of UTAUT/UTAUT2 and TPB constructs were conducted in Oman, Taiwan, Malaysia, Spain, and USA (Blaise et al., 2018; Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011; Tarhini et al., 2019; Wang et al., 2006); plus in Greece, China, the United Kingdom, and Hong Kong (Saprikis et al., 2021; Slade et al., 2015; Venkatesh et al., 2012; Zhao & Bacao, 2021). This study fills a gap by conducting a study similar to the abovementioned ones in South Africa.

Table 1: Summary / Evidence table

	Reference	Context and data	Research Purpose	Methods Used	Theory/ Framework	Unit of Analysis	Variables / Concepts Examined	Key Findings	Controls	Limitations
1.	Tarhini et al. (2019)	Oman, 530 Omani m-commerce users	Investigated the enablers and deterrents of m-commerce adoption in developing nations.	Self-administered questionnaire / survey	UTAUT2, SERVQUAL	Individual	Performance and effort expectancies, , information quality, price value, habits, system quality, trust, facilitating conditions, service quality, hedonic motivation and self-efficacy.	Information quality and service positively correlate with m-commerce adoption. Facilitating conditions, hedonic motivation, habits, price value, and performance expectancy significantly impact consumers' intention to adopt.	1. Research participants from a developing nation i.e. Oman. 2. Hedonic motivation shapes intention to adopt mobile commerce.	Only quantitative research was carried out. The study was carried out in Oman therefore, this restricts the generalisability of the findings.
2.	Al-Saedi et al. (2020)	436 respondents in Oman.	An extended UTAUT model was developed to facilitate mobile payments adoption.	Survey	Extended UTAUT	Individual	Cost, performance and effort expectancies, social influence, perceived risk, trust, and self-efficacy.	Perceived trust, effort expectancy, social influence, performance expectancy, cost and self-efficacy greatly influence mobile payments adoption.	Mobile payment users	The study was carried out in Oman therefore, this restricts the generalisability of the findings.
3.	Blaise et al. (2018)	165 Americans	Study on factors predicting mobile commerce	Survey	UTAUT	Individual	Facilitating conditions, social influence, and performance expectancy. Moderated by: experience, gender, and age.	The results suggest a considerable association between intentions to purchase and approach-	Adults who were 21 years and older across North America.	1. Limited number of respondents. 2. Sample not representative of

			purchasing intentions.					oriented goals as well as implicit motivations.		North American mobile users. 3. Self-service bias.
4.	Venkatesh et al. (2012)	1572 responses. Hong Kong	Extended UTAUT to study technology adoption.	Survey	UTAUT2	Individual	Facilitating conditions, performance expectancy, price value, social influence, effort expectancy, hedonic motivation, and habit. Moderated by: Experience, gender, and age.	UTAUT2 was strongly supported by empirical tests across diverse contexts.	Only current mobile internet users with prior mobile internet use.	The study was carried out in Hong Kong therefore, this restricts the generalisability of the findings. The research findings may not be generalisable to less technologically advanced countries.
5.	Sim et al. (2018)	278 questionnaires. Kuala Lumpar and Ipoh residents.	Perceived Effectiveness of E-commerce Institutional Mechanisms (PEEIM) and trust in mobile commerce adoption.	Survey	UTAUT, PEEIM	Individual	Trust in vendor, social influence, facilitating conditions, PEEIM, performance and effort expectancies.	All the constructs significantly correlated with mobile commerce adoption.	Mobile phone users.	The study was carried out in Malaysia therefore, this restricts the generalisability of the findings.

6.	Wang et al. (2006)	Taiwan, 258 participants from an e-commerce symposium.	To predict the likelihood that a consumer would use a mobile service.	Questionnaire / survey	TAM, TPB	Individual	Perceived financial resources, self-efficacy, perceived usefulness (PU), Perceived credibility, and Perceived Ease of Use (PEOU).	PEOU and PU are significant factors on behavioural intentions.	1. Telecoms company. 2. Research participants had to be willing to use a specific mobile service.	1. The study was carried out in Taiwan therefore, this restricts the generalisability of the findings. 2. Geographical and population size. 3. Actual usage behaviour was not monitored.
7.	Sadi and Noordin (2011)	Malaysia, 349 respondents across multiple colleges and staff from 4 cities.	Exploring the factors influencing m-commerce adoption.	Survey	TRA, TPB, TAM, DOI	Individual	PU, PEOU, facilitating conditions, perceived trust, cost, attitude towards use, behavioural control, subjective norms, personal innovativeness, and self-efficacy.	All of the factors were shown (statistically) to significantly influence m-commerce adoption.	Questionnaires were administered in the classroom and on-campus.	1. Convenience sample. 2. The study was carried out in Malaysia therefore, this restricts the generalisability of the findings.

Table 1 (Key Findings column) indicates that the factors influencing m-commerce adoption are, to a large extent, inconsistent across different countries. Hence, it cannot be assumed that the factors influencing adoption in, for example, Malaysia or Hong Kong, would be the same as those influencing adoption in South Africa. This also suggests that there are several factors that influence m-commerce adoption, and these factors may influence m-commerce adoption differently across different countries. However, there are exceptions, for example, facilitating conditions were shown to significantly influence adoption in Oman and Malaysia (Tarhini et al., 2019; Sadi & Noordin, 2011; Sim et al., 2018). In addition, different researchers used UTAUT, UTAUT2, and TPB theories on their own, or combined with varying theories and variables, in their studies hence, different factors can be used to study m-commerce adoption and the combination of UTAUT2 and TPB theories may give us a more holistic view of mobile commerce adoption in South Africa.

2.2 M-Commerce Adoption in South Africa

From the reviewed literature, it appears that only a few studies on mobile commerce adoption were carried out in South Africa. The purpose of the research conducted by Cullen and Kabanda (2018) was to investigate the effects of motivational factors and individual characteristics on m-commerce utilisation. A research model by Chong (2013, as cited by Cullen & Kabanda, 2018) was used in this study; the research findings showed that educational levels and age significantly influenced m-commerce adoption (Cullen & Kabanda, 2018). Okonkwo et al. (2019) explored the association between attitude and characteristics of an innovation, and m-commerce adoption by rural dwellers in Kwa Zulu-Natal. The Diffusion of Innovation (DOI) theory was the one primarily used in the research model and questionnaires were distributed to villagers (Cullen & Kabanda, 2018). The study found that the villagers' perceived attitudes were highly correlated with the characteristics of the innovation and m-commerce adoption (Cullen & Kabanda, 2018).

Table 2 gives a summary of some of the few studies on mobile commerce adoption that were conducted in South Africa.

Table 2: M-commerce adoption research in South Africa

	Reference	Context and data	Research Purpose	Methods Used	Theory/ Framework	Unit of Analysis	Variables / Concepts Examined	Key Findings	Controls	Limitations
1.	Joubert and Belle (2013)	500 young call centre agents in Cape Town	To ascertain the roles played by risk and trust in m-commerce adoption in South Africa	Survey	TAM and IDT trust variables	Individual	Disposition to trust, trust in m-commerce, perceived risk, institution-based trust (IBT), system trust, vendor trust	Individual characteristics influence IBT	Young call centre staff	Focus on early adopters with a higher risk tolerance hence, this is a threat to external validity.
2.	Cullen and Kabanda (2018)	South Africa, 81 respondents	Examining how motivational factors and individual characteristics influence m-commerce usage	Online questionnaire	A research model proposed by Chong (2013)	Individual	Demographics (e.g. gender), motivation (e.g. PEOU)	Educational status and age significantly influence m-commerce adoption	People who had used or were using m-commerce	1. Small (81) sample size. 2. Missing key variables, such as income.
3.	Okonkwo et al. (2019)	120 villagers from Mbongolwane in Kwa Zulu-Natal	To investigate mobile commerce adoption in remote areas and the connection between	Questionnaire (hard copies)	Diffusion of Innovation (DOI) plus additional variables	Individual	Self-efficacy, facilitating conditions, perceived risk, PEOU, subjective norms, voluntariness, relative advantage, compatibility	Rural dwellers' perceived attitudes correlate with the characteristics of the innovation and m-commerce adoption.	People residing in a rural area.	Limited to villagers residing in 1 South African district and province.

			attitude and the innovation's characteristics.							

Table 2 (Theory / Framework column) suggests that only a few, and often stand-alone, theories have been used to study m-commerce adoption in a South African context. In addition, only a few variables (Variables column) seem to have been used in the studies and this may limit our understanding of m-commerce adoption in South Africa. Hence, this suggests the need to study m-commerce adoption in South Africa using different, and ideally combined theories or frameworks, with several variables. The studies appear to have different findings and in one study there was insufficient (81 respondents) data whilst the other two studies were confined to specific geographic locations in South Africa (Cullen & Kabanda, 2018; Joubert & Belle, 2013; Okonkwo et al., 2019). This research fills a theoretical gap by studying m-commerce adoption across South Africa using two theories that have been used to study m-commerce adoption in both developed and developing countries (Blaise et al., 2018; Tarhini et al., 2019). In addition, several variables that may impact B2C m-commerce adoption in South Africa; as well as two open-ended questions, that enabled the research participants to give additional factors (which may be unique to South Africa), were used in this study.

2.3 Classification of M-commerce Categories

Fifteen categories of m-commerce marketplaces were identified from existing literature. This categorisation helps us to identify some of the types of m-commerce marketplaces that are available for use on mobile commerce platforms. The categories shown on Table 3 were used in the questionnaire to ascertain where most consumers in South Africa shop, that is, when they use mobile commerce. Consumers can only adopt m-commerce if they find an m-commerce category that is useful to them or one that meets their needs otherwise, consumers will not find any reason to adopt m-commerce. The popular m-commerce categories that have been adopted by most consumers in South Africa are general marketplaces, clothing and shoes, food, books and music, and pharmaceuticals and toiletries whilst the categories which are less popular are toys and baby products; DIY, garden and pet stores; and furniture m-commerce marketplaces. Table 3 gives a summary of m-commerce categories.

Table 3: M-commerce categories

	Category	References
1.	General marketplaces (e.g. Takealot)	(Cision, 2020; Estay, 2021; Statista, 2018; Readymadestores, 2021)
2.	Clothing, shoes (e.g. Truworths, Zando)	(Al-maaitah et al., 2021; Cision, 2020; Estay, 2021; Readymadestores, 2021; Statista, 2018)
3.	Books, movies, music and games (excluding downloads)	(Al-maaitah et al., 2021; Cision, 2020; Estay, 2021; Gefen et al., 2003; Saprikis et al., 2021)
4.	Food (e.g. Checkers sixty60, Woolies Dash)	(Al-maaitah et al., 2021; Cision, 2020; Estay, 2021; Statista, 2018; Readymadestores, 2021)
5.	Cosmetics and body care (e.g. The Body Shop)	(Estay, 2021)
6.	Bags and accessories (e.g. Guess)	(Estay, 2021; Statista, 2018)
7.	Toys and baby products (e.g. ToysRUs)	(Cision, 2020; Estay, 2021; Readymadestores, 2021)
8.	Pharmaceuticals and toiletries (e.g. Clicks and Dischem)	(Al-maaitah et al., 2021; Cision, 2020; Estay, 2021)

9.	Homeware (e.g. @Home)	(Cision, 2020; Estay, 2021)
10.	Health and fitness (e.g. Planet Fitness)	(Al-maaitah et al., 2021; Cision, 2020; Estay, 2021; Readymadestores, 2021)
11.	Household appliances (e.g. Makro, Game Stores)	(Cision, 2020; Estay, 2021)
12.	Furniture and household goods (e.g. Bradlows, Coricraft)	(Cision, 2020; Estay, 2021; Readymadestores, 2021)
13.	Do-It-Yourself (DIY), garden and pet stores (e.g. Do-it, PetHeaven)	(Cision, 2020; Estay, 2021; Gilbert, 2019; Readymadestores, 2021)
14.	Stationery and hobby suppliers (e.g. PnA, Waltons)	(Cision, 2020; Estay, 2021; Readymadestores, 2021)
15.	Hardware, paint and glass (e.g. Cashbuild)	(Readymadestores, 2021)

3 THEORETICAL BACKGROUND AND RESEARCH MODEL

In this section, the UTAUT2 and TPB theories are described together with the two additional constructs (i.e. institution-based trust and perceived financial resources). These theories are key to answering the research question. The research model is described in this section, along with a set of hypotheses. This section also seeks to clearly articulate the conceptual definitions for all the constructs used in this study.

3.1 Theoretical Background

This section describes the institution-based trust and perceived financial resources constructs together with the UTAUT2 and TPB theories. These theories are essential for addressing the research topic.

3.1.1 Unified Theory of Acceptance and Use of Technology (UTAUT2) model

The UTAUT model is the result of the analysis, comparison, and the grouping of models of technology acceptance and eight theories that are thematically interrelated, and are extensively used in extant literature (Ameen & Willis, 2018; Venkatesh et al., 2003). The UTAUT2 theoretical model extends UTAUT with three variables, that is, habit, price value, and hedonic motivation (Ameen & Willis, 2018; Tarhini et al., 2019; Venkatesh et al., 2012). The UTAUT2 and UTAUT variables that were used in the studies were social influence, performance expectancy, behavioural intention, effort expectancy, habit, perceived risk, hedonic motivation, facilitating conditions, and price value (Baabdullah et al., 2019; Blaise et al., 2018; Haryanti & Subriadi, 2020; Saprikis et al., 2021; Slade et al., 2015; Venkatesh et al., 2012). UTAUT2 has been applied in m-commerce adoption studies (Haryanti & Subriadi, 2020; Tarhini et al., 2019). The key findings of the studies were that UTAUT2, like UTAUT, was strongly supported by empirical tests across diverse contexts, and the three additional constructs (i.e. habit, price value, and hedonic motivation) produced substantial improvements in explaining behavioural intention discrepancies amongst consumers (Haryanti & Subriadi, 2020; Tarhini et al., 2019; Venkatesh et al., 2012). UTAUT2 was applied in studies that were carried out in Jordan, Hong Kong, and Oman (Baabdullah et al., 2019; Tarhini et al., 2019; Venkatesh et al., 2012). UTAUT/UTAUT2 have been used in numerous recent studies on mobile commerce adoption by consumers hence, it was selected for this study (Haryanti and Subriadi, 2020; Tarhini et al., 2019).

3.1.2 Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour regards intention as a key indicator of behaviour. TPB identifies attitude towards behaviour, perceived behavioural control, and subjective norm as the three constructs governing behaviour (Herrero-Crespo and Bosque, 2010; Sadi & Noordin, 2011; Wang et al., 2006). TPB was used to predict the likelihood that a consumer would use a mobile service and to investigate the determinants of m-commerce adoption (Sadi & Noordin, 2011; Wang et al., 2006).

TPB factors were found to significantly influence behavioural intentions (Sadi & Noordin, 2011; Wang et al., 2006). In the reviewed literature, TPB was only applied in studies that were carried out in Malaysia, Spain, and Taiwan (Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011; Wang et al., 2006). TPB was selected for this study because it encapsulates the motivational factors that impact people's behaviours, and the degree to which individuals are eager to make an effort to enable them to accomplish a specific behaviour (Herrero-Crespo and Bosque, 2010; Rajabion, 2015).

Several researchers have used various theories to investigate the factors influencing electronic commerce adoption, resulting in a theoretical tension: Tarhini et al. (2019) used UTAUT2 and SERVQUAL in their research; Wang et al. (2006) used the TPB together with the Technology Acceptance Model (TAM); Zamil et al. (2020) developed their own conceptual framework; while Sadi and Noordin (2011) used the TAM, Diffusion of Innovation (DOI) theory, Theory of Reasoned Action (TRA), and TPB in their study. In this study, TPB, the UTAUT2 model, and the perceived financial resources construct were used as theoretical lens. UTAUT2 and TPB were selected for this study because they have been successfully used in previous technology adoption (by individuals) studies (Saprikis et al., 2021; Venkatesh et al., 2003). Furthermore, UTAUT2 integrates eight important research models, and UTAUT2 and TPB have both been used to study behavioural intention in previous research (Saprikis et al., 2021; Venkatesh et al., 2003). It is anticipated that this combination of theories will provide a more comprehensive picture of factors that influence m-commerce adoption at the individual (i.e. by consumers) level in South Africa.

3.1.3 Perceived Financial Resources (PFR)

Perceived financial resources (PFR) refers to a customer's level of confidence in his or her ability to meet financial obligations (e.g. the costs of accessing wireless services and purchasing the mobile devices) required to use a mobile commerce system (Wang et al., 2006). The PFR construct was used in a study to predict the likelihood that a consumer would use a mobile service; the study was conducted in Taiwan (Wang et al., 2006). PFR differs from price value in that while PFR measures whether or not a consumer "has the money" to use m-commerce, price value however, measures a customer's perception of whether or not they believe that m-commerce offers good "value-for-money" (Tarhini et al., 2019; Venkatesh et al., 2012; Wang et al., 2006).

PFR was added as an additional construct because it was shown to significantly influence adoption in Malaysia (Sadi & Noordin, 2011). In addition, in the research conducted by Wang et al. (2006) in Taiwan; PFR was used to predict the likelihood that a consumer would use a mobile service (Wang et al., 2006). In developing nations, it is assumed that most of the consumers do not have a considerable amount of disposable income hence, PFR is an important factor to include in studies relating to the purchasing and selling of products and services in those nations.

3.1.4 Institution-Based Trust (IBT)

Institution-based trust refers to a consumer's trust and confidence in m-commerce service providers; this confidence is the result of structural safeguards and consumers' assessments of the degree to which the situation (i.e. when transacting on mobile platforms) appears normal; the compassion, friendliness, integrity and competence of service providers; and any other attribute that is beneficial to consumers (Everard & Galletta, 2005; Gefen et al., 2003; McKnight et al., 2002).

Trust has several dimensions, the key ones being perceived e-vendor benevolence, integrity and competence (McKnight et al., 2002). In addition, trust constructs are connected in structured and meaningful ways (McKnight et al., 2002). In the research done by Zamil et al. (2020); perceived ease of use and perceived usefulness of a technology were shown to positively correlate with trust. In addition, trust was found to influence repurchase intentions (Jean et al., 2018). Investigating the trust factor in a South African context would add to existing knowledge and help practice to understand the effects that IBT has on behavioural intention to utilise and accept m-commerce in South Africa. Hence, this suggests that humans must trust an e-vendor in order to use the technology or service, and for them to repurchase from a specific vendor.

3.2 Research Model

The reviewed literature was used to come up with the constructs that were used in the research. The factors that were identified from UTAUT2 and TPB are facilitating conditions, price value, performance expectancy, perceived behavioural control, perceived risk, hedonic motivation, social influence, habit, effort expectancy, and attitude towards m-commerce purchase (Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011; Tarhini et al., 2019; Venkatesh et al., 2012). Two additional constructs (i.e. institution-based trust and perceived financial resources (Gefen et al., 2003; McKnight et al., 2002; Wang et al., 2006)) were added to the research model.

3.2.1 Performance Expectancy (UTAUT2-PE)

Performance expectancy is defined as the extent to which individuals believe that utilising a given technology would increase their performance (Al-Saedi et al., 2020; Haryanti & Subriadi, 2020; Venkatesh et al., 2003). If individuals view the use of mobile commerce as highly beneficial then this increases their probability of adopting it (Al-Saedi et al., 2020; Tarhini et al., 2019). Hence:

H_1: Perceived performance expectancy positively influences the behavioural intention to adopt m-commerce by consumers.

3.2.2 Habit (UTAUT2-HA)

Habit is described as the degree to which people are predisposed to perform certain behaviours due to prior learning; these behaviours are unconscious decisions triggered by situational stimuli that comes about as a result of associating certain behaviours with satisfactory results (Haryanti & Subriadi, 2020; Tarhini et al., 2019; Venkatesh et al., 2012). If a customer associates mobile commerce usage with satisfactory outcomes then he or she is inclined to adopt it (Tarhini et al., 2019). Hence:

H_2: Habit positively influences the behavioural intention to adopt m-commerce by consumers.

3.2.3 Effort Expectancy (UTAUT2-EE)

Effort expectancy refers to the degree to which people perceive an innovation as simple to use (Haryanti & Subriadi, 2020; Tarhini et al., 2019; Venkatesh et al., 2003). If consumers find mobile commerce services effortless to operate, this increases their probability of adopting m-commerce (Al-Saedi et al., 2020; Tarhini et al., 2019). Hence:

H_3: Effort expectancy positively influences the behavioural intention to adopt m-commerce by consumers.

3.2.4 Price Value (UTAUT2-PV)

Price value refers to a situation where a consumer perceives the use of an application as more beneficial than the monetary cost of utilising the application (Venkatesh et al., 2012). If customers believe that the benefits (i.e. “value-for-money”) of using mobile commerce outweigh the financial costs, then price value can be considered as positively impacting behavioral intention (Haryanti & Subriadi, 2020; Tarhini et al., 2019; Venkatesh et al., 2012). Hence:

H_4: Perceived price value positively influences the behavioural intention to adopt m-commerce by consumers.

3.2.5 Social Influence (UTAUT2-SI)

Social influence is defined as the degree to which the people, that a consumer considers as significant, impact his or her decision to use an innovation (Al-Saedi et al., 2020; Tarhini et al., 2019; Venkatesh et al., 2003). Social influence is related to subjective norms (Venkatesh et al., 2003). If important people in a person’s life are in support of mobile commerce, this may motivate the individual to adopt m-commerce (Tarhini et al., 2019). Hence:

H_5: Social influence positively influences the behavioural intention to adopt m-commerce by consumers.

3.2.6 Hedonic Motivation (UTAUT2-HM)

Hedonic motivation refers to the gratification felt by consumers as a result of using a specific innovation (Tarhini et al., 2019; Venkatesh et al., 2012). If consumers are entertained or they have fun whilst using mobile commerce technology then the

probability that they will adopt mobile commerce increases (Venkatesh et al., 2012; Tarhini et al., 2019). Hence:

H_6: Hedonic motivation positively influences the behavioural intention to adopt m-commerce by consumers.

3.2.7 Facilitating Conditions (UTAUT2-FC)

Facilitating conditions refers to the extent to which individuals believe in the existence of an organisational and technical structure that sustains the utilisation of a system (Baabdullah et al., 2019; Tarhini et al., 2019; Venkatesh et al., 2003). If consumers consider the technical and organisational infrastructure as adequately supporting m-commerce services then this increases their probability of adopting mobile commerce. Hence:

H_7: Facilitating conditions positively influence the behavioural intention to adopt m-commerce by consumers.

3.2.8 Perceived Risk (UTAUT2-PR)

Perceived risk is described as a person's uncertainty or concern about a particular behaviour; and the gravity or significance of the behaviour's potential negative consequences (Baabdullah et al., 2019; Slade et al., 2015). If consumers perceive mobile commerce to be risky then they are less likely to adopt it. Hence:

H_8: Perceived risk negatively influences the behavioural intention to adopt m-commerce by consumers.

3.2.9 Perceived Behavioural Control (TPB-PBC)

Perceived behavioural control refers to consumers' views of the simplicity or complexity, and unavailability or availability of the resources, needed to achieve a specific task (Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011). If performing specific tasks on mobile commerce platforms is considered to be easy, and the necessary resources are available then the probability that consumers will adopt mobile commerce increases (Herrero-Crespo & Bosque, 2010). Hence:

H_9: Perceived behavioural control positively influences the behavioural intention to adopt m-commerce by consumers.

3.2.10 Attitude Towards Behaviour (TPB-ATB)

Attitude towards behaviour refers to the general proclivity for or against adopting certain behaviours; individual views about behaviour and its consequences, as well as the weight accorded to these beliefs, are thought to influence attitude (Herrero-Crespo & Bosque, 2010). TPB-ATB is related to behavioural intention (Wang et al., 2006). If an individual perceives the outcome of using an m-commerce system in a positive way then the individual is likely to adopt mobile commerce. Hence:

H_{10}: Attitude towards behaviour positively influences the behavioural intention to adopt m-commerce by consumers.

3.2.11 Perceived Financial Resources (PFR)

Perceived financial resources refers to the degree to which an individual trusts that he or she has the funds required to use an innovation, such as an m-commerce system (Wang et al., 2006). If a consumer believes that he or she has sufficient funds to use m-commerce systems, this will increase the probability that the individual will adopt m-commerce (Wang et al., 2006). Hence:

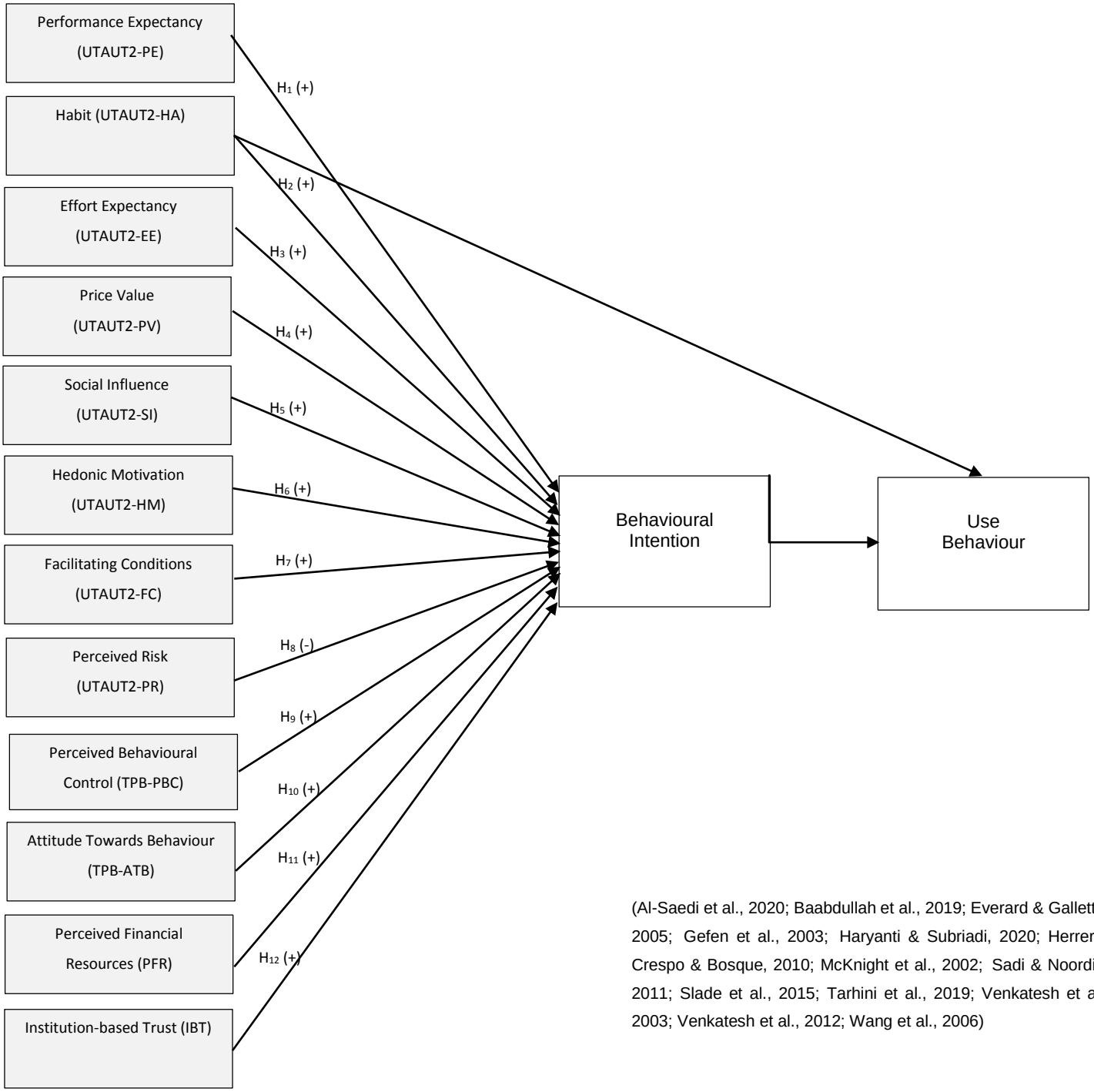
H_{11}: Perceived financial resources positively influences the behavioural intention to adopt m-commerce by consumers.

3.2.12 Institution-Based Trust (IBT)

Institution-based trust refers to a consumer's faith on an m-commerce vendor; this confidence is as a result structural assurances (i.e. security and safety nets provided by, for example, guarantees, regulations, and legal options); situational normality, that is, assurance of successful transaction based on how normal or typical the scenario appears to be (Gefen et al., 2003); benevolence (i.e. the vendor's ability to act in the consumer's interest), integrity (i.e. vendor's honesty and reliability), vendor competence, and the vendor possessing any other attributes that are beneficial to the consumer (Everard & Galletta, 2005; Gefen et al., 2003; McKnight et al., 2002). If a consumer trusts that adequate safeguards are in place to secure his or her online transactions, and he or she trusts the m-commerce vendor to deliver (or supply) goods as expected, this will increase the probability that the individual will adopt mobile commerce.

H_{12}: Trust positively influences the behavioural intention to adopt m-commerce by consumers.

Figure 2 shows the research model.



(Al-Saedi et al., 2020; Baabdullah et al., 2019; Everard & Galletta, 2005; Gefen et al., 2003; Haryanti & Subriadi, 2020; Herrero-Crespo & Bosque, 2010; McKnight et al., 2002; Sadi & Noordin, 2011; Slade et al., 2015; Tarhini et al., 2019; Venkatesh et al., 2003; Venkatesh et al., 2012; Wang et al., 2006)

Figure 2: The Conceptual Model

4 RESEARCH METHODOLOGY

A research methodology that addresses the research question and hypotheses is presented in this section. The positivist research paradigm is the one that was primarily used in this study however, at the end of the questionnaire, two open-ended questions were included. Hence, the research produced both quantitative and qualitative data. The research methodology considerations for the research are shown in Figure 3, and these considerations guide the structure of this section. A deductive research approach, cross-sectional survey, and descriptive research design were utilised in the research. This section also discusses the data collection methods and tools used for data analysis. In addition, information on operationalisation indicators, sampling, pre- and pilot testing strategy, and data analysis methods are given. Information on ethical considerations is also given. The draft research instrument (questionnaire / survey) is given on Appendix B.

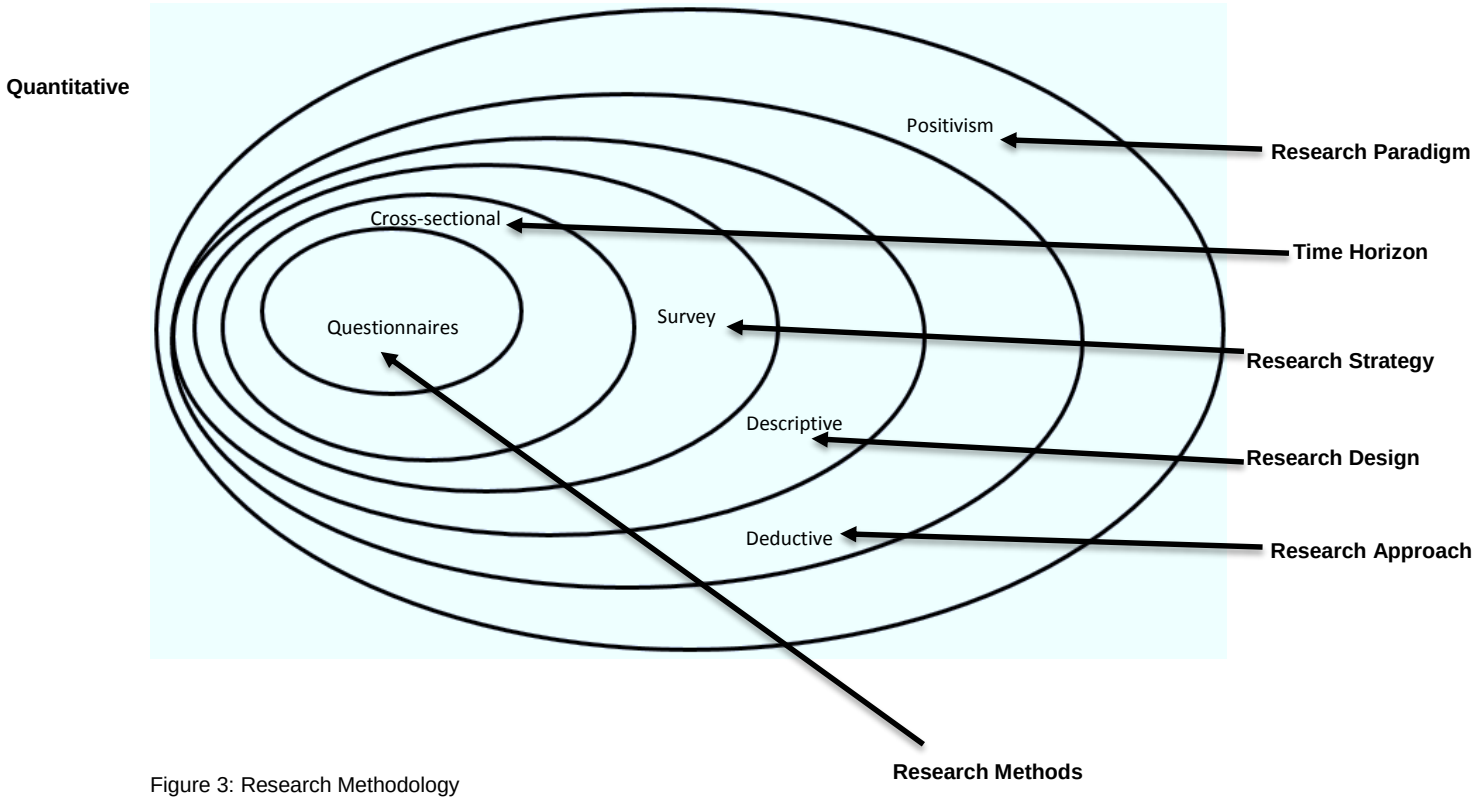


Figure 3: Research Methodology

(Adapted from Saunders et al., 2009)

4.1 Research Paradigm and Approach

A research paradigm refers to a conceptual model used by various communities to investigate and explain phenomena (Bhattacherjee, 2012; Oates, 2006).Two of the most widely employed research paradigms are positivism and interpretivism (Bhattacherjee, 2012; Oates, 2006).

Positivism was predominantly used in the study since it is consistent with the study's objectives. The research was conducted objectively, and the research tried to find universal laws or patterns on B2C m-commerce adoption that are generalisable to all consumers in South Africa. The deductive approach was applied in the investigation since hypotheses were formulated, and theories were employed in the research (Bhattacherjee, 2012).

4.2 Research Design and Strategy

A phenomena and its environment are carefully monitored, analysed, and recorded in the descriptive research design (Bhattacherjee, 2012; Oates, 2006). Descriptive research was selected for this study because it allows the factors that impact mobile commerce adoption by South African consumers to be analysed and documented in detail.

The survey was selected for this study because it enables quantitative data to be collected and analysed statistically; in addition, it allows multiple research participants in a large population to be reached (Bhattacherjee, 2012; Saunders et al., 2009). The main challenges with surveys is that surveys are subject to respondent bias (i.e. where the respondent has a predisposed view of the phenomenon), recall bias, social desirability bias, non-response bias, and sampling bias (Bhattacherjee, 2012). A low response rate (usually in the region of 15-20 percent in surveys) is indicative of non-response bias (Bhattacherjee, 2012; Oates, 2006). When a segment of the population is excluded from a study (for example, groups of persons who are not listed in university or employment databases), this is referred to as sampling bias (Bhattacherjee, 2012; Oates, 2006). Respondents with social desirability bias avoid expressing negative or socially undesirable comments; instead, in order to remain socially acceptable or respectable, these people choose not to tell the truth (Bhattacherjee, 2012; Oates, 2006). The incapacity of a respondent to recall or remember a former experience is referred to as recall bias (Bhattacherjee, 2012; Oates, 2006). Section 4 (i.e. under the Sampling and Respondents heading) discusses respondent biases.

Figure 4 depicts the research design, the arrows reflect the phases' chronological order.

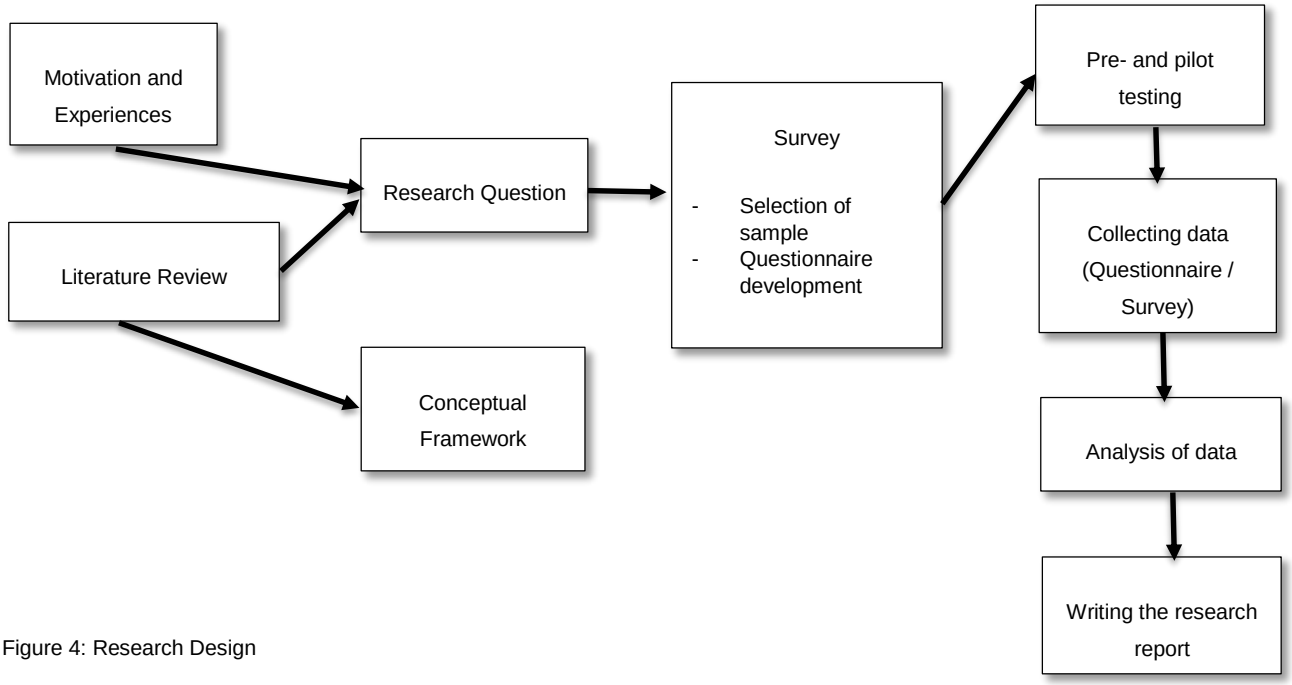


Figure 4: Research Design

(Adapted from Bhattacherjee, 2012; Oates, 2006; Saunders et al., 2009)

4.3 Time Horizon

The study employed a cross-sectional field survey. Cross-sectional field surveys are “snapshot” time horizons, that is, the data is measured at once and not over a prolonged period of time as is the case with longitudinal surveys (Bhattacherjee, 2012; Creswell, 2014). Cross-sectional time horizons have the disadvantage of not allowing the researcher to make causality and temporal precedence inferences (Studycom, 2021).

4.4 Data Collection Methods

A survey was used in the study to acquire primary data from research participants; the survey was comprised of a structured questionnaire with Likert scales (Blaise et al., 2018; Saprikis et al., 2021; Tarhini et al., 2019; Zhao & Bacao, 2021). The respondents accessed the online survey/questionnaire through a link that was shared online (primarily on social media groups), or through a link that was emailed to them.

4.4.1 Operationalisation / Instrument and Measurement Scales Development

Operationalisation is the process of transforming abstract theoretical constructs into tangible and observable components (Bhattacherjee, 2012; Saunders et al., 2009). Several items were used to operationalise all of the dependent and independent variables.

4.4.2 Dependent Variable

Adoption was the dependent variable in this study, twelve independent variables were used to measure the dependent variable, these variables reflect the degree to which m-commerce is accepted and used by South African consumers (Herrero-Crespo & Bosque, 2010; Tarhini et al., 2019; Venkatesh et al., 2012).

4.4.2.1 Adoption

Adoption refers to a consumer's decision to implement, accept, and utilise m-commerce after exhausting all other possibilities (Pavlou & Fygenson, 2006; Rogers, 1983). In the research, respondents are said to have adopted m-commerce if they are using (or have used) the technology.

Table 4 lists the indicators that were used to operationalise the dependent variable (i.e. adoption).

Table 4 Operationalisation indicators for adoption

Operationalisation Indicators for Adoption	Supporting Literature
(1) M-commerce (actual) usage, (2) m-commerce acceptance, (3) implementation/installation of m-commerce app, (4) engagement in online trade **Scale:** 1 = Yes, 2 = No, 3 = Not sure	(Al-Saedi et al., 2020; Deng et al., 2010; Pavlou & Fygenson, 2006; Rogers, 1983; Venkatesh et al., 2012; Wang et al., 2006)

4.4.3 Independent Variables

The following items (in Table 5, under the Indicators column) will be used to quantify the extent of B2C m-commerce use by South African consumers:

Table 5: Measurement approach and literature source

Construct	Indicator Code	Indicators	Sources	Scales	Number of Items
1. Performance Expectancy These measures show the extent to which South African consumers believe B2C m-commerce would enhance their performance (Al-Saedi et al., 2020; Haryanti & Subriadi, 2020; Venkatesh et al., 2003).	UTAUT2-PE	1. Mobile commerce (m-commerce) is a useful technology that I use daily. 2. M-commerce helps me accomplish tasks faster. 3. M-commerce enhances my productivity.	(Al-Saedi et al., 2020; Baabdullah et al., 2019; Blaise et al., 2018; Haryanti & Subriadi, 2020; Saprikis et al., 2021; Sim et al., 2018; Slade et al., 2015; Tarhini et al., 2019; Venkatesh et al., 2003; Venkatesh et al., 2012; Zhao & Bacao, 2021)	1= Strongly Agree, 2= Agree, 3= Somewhat Agree, 4= Neutral, 5= Somewhat Disagree, 6= Disagree, 7= Strongly Disagree	3
2. Habit These measures show the extent to which South African consumers' are inclined to perform certain behaviours due to prior learning (Tarhini et al., 2019; Venkatesh et al., 2012).	UTAUT2-HA	1. Mobile commerce has developed into a habit. 2. I am now addicted to using m-commerce. 3. I need to use mobile commerce.	(Tarhini et al., 2019; Venkatesh et al., 2012)	1=Strongly Agree to 7=Strongly Disagree	3
3. Effort Expectancy These measures show the degree to which B2C m-commerce technology is perceived as easy to use (Tarhini et al., 2019; Venkatesh et al., 2003).	UTAUT2-EE	1. I find it easy to learn how to use mobile commerce. 2. My mobile commerce interactions are clear and understandable. 3. Mobile commerce is easy to use. 4. I can become skilled at using mobile commerce without any difficulties.	(Al-Saedi et al., 2020; Baabdullah et al., 2019; Blaise et al., 2018; Haryanti & Subriadi, 2020; Saprikis et al., 2021; Sim et al., 2018; Slade et al., 2015; Tarhini et al., 2019; Venkatesh et al., 2003; Venkatesh et al., 2012; Zhao & Bacao, 2021)	1=Strongly Agree to 7=Strongly Disagree	4
4. Price Value These indicators demonstrate the extent to which South African consumers regard B2C m-commerce as providing excellent value for money (Venkatesh et al., 2012).	UTAUT2-PV	1. M-commerce related costs are reasonable. 2. M-commerce offers good value-for-money. 3. Based on current pricing, m-commerce gives great value.	(Venkatesh et al., 2012)	1=Strongly Agree to 7=Strongly Disagree	3

Construct	Indicator Code	Indicators	Sources	Scales	Number of Items
5. Social Influence These measures show the extent to which South African consumers are influenced to use B2C m-commerce by significant people in their lives (Tarhini et al., 2019; Venkatesh et al., 2003).	UTAUT2-SI	1. People who are of great importance in my life think I should use mobile commerce. 2. My behaviour is influenced by certain people, and these influential people in my life think I should use mobile commerce. 3. I value the opinions of some people, and those people would rather I used m-commerce.	(Al-Saedi et al., 2020; Baabdullah et al., 2019; Blaise et al., 2018; Sadi & Noordin, 2011; Haryanti & Subriadi, 2020; Saprikis et al., 2021; Sim et al., 2018; Slade et al., 2015; Tarhini et al., 2019; Venkatesh et al., 2003; Venkatesh et al., 2012; Zhao & Bacao, 2021)	1=Strongly Agree to 7=Strongly Disagree	3
6. Hedonic Motivation These measures show the extent to which South African consumers consider the use of B2C m-commerce as enjoyable or gratifying (Tarhini et al., 2019; Venkatesh et al., 2012).	UTAUT2-HM	1. I like using m-commerce. 2. Making use of m-commerce is fun. 3. M-commerce is very entertaining to me.	(Saprikis et al., 2021; Venkatesh et al., 2012)	1=Strongly Agree to 7=Strongly Disagree	3
7. Facilitating Conditions (Technical and Organisational resources) These measures show the extent to which South African consumers trust the organisational and technical structure as adequately supporting the m-commerce use (Tarhini et al., 2019; Venkatesh et al., 2003).	UTAUT2-FC	1. I am knowledgeable enough to use m-commerce. 2. I have the necessary resources to engage in m-commerce. 3. The other technologies I utilise are compatible with m-commerce. 4. There are people who can help me whenever I face difficulties in using m-commerce.	(Baabdullah et al., 2019; Haryanti & Subriadi, 2020; Sadi & Noordin, 2011; Saprikis et al., 2021; Sim et al., 2018; Venkatesh et al., 2012)	1=Strongly Agree to 7=Strongly Disagree	4
8. Perceived Risk These measures show the extent to which South African consumers are anxious or uncertain about B2C m-commerce (Baabdullah et al., 2019; Mandrik & Bao, 2005 as cited by Slade et al., 2015).	UTAUT2-PR	1. I am likely to worry a lot more about making purchases through m-commerce than through other (e.g. face-to-face traditional) channels. 2. I have privacy and security concerns about purchasing goods through m-commerce. 3. I am likely to experience high uncertainty if I purchase products online (m-commerce).	(Al-Saedi et al., 2020; Baabdullah et al., 2019; Herrero-Crespo & Bosque, 2010; Slade et al., 2015)	1=Strongly Agree to 7=Strongly Disagree	3

Construct	Indicator Code	Indicators	Sources	Scales	Number of Items
9. Perceived Behavioural Control (Knowledge Resources) These measures reflect South African consumers' perceptions of how easy or complex it is to accomplish a task on m-commerce platforms, and their perception of the unavailability or availability of the resources required to perform particular tasks on m-commerce platforms (Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011).	TPB-PBC	1. I can use m-commerce to purchase products whenever I want to. 2. I have the necessary resources, knowledge, and skills to use mobile commerce. 3. I am competent enough to purchase goods through m-commerce. 4. Using mobile commerce would be difficult for me.	(Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011)	1=Strongly Agree to 7=Strongly Disagree	4
10. Attitude Towards Behaviour These measures show the extent to which South African consumers are predisposed to using B2C m-commerce and what outcomes they expect (Herrero-Crespo & Bosque, 2010).	TPB-ATB	1. I like the thought of using m-commerce to purchase products within the coming 6 months. 2. Purchasing goods through m-commerce in the coming 6 months is a good idea. 3. Purchasing goods through m-commerce in the coming 6 or so months is a positive idea. 4. Purchasing goods through m-commerce in the coming 6 or so months is a wise idea.	(Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011)	1=Strongly Agree to 7=Strongly Disagree	4
11. Perceived Financial Resources These measures show the extent to which South African consumers believe they have the money required to use B2C m-commerce (Wang et al., 2006).	PFR	1. Financial resources (e.g. to buy data, products, and/or services) do not hinder me from using m-commerce. 2. I have the financial resources that are required for me to use m-commerce.	(Sadi & Noordin, 2011; Wang et al., 2006)	1=Strongly Agree to 7=Strongly Disagree	2

Construct	Indicator Code	Indicators	Sources	Scales	Number of Items
12. Institution-based Trust These measures show the extent to which South African consumers trust the m-commerce vendor (Everard & Galletta, 2005; Gefen et al., 2003; McKnight et al., 2002).	IBT	1. If a consumer needs help, most m-commerce retailers will assist the consumer to the best of their abilities. 2. I think doing business on m-commerce platforms is good because m-commerce retailers honour their agreements. 3. I have confidence that m-commerce retailers will always perform their functions as expected whenever I interact with them. 4. I believe that most m-commerce retailers have put in place sufficient technical and legal frameworks that safeguard me from problems online.	(Everard & Galletta, 2005; Gefen et al., 2003; McKnight et al., 2002; Sim et al., 2018)	1=Strongly Agree to 7=Strongly Disagree	4

(Adapted from Son & Benbasat, 2007)

4.4.2 Sampling and Respondents

Bhattacherjee (2012) defines sampling as the statistical procedure used to choose a subset (i.e. the sample) of the target population. The sample should represent the overall population in order for the findings from the sample to be generalisable to it (Bhattacherjee, 2012; Saunders et al., 2009). A portion of the population of interest that may be reached and sampled is referred to as the sampling frame (Bhattacherjee, 2012; Oates, 2006; Saunders et al., 2009).

South African consumers are the population of interest in this research hence, the research participants (sample frame) were drawn from social media (e.g. diverse South African Facebook, WhatsApp, and LinkedIn groups) and databases of consumers (or potential consumers) from the University of the Witwatersrand.

The sampling process is depicted below in Figure 5.

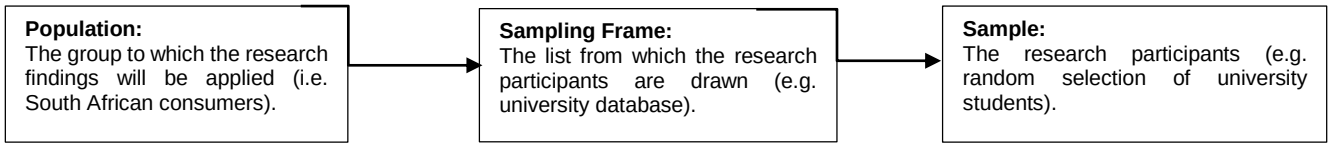


Figure 5: The Sampling Process

Source: (Bhattacherjee, 2012 (Chapter 8))

A minimum of 200 people living in South Africa (i.e. both locals and foreigners), from all regions (i.e. the sample), were included in the study. All of the research participants who did not own (or have access to) Internet-enabled mobile devices were excluded from the study (Mahatanankoon & Vila-Ruiz, 2007).

Sampling bias refers to a sampling method that systematically over or under-represents some members of the population of interest (Bhattacherjee, 2012; Oates, 2006). To avoid sampling bias, an attempt was made to invite equal numbers of research participants; the respondents were randomly selected from different groups on social media (i.e. Instagram, Twitter, LinkedIn, and Facebook) and the University of the Witwatersrand. Social media platforms, for example, Facebook, have a higher likelihood of attracting genuine consumers from any target demographic and the research participants are less likely to be phony bots or "professional survey takers" (Carroll, 2021; Ramo, 2021). People from various backgrounds and of all ages, income levels, and genders can be reached by researchers through Facebook (Carroll, 2021; Ramo, 2021). However, competing for the limited attention of social media users, and privacy concerns are some of the issues related with recruiting research participants from social media (Ramo, 2021). Each subgroup of the population of interest has an equal probability of being chosen when random sampling is employed (Bhattacherjee, 2012; Oates, 2006).

4.4.3 Pre- and Pilot Testing Strategy

Measurement scales were developed by making reference to existing literature. Face validity and content validity of the survey / questionnaire were substantiated by pre- and pilot testing. When experts in the field of research evaluate the questionnaire (or research instrument) and come to the conclusion that the attribute of interest has been accurately measured, face validity is established (Bolarinwa, 2016). Content validity is defined as the extent to which the correct or intended concepts are measured (Bhattacherjee, 2012; Bolarinwa, 2016).

A pre-test was administered to aid in identifying poorly worded or ambiguous items. A panel comprising of a group of information systems (IS) and computer science researchers (academics) was requested to review the questionnaire (Venkatesh et al., 2012). According to the panel's suggestions; any unclear questions or items in the questionnaire were eliminated or rewritten. In accordance with the Nevo and Wade (2011) study, the amended questionnaire was then distributed to a non-IT review panel (i.e. a randomly selected non-academic panel), the questionnaire was amended before the survey link was sent to some members of the sample frame for pilot testing.

A small convenience sample from one WhatsApp group was randomly selected for the pilot test; this group was excluded from the main study (Bhattacherjee, 2012; Saunders et al., 2009; Venkatesh et al., 2012). The online survey (questionnaire) was made available to the convenience (WhatsApp group) sample via WhatsApp links. In the pilot test, respondents were requested to complete the questionnaire and to provide comments that could help to improve the research instrument (Bhattacherjee, 2012; Nevo & Wade, 2011; Saunders et al., 2009). Some suggestions, on how the questionnaire could be improved, were received from the respondents, and further revisions to the questionnaire were made if the suggestions were reasonable and could be substantiated by literature (Bhattacherjee, 2012; Nevo & Wade, 2011; Saunders et al., 2009). Thereafter, the survey was ready to be shared with potential research participants.

4.4.4 Questionnaire Administration

After obtaining the sample, emails were addressed to company and university contacts requesting permission to run the survey (Saunders et al., 2009). In addition, the author randomly posted notices on South African groups on social media informing group members, primarily through group administrators, about the research and requesting them to follow a link in order to complete the survey.

Emails (with an attached cover letter) were sent to potential research participants asking them to participate in the research (Bhattacherjee, 2012). The cover letter

explained the objective and significance of the study, data collection methods, and expressed gratitude for their participation (Bhattacherjee, 2012). The email that was sent to potential research participants included a link to the online survey as well as information on voluntary participation, anonymity, and respondent confidentiality (Bhattacherjee, 2012; Saunders et al., 2009).

While surveys allow researchers to collect data from many people they are however, subject to low response rates (Bhattacherjee, 2012). During the data collecting phase, non-respondents were reminded to complete the survey via email and through the use of messages on online platforms. If the number of respondents had turned out to be significantly less than the expected minimum (200) then other social media groups, organisations, and universities would have been invited to participate in the study.

4.5 Data Analysis Methods

To generate aggregate or combined figures, the data (quantitative) was analysed using the Statistical Package for Social Sciences (SPSS). Totals and percentages were computed; the impact that each independent variable has on mobile commerce adoption by South African consumers was analysed, and the data was represented visually through the use of relevant charts (Pala et al., 2019; Picoto et al., 2014; Wang, 2020).

The constructs' measurement scales were evaluated to ensure they were reliable and valid; and the research model's hypotheses and reliability were statistically assessed using SPSS (Bhattacherjee, 2012; Chang et al., 2020; Venkatesh et al., 2012); SPSS is a statistical tool that can be used to compute, amongst others; Correlation Analysis, Principal Components Analysis, and Cronbach's alpha (Field, 2014; Lin, 2020; UCLA, 2016). The validity and reliability of the research outcomes are substantiated when the research models, hypotheses, and scales are shown to be statistically valid and trustworthy.

The qualitative data analysis (i.e. the analysis of the comments section) was conducted using theme analysis (Oates, 2006) and Microsoft Excel. Prior to the points being added (per theme) and the data being analysed and visualised, each occurrence of a factor was assigned a single point (1).

4.5.1 Reliability and Validity

Reliability refers to the extent to which the data analysis and collection methods yield consistent or dependable results (Bhattacherjee, 2012; Pandey & Pandey, 2015; Saunders et al., 2009). Cronbach's alpha was employed in the research to assess internal consistency reliability (Bhattacherjee, 2012; Taber, 2017).

Measurement scales and indicators for the dependent and independent variables were developed using existing and validated scales (based on previous comparable research). The measurement indicators that were used to operationalise the independent variable, effort expectancy, for example, were derived from previous studies by Al-Saedi et al. (2020), Tarhini et al. (2019), and Venkatesh et al. (2012). Other researchers used and tested the same measurement scales, implying that the measurements used in the study are reliable.

According to Bhattacherjee (2012), uni-dimensionality (i.e. different scales that have a number of items that measure a single phenomenon) is substantiated using Principal Components Analysis (PCA). Bhattacherjee (2012) stated that PCA is also used to substantiate discriminant validity (i.e. elements measuring construct X have to be very different from those measuring construct Y or other constructs; the elements must differ from those measuring the model's other variables), and convergent validity (i.e. elements measuring one construct must be interrelated and converge onto one core construct).

Principal Components Analysis is used to examine convergent and discriminant validity, as well as uni-dimensionality (Gefen, 2002; Karamizadeh et al., 2013). Principal Components Analysis has the advantage of being slightly sensitive to noise (outliers), and has low capacity and storage requirements (Gefen, 2002; Karamizadeh et al., 2013). One of the major drawbacks of PCA is that PCA only captures invariances that are present in the training data and excludes invariances that are not within the training data (Karamizadeh et al., 2013). PCA was used in this research to substantiate discriminant and convergent validity, that is, to confirm that the elements measuring, say, performance expectancy, are significantly interconnected and all fit under the performance expectancy construct; performance expectancy items should differ from the items measuring effort expectancy, hedonic motivation, or any of the theoretical model's other UTAUT2 or TPB components.

4.5.2 Cronbach’s Alpha

Internal consistency reliability is measured using Cronbach’s alpha (Bhattacherjee, 2012). If Cronbach's alpha (α) is larger than 0.70, the scale is deemed as dependable (Taber, 2017). Low Cronbach’s alpha values, and a reliability coefficient of zero (0) indicate the presence of several measurement errors (Taber, 2017). One disadvantage of Cronbach's alpha is that it is inclined to miscalculate the internal consistency of scales with fewer than ten items (Taber, 2017).

4.5.3 Hypothesis Testing

The hypotheses and the strength of the connection between the independent and dependent variables were evaluated using bivariate correlation analysis (Bhattacherjee, 2012).

4.6 Ethical Considerations

Respondents were informed (via a cover letter) that their participation in the research would be interpreted as their approval to participate in the study (Bhattacherjee, 2012; Oates, 2006). Furthermore, all of the respondents were informed that they had the right to decline to participate in the study and they also had the right to withdraw from the research at any moment (Bhattacherjee, 2012; Oates, 2006).

By assuring anonymity and confidentiality, the respondents' opinions, interests, and identity were safeguarded (Bhattacherjee, 2012; Oates, 2006; Rosenthal, 1994; Saunders et al., 2009). No email addresses or personal details were collected in the study. Respondents were told that no personally identifiable data would be included in the reports, and the researcher will not reveal any of their other details (such as their social media group's name). Furthermore, respondents were advised not to reveal their names or the names of the companies they work for on the survey. No hyper-claims were made regarding what the study is likely to accomplish, causal relationships were not implied where there were none. In the research, none of the research participants were exploited or harassed.

The researcher made efforts to describe exactly what the data indicates even if, in some cases, the data produced outcomes that contradicted the findings of other researchers, theories, assumptions, or hypotheses. In addition, in the paper, the researcher mentioned that the data refuted or did not support the findings of other (specified) researchers, or that the given construct did not significantly influence the adoption of mobile commerce adoption by consumers in a South African context. Generalisability and causality were only inferred where the data suggested it. The majority of the respondents fell into the 18-24 and 25-30 years age-groups, and most of them reside in the Gauteng province hence, the research findings are more generalisable to them.

5 DATA ANALYSIS

The research outcomes are given in this section. Firstly, the data screening, missing data, and outlier analysis' results are given together with details of the reverse coding process. Secondly, an analysis of the sample is given. Thirdly, the chapter describes the state of mobile commerce adoption by consumers in South Africa. Lastly, the chapter addresses the research question (i.e. RQ1: What are the factors influencing B2C mobile commerce adoption by consumers in South Africa?) by evaluating the reliability and validity of the methods employed to evaluate UTAUT2, TPB, and the two additional factors; the hypotheses are also assessed in the research model.

5.1 Data Screening

After 15 weeks of data collection, 359 responses were received. Prior to analysing the data, the data had to be cleaned; the 359 responses were screened for missing values and outliers.

According to Bhattacherjee (2012), reverse coding should be undertaken for items with a "reversed meaning from the original direction of the construct" (Bhattacherjee, 2012, p. 51). A Seven-point Likert measurement scale was utilised to evaluate all of the variables in the questionnaire; all Likert scale items were assumed to have equal weight hence, the responses given by each respondent could be added together to generate a composite score for each research participant (Bhattacherjee, 2012).

5.2 Outliers and Missing Values

The data was screened for missing values. All of the questions on the survey were mandatory apart from the two open-ended questions in the comments section hence, the only missing data could be found in the comments section. From the 359 responses received, 179 respondents did not respond to both of the open-ended questions, leaving a dataset consisting of 180 (approximately 50%) respondents who answered one or both of the open-ended questions. Table 6 summarises the missing values per open-ended question.

The 359 responses were complete and suitable for quantitative analysis however, there were a few outliers. According to Saunders et al. (2009), outliers are values that deviate significantly from the rest of the data (e.g. too high or too low). The SPSS standardised score function was employed to establish if any instances had standardised scores of -3 or +3 on several questionnaire items. Observations showing standardised scores that are below -3 or above +3 suggest that the observations are at least 3 standard deviations away from the average (Bhattacherjee, 2012). As a

result, such occurrences would be regarded as possible outliers. One instance out of 359 had numerous outlier observations, thus it was excluded from further consideration, leaving 358 acceptable responses. Subsequently, the data sample of 358 records was utilised for this study; data analysis was performed with the view of responding to the research question. The missing data is shown on Table 6.

Table 6: Missing data

Number of missing values	Number of respondents	Strategy
0 (Responded to all mandatory questions)	358	Retained for RQ1
189 (Did not respond to open-ended question 1 i.e. are there any additional factors?)	169	Retained for RQ1
277 (Did not add any other comments related to m-commerce)	81	Retained for RQ1
179 (Did not respond to both open-ended questions)	179	Excluded the data from the open-ended questions' analysis.

5.3 Sample Demographics

The respondents reside in all of the nine provinces (i.e. Free State, Northern Cape, North West, Eastern Cape, Limpopo, Gauteng, KwaZulu-Natal, Mpumalanga, and Western Cape) of South Africa (GovZA, 2021).

5.3.1 Province

The majority (80.7%) of the respondents came from the Gauteng province hence, the research findings may be more applicable to them and less applicable to people from other regions. The least number of respondents came from the Northern Cape (n=1) and the Free State (n=4) province. The summary of the provinces that the respondents came from is shown on Table 7.

Table 7: Provinces

Province	N	%
Gauteng	289	80.7%
KwaZulu-Natal	21	5.9%
Limpopo	13	3.6%
Mpumalanga	11	3.1%
North West	8	2.2%
Western Cape	6	1.7%
Eastern Cape	5	1.4%
Free State	4	1.1%
Northern Cape	1	0.3%

5.3.2 Gender

An overview of the genders of the research participants is shown on Table 8; most of the respondents (62.3%) were females followed by males (36.0%).

Table 8: Gender

Gender	N	%
Female	223	62.3%
Male	129	36.0%
Prefer not to disclose	3	0.8%
Prefer to self-identify	3	0.8%

5.3.3 Age

The majority (50.8%) of the research participants were 18 to 24 year olds followed by 25 to 30 year olds. Hence, the research findings are more applicable to 18 to 24 year olds than to any other age group. The sample mainly consisted of university students and people who are members of various social media (e.g. WhatsApp and Facebook) groups in South Africa; the data suggests that a large proportion (67.8%) of the research participants were young people aged between 18 to 30 years. Only 2% of those who responded were over the age of 60, this suggests that the majority of the people living in South Africa are people below the age of 60 hence, businesses should target under sixties when promoting their products and m-commerce businesses. Table 9 gives a summary of the age-groups.

Table 9: Age

Age	N	%
18 to 24	182	50.8%
25 to 30	61	17.0%
31 to 35	32	8.9%
36 to 40	26	7.3%
41 to 50	38	10.6%
51 to 60	12	3.4%
Greater than 61	7	2.0%

5.3.4 Monthly Income

Almost half (49.4%) of the research participants said that they do not earn a monthly salary / income, and 43.6% of the respondents earn an income from work or a business. These figures suggest that most of the respondents are still studying, looking for jobs, were left unemployed due to the pandemic, or there is high unemployment amongst the youth. It follows therefore, that if the majority of

consumers do not have a monthly income then this will negatively affect sales on all m-commerce platforms in South Africa. Table 10 gives a summary of the respondents' monthly incomes.

Table 10: Monthly income

Do you have a monthly income (i.e. from work or a business)?

	N	%
No	177	49.4%
Yes	156	43.6%
Prefer not to say	25	7.0%

5.3.5 Bank Account

The majority (95.5%) of the respondents have a bank account. Table 11 gives a summary of banked and unbanked respondents. This suggests that most of the people living in South Africa, particularly in the Gauteng province, have bank accounts hence, they should be able to transact online.

Table 11: Bank account

Do you have a bank account in your name?

	N	%
Yes	342	95.5%
No	10	2.8%
Prefer not to say	6	1.7%

5.3.6 Highest Educational Level

The top three highest educational levels of the respondents were High School (36.9%), Bachelor's degree (22.9%), and Honours degree (15.9%). These results are to be expected since most of the research participants are in the 18-24 and 25-30 years age-groups. 18-30 year olds appear to be the ones who have or are likely to adopt m-commerce hence, advertisers should target this group of people and try to cater for their needs. Only 2% of the respondents have a PhD. Table 12 summarises the respondents' highest educational levels.

Table 12: Highest educational level

Please select your highest educational level

	N	%
High school	132	36.9%
Bachelor's degree	82	22.9%
Honours degree	57	15.9%
Master's degree	40	11.2%
Diploma	17	4.7%
Certificate	16	4.5%
PhD	7	2.0%
Prefer not to say	5	1.4%
Vocational Certificate	2	0.6%

5.3.7 Mobile Device Access

The majority (99.2%) of the respondents have access to an internet-enabled mobile device, this suggests that most of the people in South Africa have internet access however, since most of the respondents (80.7%) reside in the Gauteng province, this observation may only be generalisable to them. Table 13 gives a summary of the respondents' access to mobile devices.

Table 13: Mobile device access

Do you have access to a mobile device (e.g. cellphone, tablet, or smartphone) with Internet access?

	N	%
Yes	355	99.2%
No	1	0.3%
Not sure	2	0.6%

5.3.8 Years Using Mobile Device

Slightly more than half (53.4%) of the research participants have been using mobile devices for 10 or more years. Table 14 gives a summary of the respondents' years of mobile use.

Table 14: Years using mobile device

Please indicate the number of years that you have been using a mobile device.

	N	%
Less than 1 year	2	0.6%
1 to 2 years	22	6.1%
3 to 4 years	18	5.0%
5 to 6 years	24	6.7%
7 to 8 years	61	17.0%
9 to 10 years	38	10.6%
more than 10 years	191	53.4%
Not applicable	2	0.6%

5.4 South African Consumers Using or Planning to Use Mobile Commerce

This section gives additional information on mobile commerce adoption. A summary of consumers living in South Africa who have used, are using or planning to use mobile commerce is given. In addition, information on the number of years the research participants have been using m-commerce per age-group, whether or not they adopted mobile commerce markets, and the results of the qualitative data analysis is also given.

5.4.1 Mobile Commerce Use

The majority (84.9%) of respondents have used mobile commerce. Table 15 summarises mobile commerce use by respondents. Since the majority of the respondents were young people (18-30 year olds), and the majority of the respondents have owned mobile devices for several years and have access to the internet, it is therefore, not surprising that most of the respondents have used m-commerce.

Table 15: Mobile commerce use

Have you ever used mobile commerce (i.e. online shopping through your mobile device)?

	N	%
Yes	304	84.9%
No	51	14.2%
Not sure	3	0.8%

5.4.2 Years Using Mobile Commerce

The majority (64.6%) of respondents have been using mobile commerce for less than 5 years. Table 16 and Figure 6 give a summary of the years that the respondents have been using mobile commerce. 37.2% of the respondents have been using m-commerce for less than 2 years; this suggests that the COVID-19 pandemic may have compelled most of the respondents to start using m-commerce. According to statistics the advent of COVID-19 saw an upsurge in online shopping globally (Barnes, 2020).

Table 16: Years using mobile commerce per age group

If yes (to previous question), how long have you been using mobile commerce?

	N	%
Less than 1 year	50	14.0%
1 to 2 years	83	23.2%
3 to 4 years	98	27.4%
5 years or more	73	20.4%
Not applicable	54	15.1%

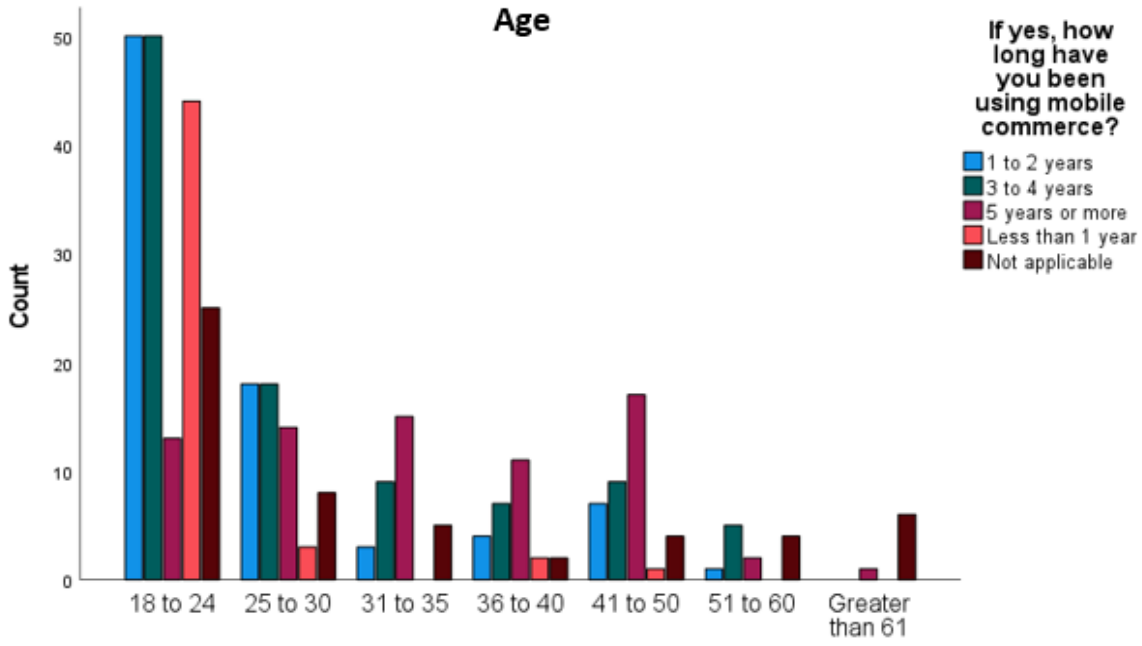


Figure 6: Years using mobile commerce per age group

In the age-groups (i.e. 18-24 and 25-30 year olds) with the highest numbers of respondents; 52% of the respondents in the 18-24 years age-group have been using mobile commerce for less than 1 year and 1-2 years (i.e. ≤ 2 years) compared to 34%

of respondents in the 25 to 30 years age-group. In the 18 to 24 years age-group, 28% have used m-commerce for 3 to 4 years, 7% have used m-commerce for 5 years or more whereas 14% reported that m-commerce was not applicable to them. In the 25-30 years age-group, 30% have used m-commerce for 3 to 4 years, 23% have used m-commerce for 5 years or more whereas 13% reported that m-commerce was not applicable to them. This suggests that the majority of the respondents (18-30 year olds) or South Africans, have only been using m-commerce for the last 2 years. It can be deduced therefore, that most South Africans started using m-commerce owing to the COVID-19 pandemic and associated lockdowns (Barnes, 2020).

5.4.3 Mobile Commerce Marketplaces that Consumers Use or are Planning to Use

The information in this section falls under additional knowledge. The significance of this is that it informs theory and practice with regards to which m-commerce markets have been adopted in South Africa; these are the m-commerce markets that most of the respondents use or are planning to use.

Research participants were requested to indicate whether or not they had used, were using, planning to use, or not planning to use specific types of mobile commerce. The respondents also had the option of indicating that they were not aware of any type of online retailer. The frequency counts (per type of online retailer) showing the mobile commerce marketplaces *available for use* and those that consumers are *planning to use* are shown on Table 17. The types of online retailers were grouped into 15 categories. The least used mobile commerce platforms are those that sell toys and baby products. Since our sample consisted mainly of 18 to 30 year olds, it is not surprising that most of them were reportedly purchasing goods on general mobile marketplaces (e.g. Takealot mobile) than on mobile marketplaces that sell baby products; the convenience of shopping on general marketplaces may be more relevant to this group than purchasing baby products and toys.

The different categories (i.e. general marketplaces (e.g. Takealot mobile); clothing and shoes; food; health and fitness; books, music, movies, and games; bags and accessories; household appliances; cosmetics and body care; furniture and household goods; DIY, garden and pet stores; toys, and baby products; stationery and hobby supplies; hardware, paint, and glass; and pharmaceuticals and toiletries) of mobile commerce marketplaces were derived from existing literature and online sources (Al-maaitah et al., 2021; Cision, 2020; Gefen et al., 2003; Saprikis et al., 2021; Statista, 2018; Takealot, 2021).

Table 17: Frequency counts per type of online retailer

Types of online retailers	Used/Using	Not planning to use but I am aware of	Plan to use within the next few months	Not aware of	Used/Using %	Not planning to use but I am aware of %	Plan to use within the next few months %	Not aware of %
Marketplace (e.g. Takealot mobile)	250	54	42	12	69.8	15.1	11.7	3.4
Clothing (e.g. Truworths, Zando)	162	115	57	24	45.3	32.1	15.9	6.7
Food (e.g. Checkers sixty60, Woolies Dash)	141	135	67	15	39.4	37.7	18.7	4.2
Homeware (e.g. Woolworths, @Home)	66	194	58	40	18.4	54.2	16.2	11.2
Health and fitness (e.g. Virgin Active, Planet Fitness)	65	179	41	73	18.2	50.0	11.5	20.4
Books, music, movies, and games (excluding downloads). E.g. Musica, Loot	156	121	42	39	43.6	33.8	11.7	10.9
Bags and accessories (e.g. Guess and Superbalist)	116	147	63	32	32.4	41.1	17.6	8.9
Household appliances (e.g. Games Stores, Makro)	102	157	70	29	28.5	43.9	19.6	8.1
Cosmetics and body care (e.g. The Body Shop)	100	176	57	25	27.9	49.2	15.9	7.0

Types of online retailers	Used/Using	Not planning to use but I am aware of	Plan to use within the next few months	Not aware of	Used/Using %	Not planning to use but I am aware of %	Plan to use within the next few months %	Not aware of %
Furniture and household goods (e.g. Bradlows, Coricraft)	39	211	54	54	10.9	58.9	15.1	15.1
DIY, garden and pet storess (e.g. Do-it, DIYdepot, Petheaven)	30	187	54	87	8.4	52.2	15.1	24.3
Toys and baby products (e.g. ToysRUs)	29	219	37	73	8.1	61.2	10.3	20.4
Stationery and hobby suppliers (e.g. PnA, Waltons)	69	182	60	47	19.3	50.8	16.8	13.1
Hardware, paint and glass (e.g. Builders, Cashbuild)	41	208	45	64	11.5	58.1	12.6	17.9
Pharmaceuticals and toiletries (e.g. Clicks, Dischem)	126	140	68	24	35.2	39.1	19.0	6.7

5.5 Adopted Mobile Commerce Markets

This section also gives additional information on mobile commerce adoption. The top five adopted m-commerce markets across all age groups were general marketplaces (i.e. mobile commerce markets that sell a wide variety of goods from multiple online retailers on a single mobile application/marketplace); clothing and shoes; food; books, music, movies, and games (excluding downloads); and pharmaceuticals. The most used mobile commerce markets, across all age groups, are illustrated in Figure 7.

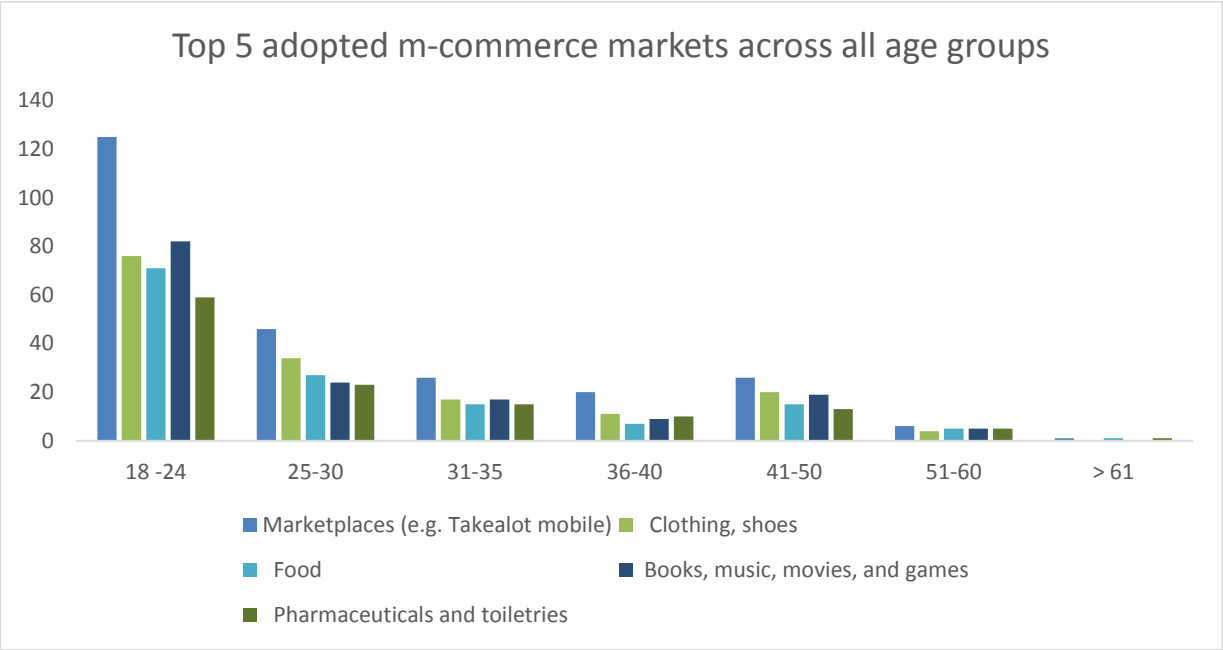


Figure 7: Top 5 adopted m-commerce marketplaces across all age groups

The majority of the respondents come from the 18 to 24, and 25 to 30 age groups. Figure 8 illustrates the top 5 m-commerce markets in the 18 to 24 and 25 to 30 age groups. The most adopted mobile markets, across these age groups, were clothing and shoes; general m-commerce marketplaces; food; books, music, movies, and games (excluding downloads), and pharmaceuticals. The statistics show that 75% of 25 to 30 year olds are using general m-commerce marketplaces (e.g. Takealot mobile) compared to 69% in the 18 to 24 years age-group. From the 25 to 30 year olds age-group, 56% have adopted 'clothing and shoes' m-commerce markets, 44% have adopted food-related m-commerce markets, and 39% have adopted m-commerce markets that sell 'books, music, movies, and games'. In comparison; in the 18 to 24 age group, 42% have adopted 'clothing and shoes' m-commerce markets, 39% have adopted food-related m-commerce markets, and 45% have adopted m-commerce markets that sell 'books, music, movies, and games'. Pharmaceuticals and toiletries are in the top five adopted m-commerce applications however, only 32% of 18 to 24

year olds have adopted pharmaceutical m-commerce markets compared to 38% adoption by 25 to 30 year olds. Only the general m-commerce marketplaces were adopted by over 50% of the respondents in both age groups. This suggests that, aside from general m-commerce marketplaces, there is low m-commerce adoption by respondents.

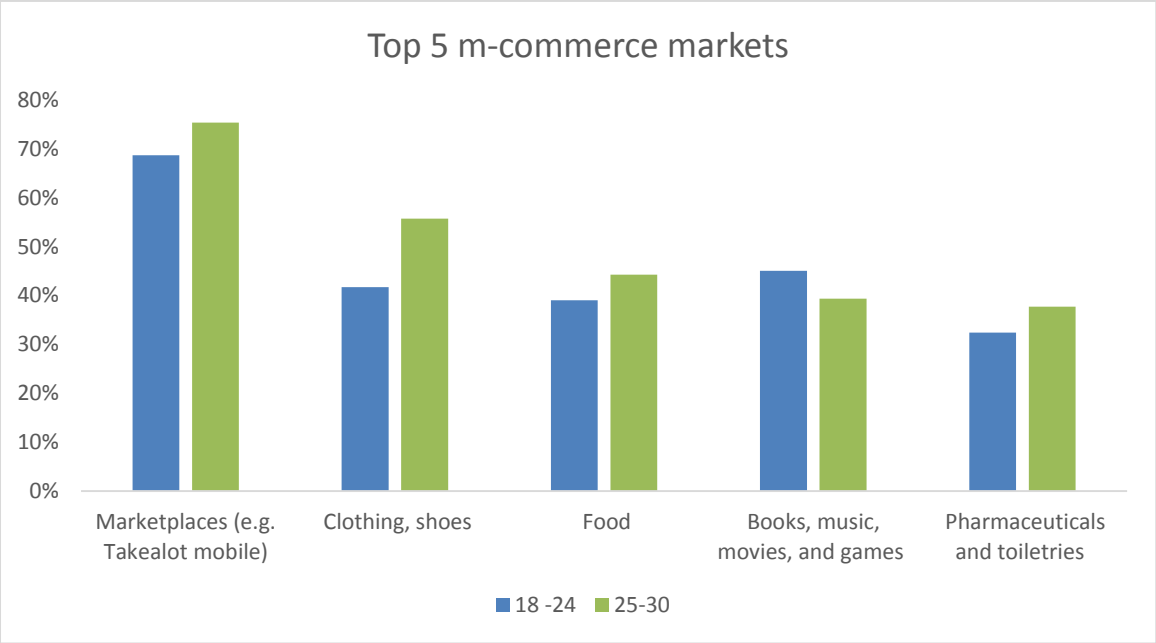


Figure 8: Top 5 most adopted m-commerce markets in the 18-24 and 25-30 age groups

Figure 9 depicts the top five m-commerce marketplaces that have been embraced by the sample's five underrepresented categories. In terms of mobile commerce permeation in various age categories (i.e. 31-35, 36-40, 41-50, and greater than 61), the results are more informative than decisive due to the small number of respondents in those age groups. Across the five age groups, m-commerce marketplaces that sell a wide variety of goods are used by 79 (out of 115 respondents in the five age groups) i.e. 69% of the respondents. Clothing and shoes m-commerce markets have been adopted by 45% (n=52) of the respondents, food-related m-commerce markets are being used by 37% (n=43) of the consumers in these age groups whilst m-commerce markets that sell 'books, music, movies and games' have been adopted by 43% (n=50) of the respondents in these age groups. Only 38% (n=44) of the respondents in the five age groups have adopted m-commerce markets that sell pharmaceuticals and toiletries.

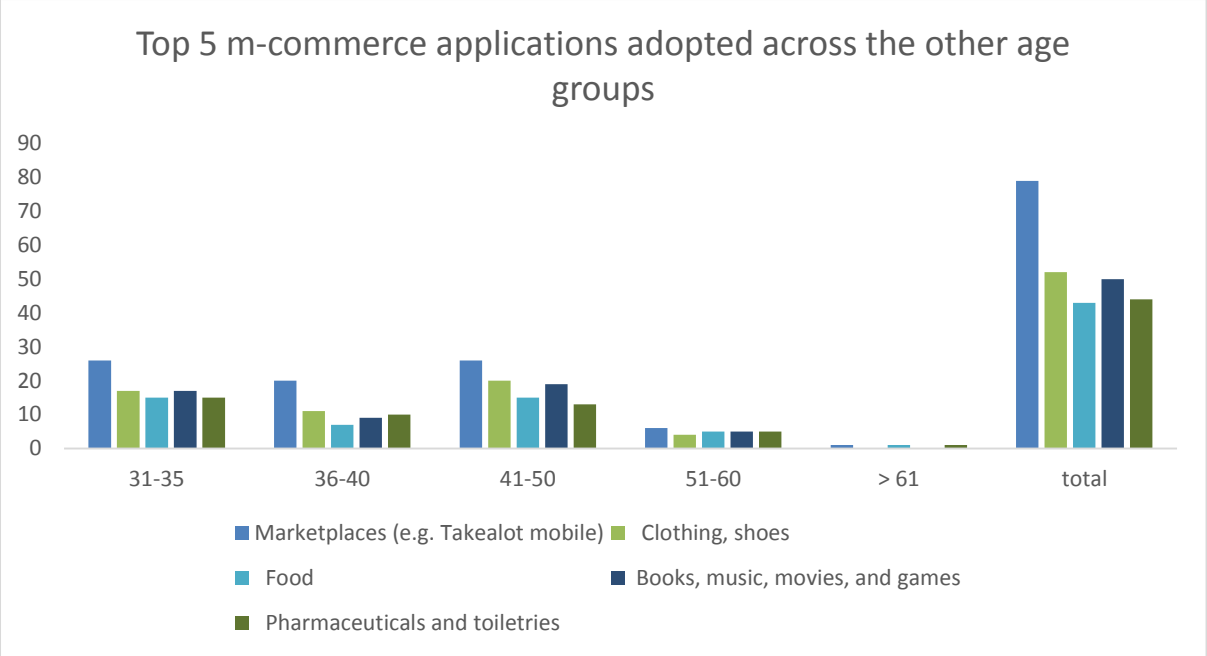


Figure 9: Top 5 adopted m-commerce markets across 5 age groups

The main types of mobile commerce markets that have been adopted in South Africa are depicted in the pie chart (Figure 10). The different categories are as follows: general marketplaces (n=250), clothing and shoes (n=162); books, movies, music and games (n=156), food (n=141), and pharmaceuticals and toiletries (n=126).

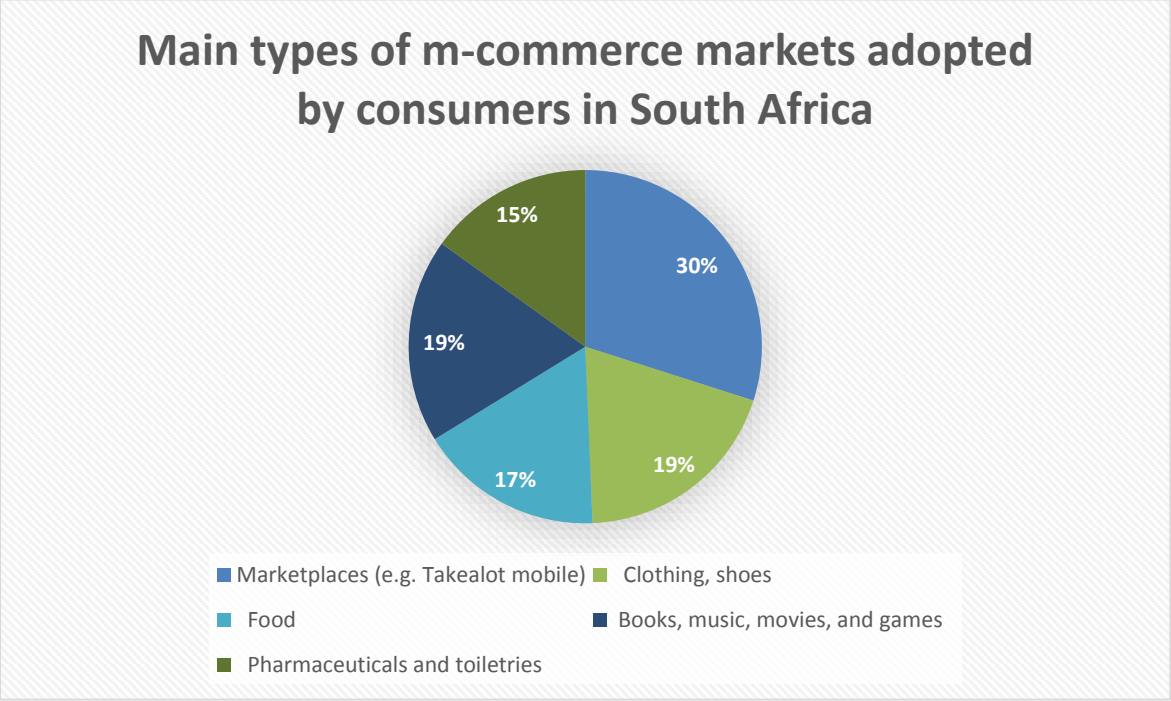


Figure 10: Main types of m-commerce markets adopted by consumers in South Africa

5.6 M-Commerce Markets (Respondents are planning to use)

This section also gives additional information on mobile commerce adoption. Figure 11 depicts the top five m-commerce markets that respondents, from all age groups, plan to use within the next few months. In the sample only 19% (n=67 out of 358) of the respondents plan to purchase food through m-commerce, 18% (n=63) plan to use m-commerce to buy bags and accessories, and 20% (n=70) plan to purchase household appliances' through m-commerce in the next few months. In addition, 17% (n=60) are planning to purchase stationery and hobby supplies whilst 19% (n=68) plan to purchase pharmaceuticals and toiletries through m-commerce.

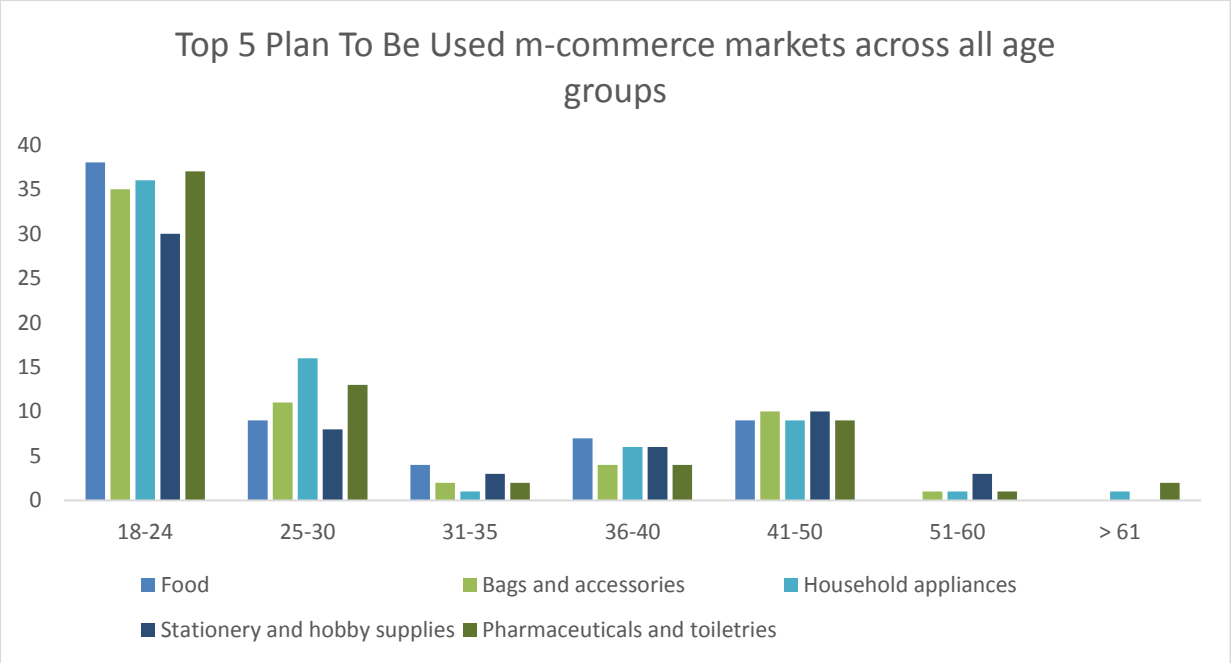


Figure 11: Plan to be used m-commerce markets across all age groups

Figure 12 depicts the top five mobile commerce marketplaces (applications) that the majority of the respondents (18-24 and 25-30 age groups) are planning to use within the next few months namely, food, bags and accessories, clothing, household appliances, and pharmaceuticals and toiletries. 19% (n=47 out of 243) of the respondents in the 18-24 and 25-30 age groups are planning to adopt m-commerce applications that sell food, 19% (n=46) plan to buy bags and accessories through m-commerce, and 21% (n-52) plan to purchase household appliances through m-commerce whilst 21% (n=50) are planning to use m-commerce to purchase clothing and shoes. 21% (n=50) of the respondents plan to purchase pharmaceuticals through m-commerce in the near future.

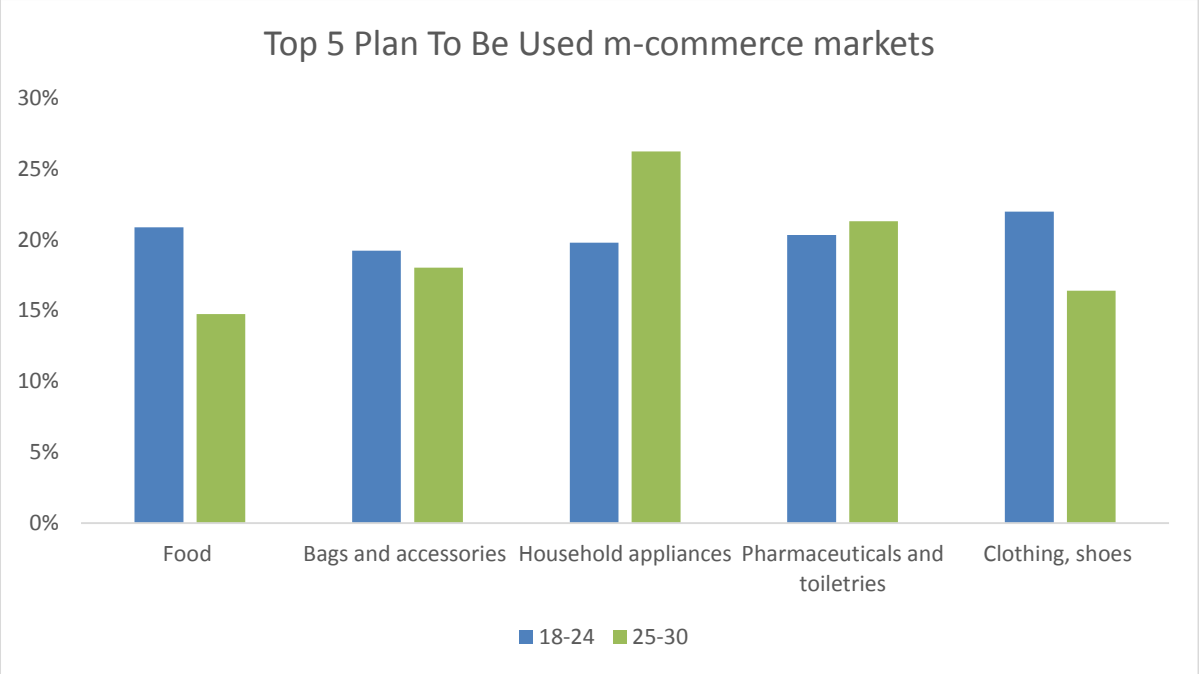


Figure 12: Top 5 Plan to be used m-commerce applications

For the remaining five less represented age groups (shown in Figure 13), 17% (n=20 out of 115) plan to use m-commerce to buy food, 15% (n=17) plan to buy bags and accessories through m-commerce, 16% (n=18) are planning to purchase household appliances in the near future through m-commerce whilst 19% (n=22) are planning to buy stationery and hobby supplies through mobile commerce, and 16% (n=18) are planning to use m-commerce to buy pharmaceuticals and toiletries within the next few months.

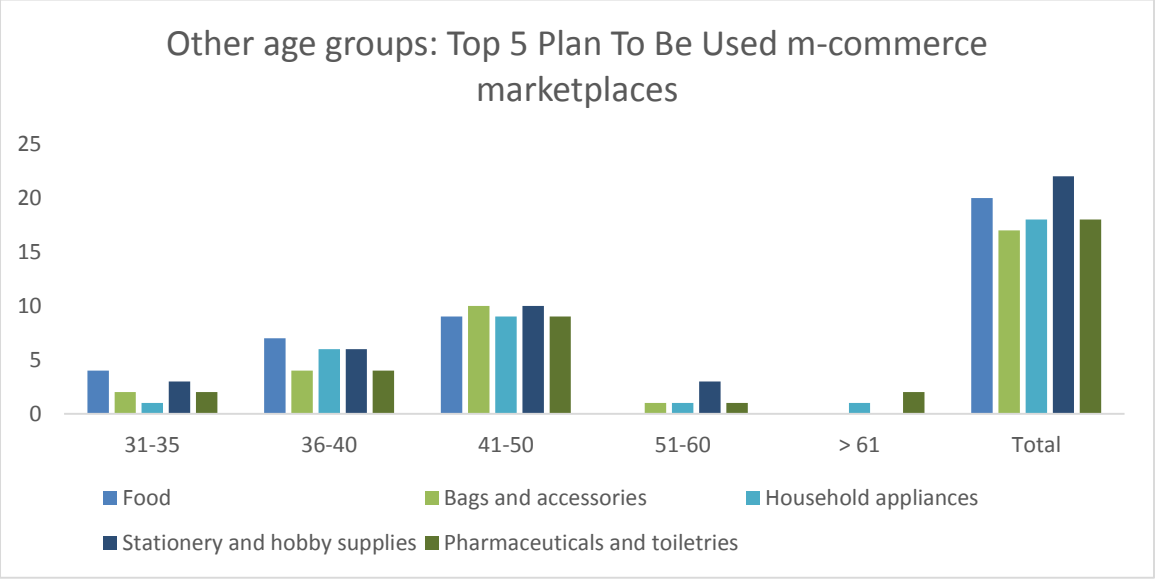


Figure 13: Other age groups: Top 5 Plan to be used m-commerce applications

5.7 Qualitative Data Analysis

The study was primarily positivist in nature with a few open-ended questions. The qualitative data analysis findings (i.e. the analysis of the open-ended or comments section questions) are given in this section. The last two questions of the survey/questionnaire were open-ended questions (i.e. in your opinion, are there any other factors influencing m-commerce adoption by people residing in South Africa? Please add any other comments (related to mobile commerce adoption)); the questions were included in the same questionnaire that had the quantitative section. Theme analysis was undertaken in order to analyse the qualitative data (Oates, 2006). Each occurrence of a factor was given a single point (1) prior to the points being added (per theme) and the data being analysed and visualised.

5.7.1 Top 5 Additional Factors Affecting M-Commerce Adoption

The top five additional factors, derived from the qualitative data analysis, were: reliable shipping and shipping costs, shopping convenience; data and device access, and security risks; product variety and availability, and delivery to remote areas.

1. Reliable Shipping and Shipping Costs (including import duties)

Most of the consumers are of the opinion that shipping-related factors hinder m-commerce adoption, and some were appealing for the reduction in import duties for individuals.

2. Shopping Convenience

Most of the respondents appear to have adopted m-commerce because it is convenient to use, particularly, due to lockdown (COVID-19) restrictions and fears of contracting the virus in crowded areas.

3. Data and Device Access, and Security Risks

Data and device access as well as security concerns (primarily, identity theft and fraud) seem to have a negative impact on mobile commerce adoption however, these factors were covered under the facilitating conditions and perceived risk constructs.

4. Product Variety and Availability

Most of the consumers living in South Africa seem to be of the opinion that m-commerce offers a wider product variety than traditional shopping channels.

5. Delivery to Remote Areas

Some of the respondents felt that most online retailers do not deliver products to remote or rural areas hence, this prevents a number of rural-based communities from adopting m-commerce.

All of the above are factors that could be included in future m-commerce adoption research. Figure 14 depicts the additional factors, as identified by research participants, which impact m-commerce adoption.

5.7.2 Additional Factors Influencing M-Commerce Adoption (Qualitative Data Analysis)

The research participants gave a number of additional factors that are shown on Figure 14 below. From the qualitative data analysis, the following additional factors were identified: Product variety and availability; poor marketing strategy; customer reviews of products and retailers; physical store preference; poor refunds and complaints processing; incentives and rewards; data and device access; reliable shipping and shipping costs; unfavourable pricing; convenience; COVID 19; delivery to remote areas; security risks (e.g. identity theft, and fraud); product quality (need to physically touch products); lack of required skillsets (for consumers to use m-commerce, for the retailer to support or develop m-commerce systems); Other (monopoly behaviour, need more consolidated marketplaces, language barriers, preference of card payments over cash); and Other (lower mistake tolerance by consumers of online retailers than traditional retailers, job losses, age, social media, peer pressure).

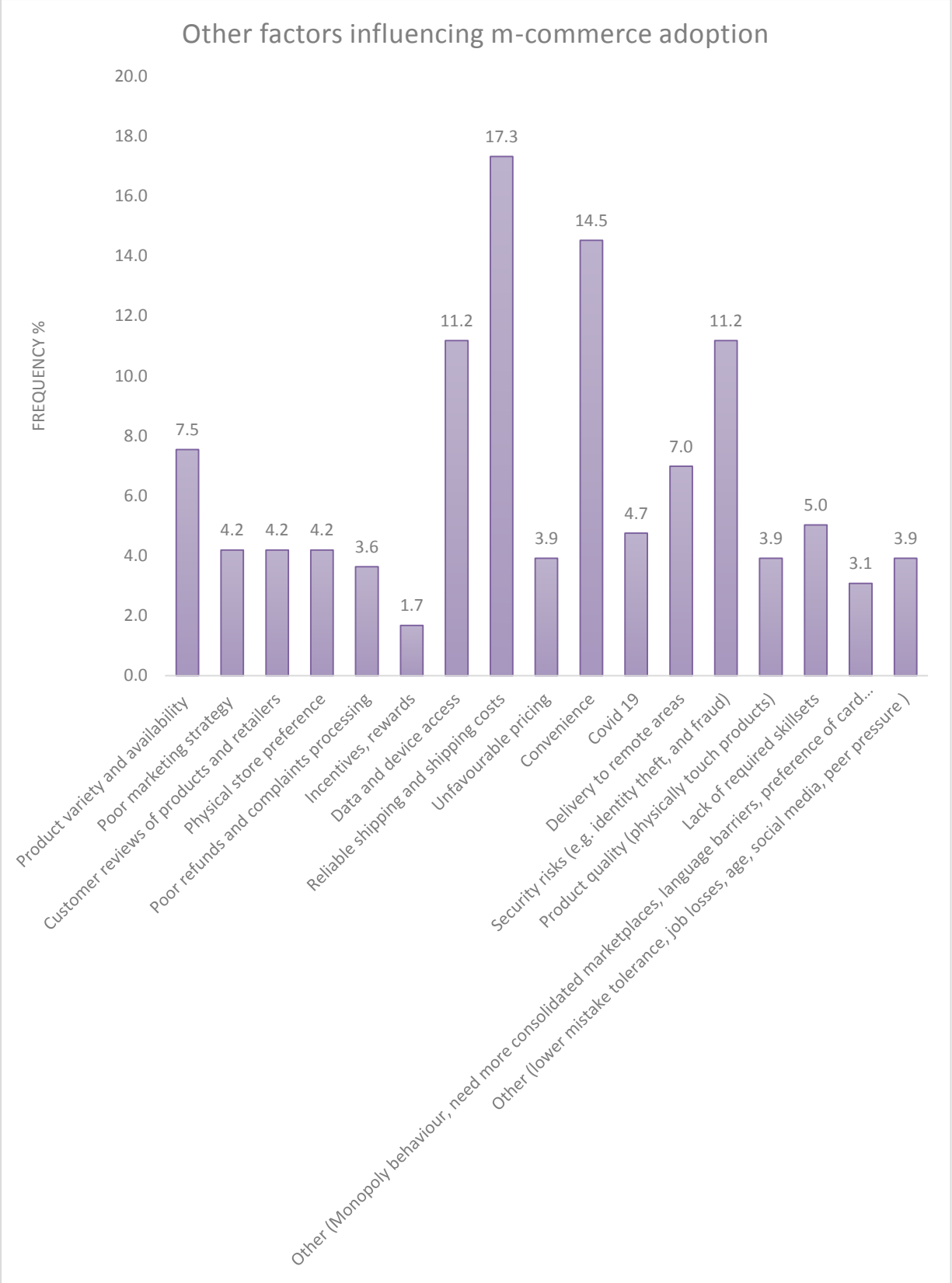


Figure 14: Additional factors - Qualitative data analysis

5.8 RQ1: UTAUT2 and TPB Factors Influencing M-Commerce Use

Testing the hypothesised research model, that links the UTAUT2 and TPB (as well as the two additional factors) factors to mobile commerce adoption, will enable us to answer the research question (RQ1) however, prior to testing the study's model; it is imperative to first ascertain the validity and reliability of the survey scales.

5.8.1 Principal Component Analysis (PCA)

PCA was employed to investigate the underlying component structure of our data. PCA is used to substantiate discriminant and convergent validity. PCA demonstrates convergent validity when all of the items, that measure a construct, significantly correlate (load) with the principal component (Gefen, 2002; Karamizadeh et al., 2013; UCLA, 2016). Discriminant validity is substantiated when there are low cross loadings between items (Gefen, 2002; Karamizadeh et al., 2013; UCLA, 2016). The PCA results are shown on tables 18 to 21.

5.8.1.1 Convergent and Discriminant Validity

PCA was used to analyse all of the independent variables in a number of ways. Firstly, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's test of sphericity (Bartlett's test) were used to determine whether the number of variables and sample size were sufficient for factor analysis (Lin, 2020; UCLA, 2016). UCLA (2016) suggests a minimum KMO value of 0.600 with significant ($p < 0.05$) Bartlett's test results. Next, a rotated Varimax solution with Kaiser Normalisation illustrated the loading structures (i.e. non-overlapping or overlapping independent variables) of the independent variables (Lin, 2020; UCLA, 2016). The items that had substantial cross-loadings (i.e. those that loaded highly on two or more factors) and those that had loadings of 0.4 and below were removed leaving the acceptable items that had loadings of 0.5 and above (Lin, 2020; UCLA, 2016). Five (i.e. for the dependent and independent variables) groups of PCA analyses were performed. The PCA results are shown on tables 18 to 21.

a. Dependent Variables

Mobile commerce adoption is measured by actual use of the technology i.e. the consumers who actually shop, or have shopped, online using mobile devices. Adoption was measured with a four-item scale that reflects mobile commerce use to purchase a variety of products online; the items on the scale reflected the use of m-commerce to transact (i.e. to purchase goods and make payments) online, the utilisation of mobile applications (apps) to transact, the installation of multiple shopping apps on mobile devices, and the mobile device being the primary means of engaging

in online shopping. PCA was performed on the four items. The Bartlett's test results were significant, and the KMO measure was 0.769. The findings substantiate uni-dimensionality within the dependent variables, convergent validity is substantiated, and each item has a substantial loading (i.e. greater than 0.7). SPSS extracted a single component factor solution that explained 59.540 percent of the entire variance. Only one dependent variable item had an eigenvalue that is greater than 1. The results of the PCA analysis, on the items related to the degree of mobile commerce use, are shown in Table 18.

Table 18: PCA factor structure for adoption of m-commerce

Dependent Variables (Extent of M-commerce Use)	
Component Matrix	
	Component
	1
DPN1	.809
DPN2	.780
DPN3	.759
DPN4	.737

Extraction Technique: PCA. Rotation Method: Varimax with Kaiser Normalisation. DPN1= use of m-commerce to transact online; DPN2= use of mobile apps to transact; DPN3= installation of mobile shopping apps; DPN4= mobile device primary means of transacting online. Suppressed absolute values that were < 0.40

b. Independent Variables (UTAUT2)

The statistic for the KMO measure was 0.820, and the Bartlett's test results for the UTAUT2 factors (i.e. social influence, facilitating conditions, performance expectancy, perceived risk, habit, hedonic motivation, effort expectancy, and price value) were significant (i.e. $p < 0.01$). After the initial Varimax rotation run, habit (HA1) was removed from the analysis because its loading was less than 0.5. The Varimax rotation was run for the second time and all the items showed significant loadings (i.e. > 0.6) on their respective components. Convergent and discriminant validity were substantiated by the test results. SPSS retrieved eight components accounting for 73.021 percent of the total variance. The eigenvalues of the eight factors were greater than one. The final results of the PCA analysis for UTAUT2 factors are shown in Table 19.

Table 19: Principal Component Analysis - UTAUT2 factors

UTAUT2 Factors

Rotated Component Matrix

	Component							
	1	2	3	4	5	6	7	8
UTAUT2-EE2	.851							
UTAUT2-EE3	.838							
UTAUT2-EE1	.826							
UTAUT2-EE4	.787							
UTAUT2-FC3		.800						
UTAUT2-FC1		.799						
UTAUT2-FC3		.792						
UTAUT2-FC4		.627						
UTAUT2-SI2			.897					
UTAUT2-SI1			.849					
UTAUT2-SI3			.848					
UTAUT2-PV2				.874				
UTAUT2-PV3				.866				
UTAUT2-PV1				.777				
UTAUT2-PE2					.842			
UTAUT2-PE3					.804			
UTAUT-PE1					.747			
UTAUT2-HM2						.823		
UTAUT2-HM1						.821		
UTAUT2-HM3						.717		
UTAUT2-PR2							.813	
UTAUT2-PR3							.797	
UTAUT2-PR1							.758	
UTAUT2-HA3								.889
UTAUT2-HA2								.876

Extraction technique: PCA. Rotation technique: Varimax with Kaiser Normalisation. PE =Performance Expectancy; PV =Price value; HM=Hedonic Motivation; PR=Perceived risk; SI=Social Influence; HA=Habit; EE=Effort Expectancy; FC=Facilitating Conditions;
Suppressed absolute values that were < 0.40

c. Independent Variables (TPB)

For the TPB factors (i.e. perceived behavioural control, and attitude towards behaviour), the Bartlett's test results were significant (i.e. $p < 0.01$), and the KMO statistical measure was 0.811. The Varimax rotation was run and all of the items loaded significantly (> 0.6). Convergent and discriminant validity were substantiated by the test results. Two factors, accounting for 71.690 percent of the total variance, were extracted by SPSS. The eigenvalues of the two factors were greater than one. The final results of the PCA analysis for the TPB are shown in Table 20.

Table 20: Principal Component Analysis - TPB factors

TPB Factors

Rotated Component Matrix

	Component	
	1	2
TPB-ATB3	.904	
TPB-ATB2	.904	
TPB-ATB4	.845	
TPB-ATB1	.799	
TPB-PBC3		.886
TPB-PBC2		.880
TPB-PBC1		.745
TPB-PBC4		.672

Extraction technique: PCA. Rotation technique: Varimax with Kaiser Normalisation. ATB=Attitude Towards Behaviour; PBC= Perceived Behavioural Control. Suppressed absolute values that were < 0.40

d. Independent Variables (PFR and IBT)

For the additional factors (i.e. perceived financial resources, and institution-based trust analysed together), the KMO statistical measure was 0.726 and Bartlett's test results were significant (i.e. $p < 0.01$). Varimax rotation was run and all of the items loaded significantly (i.e. > 0.7). Convergent and discriminant validity were substantiated by the test results. Two factors that explained 67.817 percent of the total variance were extracted by SPSS. The eigenvalues of the two factors were greater than one. The final PCA analysis results (i.e. for the IBT and PFR factors) are presented on Table 21.

Table 21: Principal Component Analysis factor structure for TPB factors

Additional (PFR and IBT) Factors

Rotated Component Matrix[a]

	Component	
	1	2
IBT2	.824	
IBT3	.789	
IBT4	.769	
IBT1	.710	
PFR2		.896
PFR1		.887

Extraction technique: PCA. Rotation Method: Varimax with Kaiser Normalisation. IBT= Institution-based Trust; PFR= Perceived Financial Resources. Suppressed absolute values that were < 0.40

5.8.2 Cronbach's Alpha

After satisfying the discriminant and convergent validity requirements, the scales' internal consistency reliability was confirmed. Cronbach's alpha was employed to assess the measuring scale's internal consistency. When Cronbach's alpha is greater than or equal to 0.70, the scale is deemed dependable (Taber, 2017). Table 22 shows that the Cronbach's alpha of all of the scales used in the study were greater than 0.70 hence, the scales were considered to be reliable. In addition, item-to-total correlations were evaluated to confirm that the correlation coefficients for each construct were at least 0.400 (Field, 2014) and that all items were kept. The reliability analysis is shown on Table 22.

Table 22: Reliability Analysis

	Number of items	Cronbach's Alpha
Extent of m-commerce use	4	0.773
Performance Expectancy	3	0.786
Habit	2	0.791
Effort Expectancy	4	0.892
Price Value	3	0.839
Social Influence	3	0.855
Hedonic Motivation	3	0.786
Facilitating Conditions	4	0.828
Perceived Risk	3	0.727
Perceived Behavioural Control	4	0.824
Attitude Towards Behaviour	4	0.898
Perceived Financial Resources	2	0.767
Institution-based Trust	4	0.786

5.8.3 Hypothesis Testing

Bivariate correlation analysis was used to assess the hypotheses and the strength of the relationship between the independent and dependent variables (Bhattacherjee, 2012). Composite scores were calculated for the independent variables; the composite scores were calculated by averaging a set of equally weighted items.

5.8.3.1 Composite Scores

Multiple regression and correlation could not be performed until multiple items were reduced to one composite (combined) score. Composite scores were calculated for habit, effort expectancy, perceived risk, facilitating conditions, performance expectancy, hedonic motivation, price value, and attitude towards behaviour; perceived financial resources, social influence, perceived behavioural control, and institution-based trust. The variables that remained after factor analysis were used to

compute the composite scores; the composite scores were obtained by calculating the mean (average) of a group of items which were weighted equally. For establishing a normal univariate distribution, kurtosis and asymmetry values between -2 and +2 are regarded as acceptable (George & Mallery, 2010 as cited by Watson, 2018; Watson, 2018). Data is deemed normal if the kurtosis is between -7 and +7, and skewness is between -2 and +2 (Bryne, 2010 as cited by Watson, 2018; Hair et al., 2010 as cited by Watson, 2010; Watson, 2018). Table 23 shows that the data is within acceptable limits hence, univariate distribution was established and the data is deemed to be normal (Watson, 2018). The research model will include all of the variables since all of them were normally distributed. The composite scores and the descriptive statistics for the composite variables are shown on Table 23.

Table 23: Composite Scores for the independent variables

Items	N	Min.	Max.	Mean (Ave.)	Standard Deviation (SD)	Variance	Skewness Statistic	Skewness Standard Error	Kurtosis Statistic	Kurtosis Standard Error
Performance Expectancy	358	1.00	6.67	4.0875	1.77433	3.148	-.302	.129	-1.315	.257
Habit	358	1.00	7.00	4.4092	1.94986	3.802	.045	.129	-1.248	.257
Effort Expectancy	358	1.00	7.00	3.6830	1.98216	3.929	-.019	.129	-1.525	.257
Price Value	358	1.00	7.00	3.2505	1.62179	2.630	.232	.129	-.596	.257
Social Influence	358	1.00	7.00	3.4786	1.64912	2.720	.480	.129	-.354	.257
Hedonic Motivation	358	1.00	7.00	3.5177	1.68722	2.847	.199	.129	-.908	.257
Facilitating Conditions	358	1.00	7.00	3.7451	1.81906	3.309	-.120	.129	-1.351	.257
Perceived Risk	358	1.00	7.00	3.6899	1.59376	2.540	.098	.129	-.787	.257

Items	N	Min.	Max.	Mean (Ave.)	Standard Deviation (SD)	Variance	Skewness Statistic	Skewness Standard Error	Kurtosis Statistic	Kurtosis Standard Error
Perceived Behavioural Control	358	1.00	7.00	3.8520	1.84266	3.395	-.022	.129	-1.405	.257
Attitude Towards Behaviour	358	1.00	7.00	3.6774	1.80606	3.262	.046	.129	-1.122	.257
Perceived Financial Resources	358	1.00	7.00	3.3911	1.86502	3.478	.221	.129	-1.123	.257
Institution-based Trust Score	358	1.00	7.00	3.2633	1.43912	2.071	.347	.129	-.237	.257

5.8.3.2 Adoption

The composite scores for adoption were obtained by computing the mean score of the scale items; the scale items (i.e. DPN1= use of m-commerce to transact online; DPN2= use of mobile apps to transact; DPN3= installation of mobile shopping apps; DPN4= mobile device primary means of transacting online) were weighted equally. Table 24 shows that the data is within acceptable limits hence, univariate distribution was established and the data is deemed to be normal (Watson, 2018). Table 24 gives the composite scores for adoption.

Table 24: Composite scores for the dependent variable (adoption)

Items	N	Min.	Max.	Mean	Standard Deviation	Variance	Skewness Statistic	Skewness Standard Error	Kurtosis Statistic	Kurtosis Standard Error
Extent of m-commerce use	358	1.00	7.00	4.1571	1.69525	2.874	-.143	.129	-1.178	.257

5.8.4. Correlation Analysis

Hypothesis testing was performed using bivariate analysis (bivariate correlation coefficient (denoted as 'r')); the bivariate correlation coefficient is applied in statistics to assess the intensity of the relationship between two variables (Bhattacherjee, 2012). The values of 'r' range from -1 to +1 and these denote how strongly related two variables (in this case, adoption and each independent variable) are (Bhattacherjee, 2012). The results shown on Table 25 are within the acceptable range. The correlation analysis is shown on Table 25.

Table 25: Correlation Analysis

	Extent of Mobile Commerce Use
Perceived Performance Expectancy	0.368**
Habit	0.145**
Effort Expectancy	0.297**
Price Value	0.227**
Social Influence	0.168**
Hedonic Motivation	0.352**
Facilitating Conditions	0.347**
Perceived Risk	0.156**
Perceived Behavioural Control	0.375**
Attitude Towards Behaviour	0.375**
Perceived Financial Resources	0.337**
Institution-based Trust Score	0.173**
$^{**}p < 0.01$ $^{*}p < 0.05$.	

1. Hypothesis 1

The degree of m-commerce adoption is assessed by examining the association between perceived performance expectancy (Mean (M) = 4.0875; Standard Deviation (SD) = 1.77433) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between adoption and perceived performance expectancy was 0.368, this figure is significant statistically at the 0.01 level ($r= 0.368$, $p< 0.01$). This lends credence to hypothesis 1: perceived performance expectancy is positively and significantly connected to mobile commerce adoption. As a result, the perceived performance expectancy of m-commerce positively influences the degree to which mobile commerce is adopted.

2. Hypothesis 2

The degree of m-commerce adoption is measured by examining the relationship between habit (M= 4.4092; SD =1.94986) and adoption (M= 4.1571; SD=1.69525). The sample correlation coefficient for the relationship between habit and adoption was 0.145 (r= 0.145, p> 0.05). This lends credence to hypothesis 2: habit is positively connected to m-commerce adoption. As a result, habit positively influences the degree to which mobile commerce is adopted.

3. Hypothesis 3

The degree of m-commerce adoption is measured by examining the relationship between effort expectancy (M = 3.6830; SD = 1.98216) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between adoption and effort expectancy was 0.297, this figure is statistically significant at the 0.01 level (r= 0.297, p< 0.01). This lends credence to hypothesis 3: effort expectancy is positively and significantly connected to mobile commerce adoption. As a result, effort expectancy positively influences the degree to which mobile commerce is adopted.

4. Hypothesis 4

The degree of mobile commerce adoption is measured by examining the relationship between perceived price value (M = 3.2505; SD = 1.62179) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between perceived price value and adoption was 0.227, this figure is statistically significant at the 0.01 level (r= 0.227, p< 0.01). This lends credence to hypothesis 4: perceived price value is positively and significantly connected to m-commerce adoption. Hence, the perceived price value of mobile commerce positively influences the degree to which mobile commerce is adopted.

5. Hypothesis 5

The degree of m-commerce adoption is measured by examining the relationship between social influence (M = 3.4786; SD = 1.64912) and adoption (M=4.1571; SD=1.69525). The sample correlation coefficient for the relationship between adoption and social influence was 0.168, this figure is significant statistically at the 0.05 level (r= 0.168, p< 0.05). This lends credence to hypothesis 5: social influence and m-commerce adoption are significantly and positively connected. As a result, social influence positively influences the degree to which mobile commerce is adopted.

6. Hypothesis 6

The degree of m-commerce adoption is measured by examining the relationship between hedonic motivation (M=3.5177; SD = 1.68722) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between adoption and hedonic motivation was 0.352, this figure is statistically significant at the 0.01 level ($r= 0.352$, $p< 0.01$). This lends credence to hypothesis 6: hedonic motivation is positively and significantly connected to m-commerce adoption. As a result, hedonic motivation positively influences the degree to which mobile commerce is adopted.

7. Hypothesis 7

The degree of m-commerce adoption is measured by examining the relationship between facilitating conditions (M = 3.7451; SD = 1.81906) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between facilitating conditions and adoption was 0.347, this figure is significant statistically at the 0.01 level ($r= 0.347$, $p< 0.01$). This lends credence to hypothesis 7: facilitating conditions is positively and significantly correlated to m-commerce adoption. As a result, facilitating conditions has a positive influence on the degree to which mobile commerce is adopted.

8. Hypothesis 8

The degree of m-commerce adoption is measured by examining the relationship between perceived risk (M = 3.6899; SD = 1.59376) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between perceived risk and adoption was 0.156, this figure is statistically significant at the 0.05 level ($r= 0.156$, $p< 0.05$). This lends credence to hypothesis 8: perceived risk is negatively and significantly connected to m-commerce adoption. As a result, the perceived risk of m-commerce negatively influences the degree to which mobile commerce is adopted.

9. Hypothesis 9

The degree of m-commerce adoption is measured by examining the relationship between perceived behavioural control (M = 3.6899; SD = 1.59376) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between perceived behavioural control and adoption was 0.375, this figure is statistically significant at the 0.01 level ($r= 0.375$, $p< 0.01$). This lends credence to hypothesis 9: perceived behavioural control is positively and significantly connected to m-commerce adoption. As a result, perceived behavioural control positively influences the degree to which mobile commerce is adopted.

10. Hypothesis 10

The degree of m-commerce adoption is measured by examining the relationship between attitude towards behaviour (M = 3.6774; SD = 1.80606) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between attitude towards behaviour and adoption was 0.375, this figure is statistically significant at the 0.01 level ($r= 0.375$, $p< 0.01$). This lends credence to hypothesis 10: attitude towards behaviour is positively and significantly connected to m-commerce adoption. As a result, the attitude towards behaviour positively influences the degree to which mobile commerce is adopted.

11. Hypothesis 11

The degree of m-commerce adoption is measured by examining the relationship between perceived financial resources (M = 3.3911; SD = 1.86502) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between perceived financial resources and adoption was 0.337, this figure is statistically significant at the 0.01 level ($r= 0.337$, $p< 0.01$). This lends credence to hypothesis 11: perceived financial resources is positively and significantly connected to m-commerce adoption. As a result, the perceived financial resources positively influences the degree to which mobile commerce is adopted.

12. Hypothesis 12

The degree of m-commerce adoption is measured by examining the relationship between institution-based trust (M = 3.2633; SD = 1.43912) and adoption (M = 4.1571; SD = 1.69525). The sample correlation coefficient for the relationship between IBT and adoption was 0.173, this figure is statistically significant at the 0.05 level ($r= 0.173$, $p< 0.05$). This lends credence to hypothesis 12: institution-based trust is positively and significantly connected to m-commerce adoption. As a result, institution-based trust positively influences the degree to which m-commerce is adopted.

Based on the above findings; all of the hypotheses (i.e. H_1 to H_{12}) were found to be true.

5.9 Factors Influencing the Degree of M-Commerce Use

The independent factors influencing the degree of m-commerce use (adoption) were identified using multiple regression analysis.

5.9.1 Multiple Regression Analysis

Multiple regression analysis was utilised in an attempt to fully understand the combined effect of several independent variables on mobile commerce adoption (Bhattacherjee, 2012). In the following models, consumers are said to have adopted mobile commerce if they have used or are using the technology.

a. UTAUT2 Factors

In model 1, the impact of UTAUT2 factors on m-commerce adoption are investigated. The adjusted R^2 is 0.223 (R^2 = 0.241), indicating that 22.3 percent of the variation in m-commerce adoption is explained by this model. This figure is statistically significant at the p< 0.001 level. Performance expectancy (standardised regression coefficient (β) = 0.232; p< 0.001) had the greatest significant effect on m-commerce adoption. Figure 15 shows model 1 (UTAUT2 factors).



***p< 0.001 **p < 0.01 *p <0.05 p>0.05

Figure 15: Model 1 (UTAUT2 factors)

P-values exceeding 0.05 (i.e. p >0.05) suggest that there is insufficient support contradicting the null hypothesis, this implies that the null hypothesis is admissible (Grabwoski, 2016; Rumsey, 2021). Hence, all the UTAUT2 variables with p-values greater than 5 were grouped (Figure 15) separately from those with p-values that are below 0.05. In the multiple regression model; hedonic motivation, facilitating conditions and performance expectancy were found to significantly influence adoption.

Further analysis (depicted in Figure 16) was done to investigate the impact of the 3 (i.e. facilitating conditions, performance expectancy, and hedonic motivation) UTAUT2 factors on m-commerce adoption. For this model, the adjusted R^2 is 0.216 (R^2 = 0.223), indicating that 21.6 percent of the variation in m-commerce adoption can be accounted for by this model. This figure is statistically significant at the $p < 0.001$ level. Performance expectancy (standardised regression coefficient (β) = 0.252; $p < 0.001$) had the greatest significant effect on m-commerce adoption.

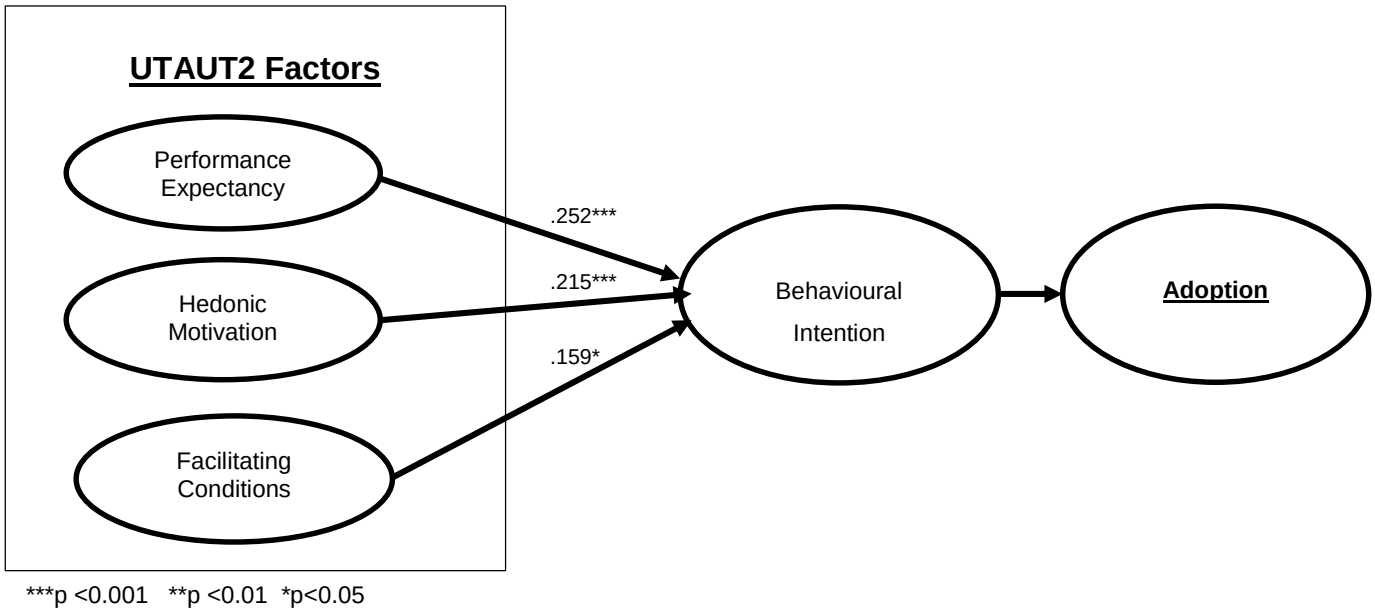
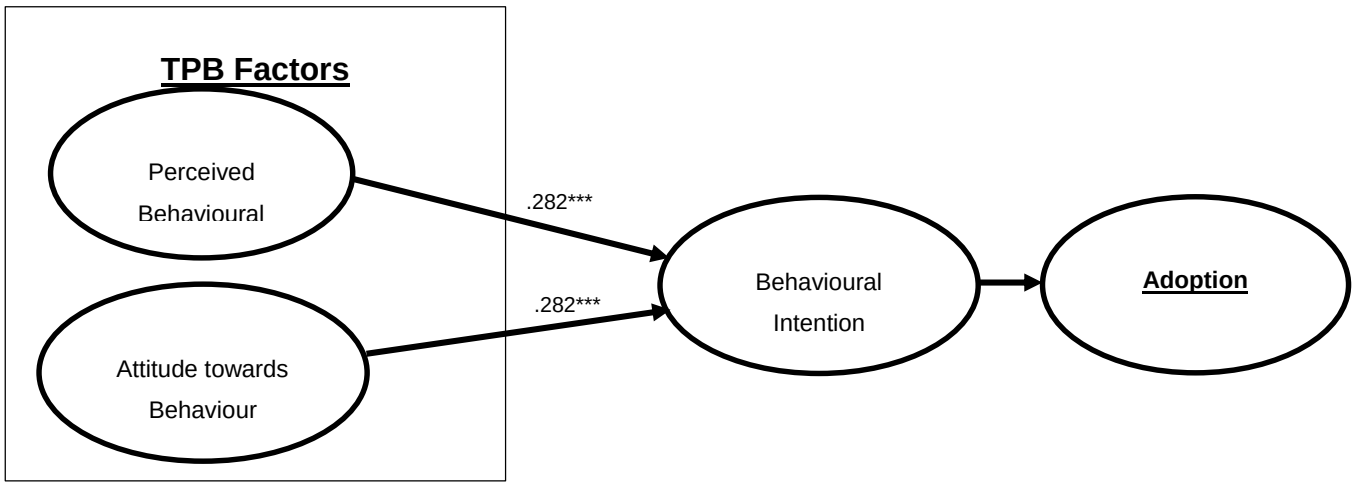


Figure 16: Impact of the 3 most significant UTAUT2 factors on adoption

b. TPB Factors

The impact of the TPB factors on m-commerce acceptance is studied in model 2 (Figure 17). 20.7 percent of the variation in m-commerce adoption is explained by this model. The adjusted R^2 is 0.207 (R^2 = 0.211), this figure is statistically significant at the $p< 0.001$ level. Both variables (i.e. perceived behavioural control and attitude towards behaviour) with standardised coefficient (β) values of 0.282 have a significant effect on mobile commerce adoption ($p< 0.001$).

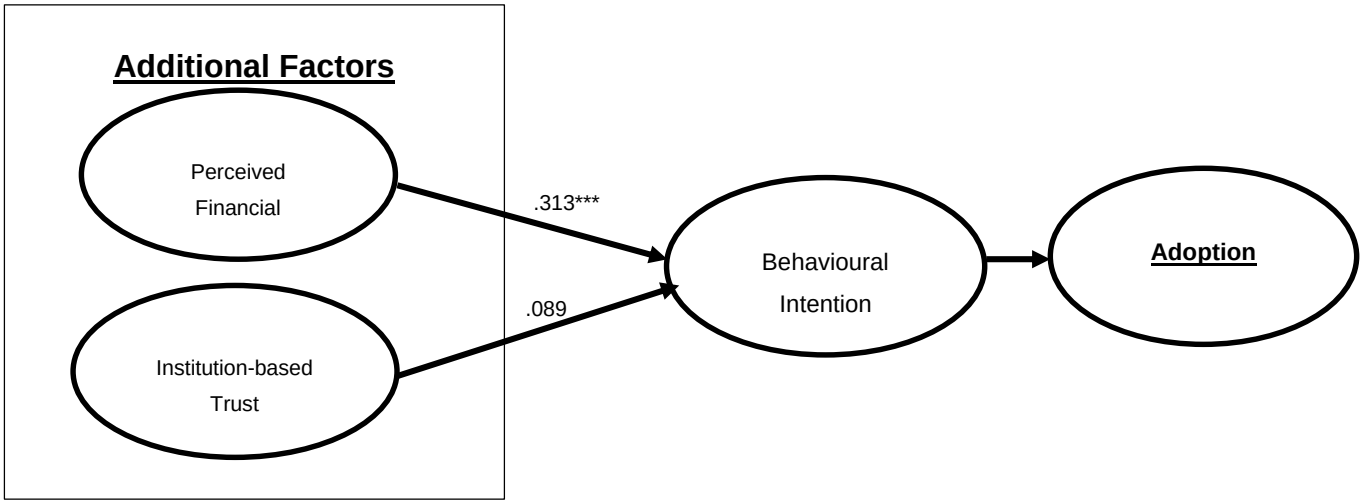


***p <0.001 **p <0.01 * p< 0.05

Figure 17: Model 2 (TPB factors)

c. Additional Factors

In model 3, the impact of the other two factors (i.e. perceived financial resources and institution-based trust) on m-commerce adoption were investigated. The adjusted R^2 is 0.116 (R^2 = 0.121), indicating that 11.6 percent of the variation in m-commerce adoption is explained by this model. This is statistically significant at the p< 0.001 level. In this model, perceived financial resources (standardised regression coefficient (β) = 0.313; p < 0.001) had the greatest significant influence on m-commerce adoption. Model 3 is shown in Figure 18.



***p< 0.001 **p< 0.01 * p< 0.05

Figure 18: Model 3 (Additional factors (PFR, IBT))

5.9.2 Assumptions

Collinearity, the homoscedasticity assumption, the linear relationship assumption, and residual distribution normality are discussed in this section.

a. Collinearity

Collinearity exists where several independent factors are substantively correlated in a multiple regression (O'Brien, 2007). When there is multicollinearity, the regression approximations for the independent variables become volatile (O'Brien, 2007). To evaluate multiple regression, the Tolerance parameter and its reciprocal, the Variance Inflation Factor (VIF), were utilised. Acceptable VIF scores should be between zero and four (i.e. 0 to +4) while Tolerance scores should be approximately one (O'Brien, 2007). The Tolerance and VIF scores of all the variables, in the regression analysis, did not indicate any signs of multi-collinearity hence, this suggests that assumption violations do not exist. The collinearity statistics for the extent of mobile commerce adoption are presented in Table 26.

Table 26: Collinearity statistics for extent of m-commerce use

	Collinearity Statistics	
	Tolerance	**VIF**
Model 1		
Performance Expectancy	0.768	1.301
Habit	0.867	1.153
Effort Expectancy	0.697	1.435
Price Value	0.825	1.212
Social Influence	0.885	1.129
Hedonic Motivation	0.731	1.368
Facilitating Conditions	0.661	1.514
Perceived Risk	0.891	1.122
Collinearity results for the 3 most significant UTAUT2 factors		
Performance Expectancy	0.846	1.181
Hedonic Motivation	0.795	1.258
Facilitating Conditions	0.736	1.358

	Collinearity Statistics	
	Tolerance	**VIF**
Model 2		
Perceived Behavioural Control	0.892	1.121
Attitude Towards Behaviour	0.892	1.121
Model 3		
Perceived Financial Resources	.928	1.077
Institution-Based Trust	.928	1.077

b. Linear Relationship Assumption

The relationship between the dependent and independent variables can only be adequately calculated in traditional multiple regression if the relationship is linear; a linear model cannot be fitted to non-linearly related data (Osborne & Waters, 2002). According to UCLA (2021), in order to detect violations of this assumption, the scatter plot of the standardised predicted values (i.e. ZPRED on the X-axis) and the standardised residuals (i.e. ZRESID on the Y-axis) have to be examined. The scatter plot that results should be block or spherically shaped (Osborne & Waters, 2002). If the residuals have a curved pattern, this indicates the possibility of non-linearity (Osborne & Waters, 2002; UCLA, 2021). The scatterplots (Appendix C) were examined and found to be devoid of any non-linear pattern, this suggests that the linearity assumption was not violated. The linear relationship for the UTAUT2 factors is shown on Figure 19. All the other graphs that show the linear relationships of the other factors are shown on Appendix C.

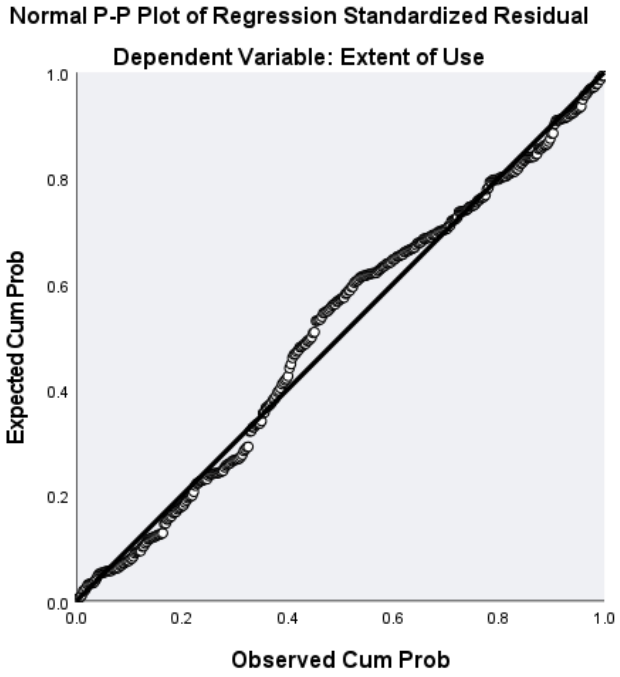


Figure 19: UTAUT2 factors (Linear relationship example)

c. Homoscedasticity Assumption

The homoscedasticity assumption assumes that there is constant error variance (Osborne & Waters, 2002). The homoscedasticity assumption was checked using the same scatterplot as before (i.e. ZRESID versus ZPRED on SPSS) by evaluating whether the residuals were arbitrarily distributed around zero (0) and did not create a fan-like structure. The scatter plot evaluation indicates that the homoscedasticity assumption was not violated. The scatterplot for the UTAUT2 factors is shown on Figure 20. The scatterplots, for the other factors, are shown on Appendix C.

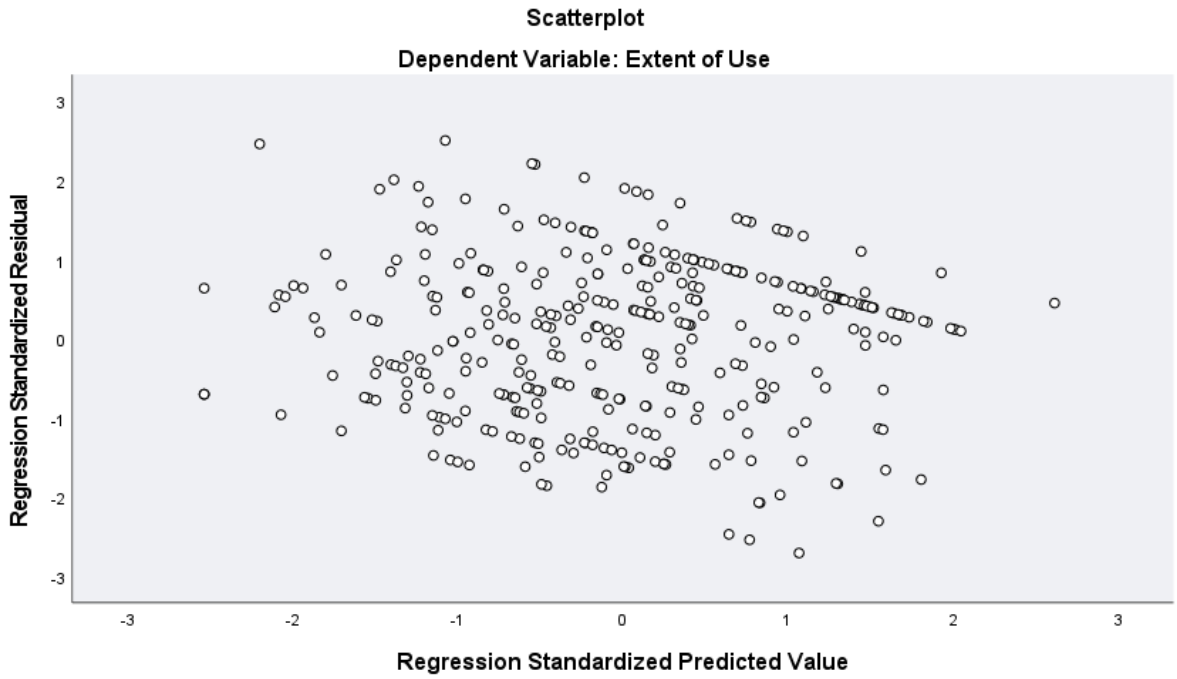


Figure 20: UTAUT2 factors (Homoscedasticity example)

d. Residual Distribution Normality

An evaluation was carried out to determine if a normal (linear) probability plot of the residuals exists (Osborne & Waters, 2002). The residual plots appear to be very close to being normally distributed. Upon examination, the histogram was found to approximate a normal distribution curve. Hence, the normality assumption has not been violated. Figure 21 depicts the residual distribution graph for the UTAUT2 factors. The other graphs, on residual distribution for the other factors, are shown on Appendix C.

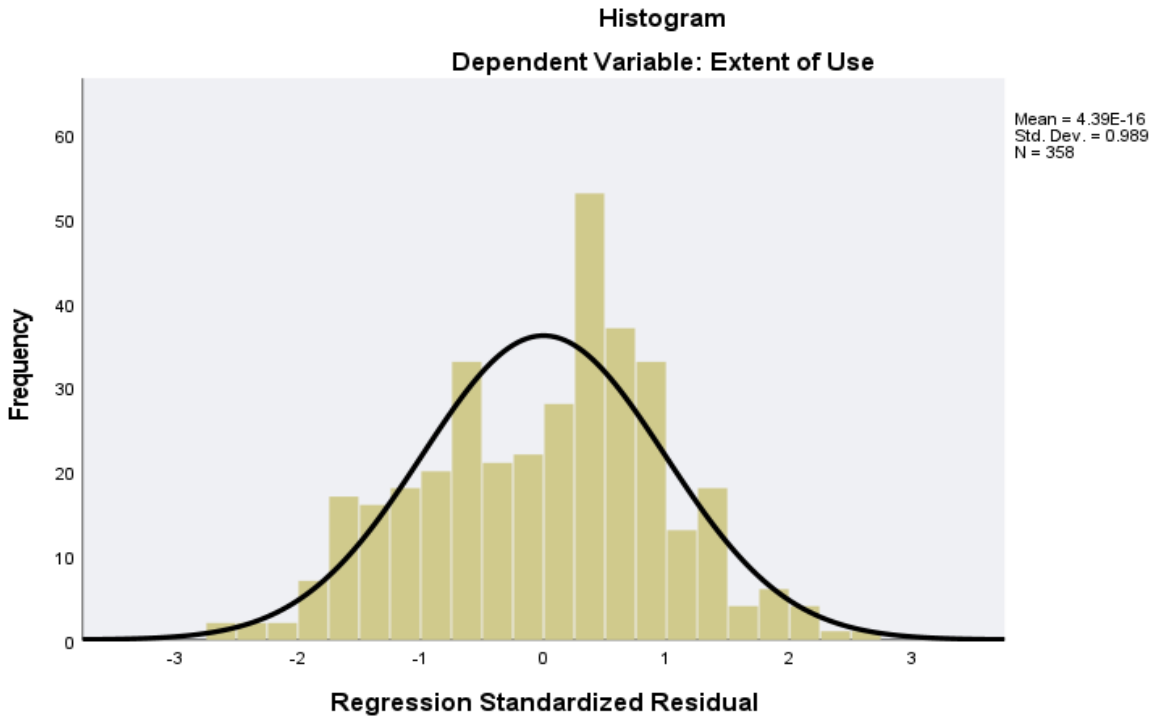


Figure 21: UTAUT2 factors (Residual distribution example)

5.9.3 Conclusion of the Section

The findings from the data analysis are presented in this section. This section also reported the results of the data screening, missing data, and outlier analysis. The next section presents a sample (consumer) profile analysis. Finally, the research question is addressed in the chapter. The measures' validity and reliability, as well as the hypotheses and the research model, are assessed. In the following section, more details will be given on these findings and the research findings will be compared to existing research.

6 DISCUSSION

The objectives of the study were to determine the factors influencing mobile commerce adoption, at individual level, in South Africa; and this was achieved by researching on m-commerce adoption in South Africa using 12 constructs as well as two open-ended questions. In this chapter, the research outcomes are discussed and compared with previous UTAUT2 and TPB studies. Firstly, the impact that UTAUT2, TPB, and the additional factors (i.e. perceived financial resources and institution-based trust) have on mobile commerce adoption is discussed prior to discussing the categories of mobile commerce used in South Africa. It should be noted that all of the findings and assumptions relate more specifically, or are more generalisable, to 18-30 year olds living in the Gauteng province of South Africa because the majority of the respondents came from these groups.

6.1 Effects of UTAUT2 Factors on Mobile Commerce Adoption

The research question (i.e. RQ1: What are the factors influencing B2C m-commerce adoption by consumers in South Africa?) was explored by measuring the extent to which m-commerce is utilised by consumers to purchase products from retailers in South Africa.

a. Performance Expectancy

It was hypothesised that performance expectancy will have a favourable positive influence on behavioural intention to adopt m-commerce, where adoption is measured by the degree to which the consumer uses m-commerce. The hypothesis was rationalised by the notion that a consumer adopts m-commerce if he or she (hereon jointly referred to as he) views it as beneficial i.e. likely to improve his or her (hereon jointly referred to as his) performance (Al-Saedi et al., 2020; Haryanti & Subriadi, 2020; Tarhini et al., 2019). Other researchers discovered that people are inclined to accept m-commerce because of its mobility and flexibility, as well as when they believe it would help them complete activities more successfully and efficiently (Baabdullah et al., 2019; Sim et al., 2018; Venkatesh et al., 2012). From the UTAUT2 factors, performance expectancy was found to have a substantial positive influence on mobile commerce adoption and this corresponds with some previous studies (Venkatesh et al., 2012; Zhao & Bacao, 2021; Morosan & DeFranco, 2016 as cited by Zhao & Bacao, 2021). The correlation and multiple regression analyses of the UTAUT2 characteristics suggest that consumers in South Africa are more inclined to adopt mobile commerce if they regard it to be a valuable and convenient technology that increases productivity, and allows them to complete activities more quickly (Al-Saedi et al., 2020; Haryanti & Subriadi, 2020; Tarhini et al., 2019).

b. Habit

It was hypothesised that habit will have a positive impact on behavioural intention to use mobile commerce where adoption is measured by the degree to which the consumer uses mobile commerce. The hypothesis was rationalised by the notion that people are inclined to perform certain behaviours as a result of prior learning (Tarhini et al., 2019; Venkatesh et al., 2012). The statistical analysis (i.e. multiple regression) of the data, suggests that habit does not significantly influence mobile commerce adoption by consumers in South Africa. The research findings differ from those of Venkatesh et al., (2012) and Tarhini et al., (2019).

c. Effort Expectancy

It was hypothesised that effort expectancy will have a positive impact on behavioural intention to use mobile commerce where adoption is measured by the degree to which the consumer uses m-commerce. The hypothesis was rationalised by the notion that people are likely to adopt m-commerce if they perceive the technology as easy to use (Haryanti & Subriadi, 2020; Saprikis et al., 2021; Venkatesh et al., 2012). From the statistical analysis, it was shown that effort expectancy does not significantly influence the behavioural intention to adopt m-commerce by consumers in South Africa. The research findings differ from those of Sim et al. (2018) who stated that effort expectancy significantly influences m-commerce adoption however, the research findings were similar to those of Saprikis et al. (2021). Zhao and Bacao (2021) found that effort expectancy has a negative influence behavioural intention to adopt mobile commerce. According to Venkatesh et al. (2012) performance expectancy, social influence, and effort expectancy are influenced by individual attributes such as experience, gender, and age.

d. Price Value

It was hypothesised that price value will have a beneficial impact on behavioural intention to use mobile commerce where adoption is measured by the degree to which the consumer uses mobile commerce. The hypothesis was rationalised by the notion that people are more inclined to accept mobile commerce if they perceive it as providing excellent value for money (Venkatesh et al., 2012). The statistical analysis of the data has shown that the behavioural intention to adopt m-commerce by the consumers in South Africa is not significantly influenced by price value. Price value however, positively influences the behavioural intention to continue using m-commerce (Venkatesh et al., 2012), and not necessarily the behavioural intention to adopt the technology.

e. Social Influence

It was hypothesised that social influence will have a beneficial impact on behavioural intention to use mobile commerce where adoption is measured by the degree to which the consumer uses m-commerce. The hypothesis was rationalised by the notion that people are more inclined to adopt mobile commerce if important people in their lives think or are of the opinion that they should use m-commerce (Al-Saedi et al., 2020; Blaise et al., 2018; Sadi & Noordin, 2011). The statistical analysis (i.e. multiple regression) indicates that social influence does not significantly influence m-commerce adoption. The research findings suggest that consumers in South Africa are marginally influenced by others; this relates more specifically to people residing in the Gauteng province because most of the research participants were from Gauteng. The research findings were similar to those of Saprikis et al. (2021) but differed to those of Sim et al. (2018) and Blaise et al. (2018) who reported that social influence significantly influenced mobile commerce adoption. According to Saprikis et al. (2021), social influence and effort expectancy have an indirect influence on behavioural intention to adopt a technology.

f. Hedonic Motivation

Hedonic motivation was hypothesised to have a beneficial impact on behavioural intention to use m-commerce where adoption is measured by the degree to which the individual uses mobile commerce. The hypothesis was rationalised by the notion that an individual's behavioural intention to adopt m-commerce is motivated by the degree to which the individual considers the utilisation of mobile commerce as enjoyable or gratifying (Tarhini et al., 2019; Saprikis et al., 2021; Venkatesh et al., 2012).Other studies supported the above by mentioning that people are most likely to accept mobile commerce due to intrinsic benefits which come from the feelings of joy and hedonism derived from utilising the technology (Tarhini et al., 2019; Van der Heijden, 2004 as cited by Tarhini et al., 2019; Venkatesh et al., 2012). From the data analysis, hedonic motivation was found to have the second most significant positive influence on mobile commerce adoption (in South Africa) among the UTAUT2 factors. Previous research has also demonstrated that hedonic motivation significantly influences m-commerce adoption (Tarhini et al., 2019; Venkatesh et al., 2012). The results of the multiple regression and correlation analysis of the UTAUT2 characteristics indicates that South African consumers are inclined to adopt mobile commerce if they view it to be an engaging, exciting, fun, and entertaining innovation (Tarhini et al., 2019; Saprikis et al., 2021; Venkatesh et al., 2012).

g. Facilitating Conditions

It was hypothesised that facilitating conditions will have a positive effect on behavioural intention to use mobile commerce where adoption is measured by the degree to which the consumer uses m-commerce. The hypothesis was rationalised by the notion that an individual's behavioural intention to adopt mobile commerce is motivated by the extent to which the individual trusts the organisational and technical structure supporting m-commerce use (Tarhini et al., 2019; Venkatesh et al., 2003). Other researchers found that individuals are more inclined to use m-commerce when there is a technical and organisational structure in place to sustain it (Tarhini et al., 2019; Venkatesh et al., 2012). Facilitating conditions had the third most significant positive influence on m-commerce adoption (in South Africa) among the UTAUT2 factors. Facilitating conditions were shown to significantly influence m-commerce adoption in earlier studies (Tarhini et al., 2019; Venkatesh et al., 2012). The results of the UTAUT2 factors' correlation and multiple regression analysis show that consumers in South Africa are more inclined to adopt mobile commerce if they are knowledgeable enough to use it; the other technologies (e.g. banking apps) are compatible with mobile commerce, and there are people (e.g. from the online retailer's organisation) who can help consumers whenever they face difficulties in using mobile commerce (Baabdullah et al., 2019; Sadi & Noordin, 2011; Saprikas et al., 2021). Facilitating conditions were identified as an important influencer of consumer behavioural control (Sadi & Noordin, 2011).

h. Perceived Risk

It was hypothesised that perceived risk will have a negative effect on behavioural intention to utilise m-commerce where adoption is measured by the degree to which the consumer uses m-commerce. The hypothesis was rationalised by the notion that people are less inclined to accept and utilise mobile commerce if they perceive it to be risky (Baabdullah et al., 2019; Herrero-Crespo & Bosque, 2010; Slade et al., 2015). The statistical analysis (i.e. correlation and multiple regression) of the data indicates that perceived risk does not significantly influence m-commerce adoption by the consumers living in South Africa, this is comparable to the results of a research done by Al-Saedi et al. (2020). Perceived risk negatively influences the behavioural intention to adopt m-commerce, this supports the findings of earlier research done by Herrero-Crespo and Bosque (2010) as well as other studies (Al-Saedi et al., 2020; Slade et al., 2015).

6.2 Effects of TPB Factors on Mobile Commerce Adoption

The effects of the Theory of Planned Behaviour (TPB) factors (i.e. perceived behavioural control, and attitude towards behaviour) on adoption are discussed in this section.

a. Perceived Behavioural Control

It was hypothesised that perceived behavioural control will have a beneficial effect on behavioural intention to use mobile commerce where adoption is measured by the degree to which the consumer uses m-commerce. The hypothesis was rationalised by the idea that an individual's behavioural intention to adopt m-commerce is motivated by the extent to which performing specific tasks on mobile platforms is considered to be easy, and the accessibility of essential opportunities and resources that encourage this behaviour (Ajzen & Madden, 1986 as cited by Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011). Perceived behavioural control arises from personal beliefs concerning the elements (factors) governing behaviour, and from one's ability to influence such elements (Herrero-Crespo & Bosque, 2010). Both TPB factors (i.e. perceived behavioural control, and attitude towards behaviour) were shown to have a significant positive effect on behavioural intention to accept m-commerce. In the study conducted by Herrero-Crespo and Bosque (2010), perceived behavioural control did not considerably affect behavioural intention to purchase online (Sadi & Noordin, 2011). The outcome of the correlation and multiple regression analysis of perceived behavioural control indicates that consumers in South Africa are inclined to adopt m-commerce if they find m-commerce easy to use, and they possess the necessary resources, skills, and knowledge to use mobile commerce (Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011).

b. Attitude Towards Behaviour

It was hypothesised that attitude towards behaviour will have a beneficial effect on behavioural intention to utilise m-commerce where adoption is measured by the degree to which the consumer uses m-commerce. The hypothesis was rationalised by the idea that an individual's behavioural intention to adopt mobile commerce is influenced by the extent to which the individual perceives the outcome of using an m-commerce system in a positive way (Herrero-Crespo & Bosque, 2010; Wang et al., 2006). Personal convictions about behaviour and its aftermaths, as well as the significance these convictions are given, are thought to contribute to attitude (Herrero-Crespo & Bosque, 2010). From the statistical analysis, attitude towards behaviour (like perceived behavioural control) was shown to significantly influence mobile commerce adoption. In the study conducted by Herrero-Crespo and Bosque (2010), attitude towards behaviour had a significant effect on behavioural intention to purchase online.

The results of the correlation and multiple regression analysis of attitude towards behaviour indicates that customers in South Africa are inclined to adopt m-commerce if they consider it to be a good, positive, or wise idea (Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011).

6.3 Effects of Additional Factors on Mobile Commerce Adoption

The effects of the additional factors (i.e. perceived financial resources, and institution-based trust) on adoption are discussed in this section.

a. Perceived Financial Resources

It was hypothesised that perceived financial resources will have a beneficial impact on behavioural intention to utilise mobile commerce where adoption is measured by the degree to which the consumer uses m-commerce. The hypothesis was rationalised by the idea that an individual's behavioural intention to adopt mobile commerce is influenced by the extent to which the person trusts that he has the funds (e.g. to buy data, a smartphone, pay delivery fees, and buy the products) required to use a mobile commerce system (Sadi & Noordin, 2011; Wang et al., 2006). From the statistical analysis, perceived financial resources was shown to significantly influence m-commerce adoption. The research supports prior research which found that perceived financial resources significantly influences behavioural intention to utilise m-commerce (Sadi & Noordin, 2011; Wang et al., 2006). The results of the correlation and multiple regression analysis of perceived financial resources indicate that people living in South Africa are more inclined to adopt m-commerce if they have the money required to use it (Sadi & Noordin, 2011; Wang et al., 2006).

b. Institution-Based Trust

It was hypothesised that institution-based trust will have a beneficial effect on behavioural intention to utilise mobile commerce where adoption is measured by the extent to which the consumer uses mobile commerce. The hypothesis was rationalised by the idea that an individual's behavioural intention to adopt m-commerce is influenced by the extent to which the individual trusts the m-commerce vendor (Everard & Galletta, 2005; Gefen et al., 2003; McKnight et al., 2002; Sim et al., 2018). This confidence is as a result structural assurances (e.g. security and safety nets provided by the vendor such as guarantees, and legal options), and situational normality (Everard & Galletta, 2005; Gefen et al., 2003; McKnight et al., 2002). From the statistical analysis, IBT was shown to significantly impact behavioural intention to adopt m-commerce by consumers in South Africa. The research supports prior research which found that institution-based trust significantly influences behavioural intention to adopt mobile commerce (Blaise et al., 2018; Sim et al., 2018).

From the qualitative data analysis it was discovered that most consumers were unaware of any technical or legal frameworks that safeguard them from problems online. In addition, consumers were not sure whether or not m-commerce retailers will always look out for their (consumers') best interests.

6.4 Mobile Commerce Categories in Use in South Africa

Fifteen (15) categories of mobile commerce were identified from extant literature (Cision, 2020; McKnight et al., 2002; Wang et al., 2006). The mobile commerce e-marketplaces identified were general marketplaces (e.g. Takealot) that sell a wide range of products from multiple suppliers on a single platform; clothing and shoes; food; health and fitness; homeware; books, music, movies, and games; bags and accessories; household appliances; cosmetics and body care; furniture and household goods; DIY, garden and pet stores; toys, and baby products; stationery and hobby supplies; hardware, paint and glass; and pharmaceuticals and toiletries (Al-maaitah et al., 2021; Cision, 2020; Gefen et al., 2003; Saprikis et al., 2021; Statista, 2018; Takealot, 2021). Other m-commerce categories may exist however, general e-marketplaces tend to sell a wide variety of goods, including cars and electronics (Readymadestores, 2021; Takealot, 2021).

Based on the results of the survey data analysis (358 responses), it was discovered that the majority (i.e. the 18-24 and 25-30 age-groups) of the respondents were using general electronic marketplaces; food; clothing and shoes; books, music, movies, and games (excluding downloads); and pharmaceuticals and toiletries to conduct mobile commerce payments and purchases. These findings are comparable to others (Estay, 2021; Gilbert, 2019; Statista, 2018). The m-commerce categories that are used the least by the research participants are toys and baby products; DIY, garden and pet stores; and furniture. This suggests that the majority of the research participants do not use the products in the bottom three categories, are unaware of m-commerce retailers that sell those products, they prefer to buy those products (e.g. baby diapers, garden tools, and pet food) from traditional stores for immediate use instead of having to wait for weeks to receive those products (as is often the case when products are purchased through some m-commerce platforms). The reasons behind adopting some m-commerce categories over others may encourage some businesses (e.g. those selling toys and baby products) to sell their products on general m-commerce marketplaces instead of niche m-commerce markets.

There was minimal variation between the different age-groups (across provinces) in terms of the mobile commerce categories they had adopted or were using. The top five m-commerce categories were basically the same across all age-groups.

6.5 Chapter Conclusion

The research findings were discussed in this chapter and reference was made to prior studies in order for us to ascertain whether or not the findings corroborate with or deviate from expectation. The influences of UTAUT2, TPB and the two additional factors (i.e. PFR and IBT) on mobile commerce adoption were discussed. A discussion on the different mobile commerce categories was also given. The top five used m-commerce marketplaces are general marketplaces; food; clothing and shoes; books, music, movies, and games (excluding downloads); and pharmaceuticals and toiletries. The least used m-commerce marketplaces are the ones that sell toys and baby products; DIY, garden and pet stores; and furniture.

7 CONCLUSION

The findings of the study, as well as their implications for practice and theory, are summarised in this section. This section also highlights the limitations of the study and provides recommendations for future research.

7.1 Research Findings Summary

The main objective of the research was to identify the determinants of mobile commerce adoption by consumers in South Africa using UTAUT2, TPB and 2 additional constructs (i.e. PFR and IBT) as theoretical lens. A research gap, which suggests that m-commerce adoption by consumers living in South Africa is not well understood, was discovered from the literature review.

An online survey was utilised to examine the factors influencing m-commerce adoption in a South African setting. The survey/questionnaire link was shared at random on various South African social media groups and accounts (mainly on Facebook, WhatsApp, Instagram, and Twitter). Emails, containing the survey link, were also sent out to university students, individuals, and employees in different organisations across South Africa.

358 people from different provinces and age-groups responded to the survey. The research findings suggest that most of the people who have adopted m-commerce reside in the Gauteng province, and are in the 18-24 and 25-30 years age-groups. Hence, the research findings are more generalisable to them. The main constructs used to study m-commerce adoption at individual level were identified. Hence, the survey used twelve (12) independent variables to measure the dependent variable (i.e. adoption).

A research model, that was primarily using UTAUT2 and TPB as theoretical lens, was produced hypothesising the impacts of 12 variables (i.e. perceived risk, social influence, facilitating conditions, habit, effort expectancy, price value, perceived behavioural control, hedonic motivation, attitude towards behaviour, perceived financial resources, performance expectancy, and institution-based trust) on m-commerce adoption by consumers living in South Africa. In the research, adoption was measured by the degree of m-commerce usage. From the correlation analysis, it was discovered that all of the given hypotheses were correct, that is, eleven (11) factors have a positive impact on the behavioural intention to adopt mobile commerce by consumers in South Africa while perceived risk negatively impacts adoption. 358 responses were used in the final data analysis. The results of the regression analysis indicate that performance expectancy, facilitating conditions, perceived behavioural control, hedonic motivation, attitude towards behaviour, and perceived financial

resources have the greatest significant effect on m-commerce adoption. The study was primarily positivist in nature however, the research participants had the option of responding to two open-ended (interpretivist) questions at the end of the questionnaire.

The top 5 additional factors influencing m-commerce adoption, that were identified from the qualitative data analysis are reliable shipping and shipping costs; shopping convenience; data and device access, and security risks; product variety and availability; and delivery to remote areas. These additional factors may be used in future research on mobile commerce adoption.

From the literature review, fifteen (15) categories of m-commerce marketplaces in use in South Africa were identified. The study identified the top 5 m-commerce marketplaces in use in South Africa; these marketplaces are: general mobile commerce marketplaces (e.g. Takealot); clothing and shoes; food; books, music, movies, and games (excluding downloads); and pharmaceuticals and toiletries. If VodaPay has a business model similar to that of general m-commerce marketplaces (e.g. Takealot) and effective marketing is done then it is likely to succeed.

7.2 Implications for Theory and Practice

The implications of the research findings for theory and practice are discussed in this section.

7.2.1 Implications for Theory

In the study, m-commerce adoption was conceptualised by drawing on the UTAUT2 model and TPB theory (Herrero-Crespo & Bosque, 2010; Sadi & Noordin, 2011; Tarhini et al., 2019; Venkatesh et al., 2003). UTAUT2, TPB, and two additional factors (i.e. perceived financial resources and institution-based trust) were discovered using the literature review. The research findings suggest that m-commerce adoption by the research participants is largely influenced by three UTAUT2 factors (i.e. facilitating conditions, hedonic motivation, and performance expectancy), both of the TPB factors (i.e. perceived behavioural control and attitude towards behaviour), as well as perceived financial resources (i.e. one of the additional factors). The other factors (i.e. habit, effort expectancy, price value, social influence, perceived risk, and institution-based trust) had a surprisingly insignificant effect on m-commerce adoption however, some of these factors (e.g. social influence, effort expectancy, and habit) significantly influenced adoption in previous studies (Blaise et al., 2018; Sim et al., 2018;Tarhini et al., 2019; Venkatesh et al.,2012).

When assessing the UTAUT2 factors, the research findings suggest that performance expectancy has the greatest influence on behavioural intention to adopt m-commerce

at individual level, and both of the TPB factors have an equal impact on the behavioural intention to adopt mobile commerce at individual level. It is suggested that these three factors (i.e. UTAUT2-PE, TPB-PBC and TPB-ATB) be included in future research on m-commerce adoption. This research has contributed by showing that: i) factors that significantly influence adoption in other countries are not necessarily the same as those that influence m-commerce adoption in a South African context, ii) there are other key factors, such as financial resources, which if absent, make it impossible to use m-commerce, and lack of financial resources can potentially override several factors (e.g. habit, social influence, price value and even perceived risk), iii) the availability of a mobile commerce marketplace does not guarantee that many consumers will adopt it (e.g. toys, baby products, DIY, pet stores, homeware and furniture m-commerce marketplaces); it is important to research the market before introducing any new marketplaces to avoid complete failure in m-commerce, and iv) a combination of different theoretical models and theories (e.g. UTAUT2, TPB plus additional constructs derived from literature) were utilised to study the behavioural intention to adopt m-commerce by people living in South Africa; the results of this combination of research models and theories coupled with response analysis (i.e. the analysis of open-ended questions) can give us a more holistic view of the phenomenon than, for example, if only one theory or research paradigm had been used in the research.

7.2.2 Implications for Practice

The study's findings may be used to guide organisations into understanding the determinants of mobile commerce acceptance by people living in South Africa. For example, the research outcomes suggest that perceived financial resources and performance expectancy strongly influence the behavioural intention to adopt mobile commerce. If individuals perceive using m-commerce as detrimental or unfavourable then there will be no need for them to use it. Furthermore, what motivates the research participants to adopt m-commerce appears to be driven by perceived financial resources than habit, or social influence. Without sufficient funds to buy data, a suitable handset, and without the funds (or online retailers' preferred payment method e.g. preference for card payments over cash) to purchase products from m-commerce marketplaces; habit, social influence and the other factors may become almost negligible.

Consumers planning to adopt m-commerce must first assess the benefits of using the technology as well as their financial resources hence, it is suggested that organisations highlight the benefits of using m-commerce to potential and current customers. Organisations need to be intentional about educating consumers on the benefits of using m-commerce and they need to ensure that they are in a position to keep their promises (e.g. timely delivery of correct and high quality products, and

facilitate refunds). Furthermore, it is suggested that different organisations should advertise their products and services by targeting specific niche markets and age-groups so as to ensure that their target audience has a need for the specific products being advertised to them, and that they potentially have the funds, access to data and appropriate devices.

The research findings can also be used to provide managers, business owners, government officials, and other decision makers with information on the different categories of mobile commerce marketplaces that are accessible for adoption; in addition, data on the most popularly used m-commerce marketplaces are given. Practitioners, business owners, and other decision makers can use this information to their advantage by adopting the top 5 types of m-commerce marketplaces, or trading solely on them inorder to maximise profits and to reach more potential customers. The research findings also inform practice on which m-commerce marketplaces are popularly used across all age-groups as well as which marketplaces consumers they intend using in the near future. M-commerce retailers and companies wishing to trade on m-commerce marketplaces can use these research findings as a benchmark that guides their m-commerce activities, policies and business strategies. The research findings could help both large and small organisations to make informed decisions regarding which m-commerce marketplaces to adopt and additional information was provided by consumers on the open-ended questions' section of the survey, this information (e.g. need for deliveries to remote areas, issues concerning high delivery costs, poor marketing strategies, simplifying the process of refunding and/or exchanging goods, and a need for more consolidated m-commerce marketplaces so as to address the perceived monopoly in those marketplaces) could prove very helpful to existing and new players in m-commerce in South Africa.

Policy makers could also use the research findings to formulate policies and give incentives to organisations that develop or introduce consolidated m-commerce marketplaces in South Africa. In addition, some research participants were of the opinion that m-commerce costs were exorbitant especially for individuals who want to purchase imported goods into the country, they argued that some products were not available locally hence, they prefer to order the products from the overseas manufacturers but the importation duties are too high. Policy makers and business owners could consider producing a list of goods that are exempt from high importation taxes. Also, individuals need to be educated on how much they are permitted to import annually at low importation rates (i.e. if such an allowance exists), or new companies that handle special orders (i.e. of scarce products) need to be formed so that people can order and import goods through them at reasonable importation rates.

7.3 Limitations and Future Research

Most of the people who participated in the study reside in the Gauteng province, are in the 18 to 24 and 25 to 30 years age-groups, and they do not have a monthly income (i.e. from work or a business). A small percentage of the respondents came from other age-groups and provinces hence, the respondents are not a true (or precise) representation of how the South African population is distributed (StatsSA, 2020). The survey was self-administered hence, it was open to respondent bias, for example, respondents could have misinterpreted some questions, or they may have responded to some questions in a way that portrays them in a better light, that is, in terms of m-commerce adoption (social desirability bias). Furthermore, some of the research participants could be people who reside outside South Africa but who found the link to the survey on social media groups; the views of people living outside South Africa may differ from those of people living in South Africa. Care was however, taken to ensure that people who reside in South Africa completed the survey, for example, checking WhatsApp groups to ensure that most of the group members have South African cellphone numbers; inviting students from South African universities to participate in the study; and asking friends or colleagues, who acted as gatekeepers, in their companies or social networks to share the survey link with their connections or friends who reside in South Africa. The survey was web-based hence, people who prefer paper-based surveys may have been unable to participate in the study. Some people may have decided not to respond to the survey because of the structure of the questionnaire, or due to lack of the resources (e.g. data or internet access) required to complete the web-based survey. It is not possible to cover all of the factors influencing m-commerce adoption in a single study. Hence, other factors influencing m-commerce adoption could have been excluded from the study since only the factors derived from the UTAUT2, TPB, and the two additional constructs (i.e. perceived financial resources and institution-based trust) were used.The fifteen (15) categories of m-commerce marketplaces were derived from existing literature however, there may still be several other m-commerce marketplace categories that were not included in the research. In addition, since a cross-sectional study was done, causality and temporal precedence inferences should not be made (Studycom, 2021). When put together, all of these issues present limitations to internal and external validity of research findings.

Longitudinal studies may be used by future researchers to give greater insights on prolonged and continued use (adoption) of mobile commerce. In future research, other independent factors (e.g. language barriers, effects of pandemics, other categories of m-commerce marketplaces or business models, and effects of government regulations on importations) could be employed to investigate the factors influencing

m-commerce adoption. The variables applied in this research could be used in future research to study mobile commerce adoption in smaller provinces in South Africa, or in other countries. Future researchers could also find out which mobile commerce systems (or trading platforms) are used by South African online retailers.

7.9 Conclusion

This research, which used UTAUT2 and TPB as theoretical lens, has added new knowledge to theory and practice by evaluating the level of B2C mobile commerce adoption among South African consumers. The empirical methods that were used in the study revealed that hedonic motivation, facilitating conditions, price value, effort expectancy, perceived behavioural control, performance expectancy, habit, attitude towards behaviour, perceived financial resources, social influence, and institution-based trust positively influence mobile commerce adoption by consumers in South Africa whereas, perceived risk has a negative effect on mobile commerce adoption. The qualitative data analysis identified reliable shipping, shopping convenience, data and device access, product variety and availability, as well as delivery to remote areas as some of the additional factors influencing m-commerce adoption in South Africa. This research has also contributed to theory and practice by identifying m-commerce marketplace categories that are in use in South Africa. Based on the outcomes of this research, South African consumers and businesses planning to adopt and those who have adopted m-commerce, will increase their knowledge and understanding of m-commerce use in South Africa and will subsequently make more informed decisions on m-commerce adoption.

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9 APPENDICES

Appendix A: Cover Letter



Dear [Sir/ madam / Name],

I am a master's degree student at the University of the Witwatersrand, Johannesburg. As part of my studies, I am researching on the factors that influence people's decisions to use B2C (business-to-consumer) mobile commerce (m-commerce) in South Africa. The barriers and enablers of B2C m-commerce adoption would be identified once these factors are understood. B2C mobile commerce, an extension of B2C electronic commerce, offers consumers the convenience of shopping online, from any geographical location, using wireless terminals such as smart phones, tablets, and a network or other internet connection.

You are cordially invited to take part in this research. Please keep in mind that, while your participation in the study is crucial to my research, it is entirely voluntary.

The confidentiality and anonymity of all research participants will be respected and maintained. You will not be expected to disclose any information that might be used to identify you or your organisation in your responses to the questionnaire; and during the research process, all of your information will be confidential. Third parties will not be given access to any of the research data, the final report and questionnaire will only be used for academic purposes, and the final report will only provide aggregate or combined results. Please bear in mind that you have the right to refuse to participate and to withdraw from the study at any moment.

Your completion of the survey will be interpreted as your consent to participate in the research. The survey will take about 10-15 minutes to complete and can be found here: https://forms.gle/oypXUNcGvNBvswu68

The study was authorised by the School of Economic and Business Sciences' (SBS) research ethics committee; the protocol number is CBUSE1909.

Your willingness to engage in this study is critical to my research and I can meet with you online at any time that is convenient for you. Please contact me by email at the following address if you have any questions or need any clarifications: 1470967@students.wits.ac.za.

Thank you and regards,

Nomusah Ndebele
Master of Commerce in Information Systems student,
SBS,
University of the Witwatersrand, Johannesburg

Appendix B: Research Instrument

The survey is divided into four sections and should take between 10 and 15 minutes to complete.

I agree with and understand the following:

1. My responses will only be used for educational and research purposes.
2. My privacy and confidentiality, as well as that of my company, shall be maintained. On the questionnaire or report, no company or personally identifiable information will be shared.
3. Participation in the survey is entirely voluntary on my part.
4. I have the right to opt out of the survey at any time.
5. The questionnaire is only open to those who live in South Africa and are at least 18 years old.

I confirm that I currently reside (or live) in South Africa.

Section A: Demographic Details

	Narrative on questionnaire	Options
Country	Do you live in South Africa?	Yes No
Province	In which province do you live?	Eastern Cape Free State Gauteng KwaZulu-Natal Limpopo Mpumalanga Northern Cape North West Western Cape
Gender	Gender	Female Male Prefer not to disclose Prefer to self-identify
Age	Age	Less than 18 18 to 24 25 to 30 31 to 35 36 to 40 41 to 50 51 to 60 Greater than 61
Income	Do you have a monthly income (i.e. from work or a business)?	Yes No Prefer not to say
Banked/Unbanked	Do you have a bank account in your name? [Please DO NOT give us your name or any of your banking details].	Yes No Prefer not to say
Highest educational Level	Please select your highest educational level	High school Certificate Diploma Vocational Certificate Bachelor's degree Honours degree Master's degree PhD Other Prefer not to say
Internet-enabled mobile device ownership	Do you have access to a mobile device (such as a cellphone, smartphone or tablet) with Internet access?	Yes No Not sure
Years using mobile devices	Please indicate the number of years that you have been using a mobile device.	Less than 1 year 1 to 2 years 3 to 4 years 5 to 6 years 7 to 8 years 9 to 10 years more than 10 years Not applicable

Section B: Use of B2C Mobile Commerce

Mobile commerce offers consumers the convenience of shopping online, from any geographical location, using wireless terminals such as smart phones, tablets, and a network or other internet connection.

Mobile commerce usage experience	Have you ever used mobile commerce (i.e. online shopping through your mobile device)?	Yes No Not sure
	If yes, how long have you been using mobile commerce	Less than 1 year 1 to 2 years 3 to 4 years 5 years or more Not applicable

Please specify which online retailer or website you use, or have used in the past, plan to use, or you are aware of.

		Used/Using	Planning to use within the next few months	Not planning to use but I am aware of	Not aware of
Category	**Example**				
Marketplace	Takealot mobile				
Clothing, shoes	Truworths, Zando, Superbalist				
Food	Checkers sixty60; Woolies Dash				
Homeware	Woolworths, @Home				

Health and fitness	Virgin Active, Viva Gym, Planet Fitness	☐	☐	☐	☐
Books, music, movies, and games (excluding downloads)	Musica, Loot mobile, buybooksonlinesa	☐	☐	☐	☐
Bags and accessories	Guess, Superbalist	☐	☐	☐	☐
Household appliances	Game Stores, Makro	☐	☐	☐	☐
Cosmetics and body care	Woolworths, The Body Shop	☐	☐	☐	☐
Furniture and household goods	Bradlows, Coricraft, Decofurn, HouseandHome	☐	☐	☐	☐
DIY, garden and pet stores	Do-it, DIYdepot, Gardenshop, Petheaven	☐	☐	☐	☐
Toys, and baby products	ToysRUs	☐	☐	☐	☐
Stationery and hobby supplies	PNA, Waltons	☐	☐	☐	☐
Hardware, paint, and glass	Builders, Cashbuild, Tjhoko Paint, Dulux	☐	☐	☐	☐
Pharmaceuticals and toiletries	Clicks, Dischem	☐	☐	☐	☐

Section C: Dependent Variable

Please indicate the extent to which you are conducting online shopping through your mobile device.

	Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree
1. I often use mobile online platforms to transact (purchase products and make payments).							
2. I mostly use my mobile apps to purchase products and make payments.							
3. I have installed multiple online shopping apps on my mobile device.							
4. My mobile device is my primary means to engage in online shopping.							

Section D: Independent Variables

Please indicate how much you agree with each of the following statements about B2C mobile commerce technology:

	Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree
Performance Expectancy UTAUT2-PE1 Mobile commerce (m-commerce) is a useful technology. UTAUT2-PE2 M-commerce helps me accomplish tasks faster. UTAUT2-PE3 M-commerce enhances my productivity. **Habit** UTAUT2-HA1 M-commerce has developed into a habit. UTAUT2-HA2 I am addicted to using m-commerce.							

UTAUT2-HA3 M-commerce has developed into an obsession or compulsion for me.							
Effort Expectancy							
UTAUT2-EE1 It is simple for me to learn how to use m-commerce.							
UTAUT2-EE2 My interaction with m-commerce is understandable and clear.							
UTAUT2-EE3 M-commerce is simple to use.							
UTAUT2-EE4 I can easily become skilled at using m-commerce.							
Price Value							
UTAUT2-PV1 M-commerce related costs are reasonable.							
UTAUT2-PV2 M-commerce offers good value-for-money.							
UTAUT2-PV3 Based on current pricing, m-commerce gives good value.							
Social Influence							
UTAUT2-SI1 Important people in my life think I should use mobile commerce.							
UTAUT2-SI2 Influential people in my life think I should use mobile commerce.							
UTAUT2-SI3 The people whose opinions I value inspire me to use mobile commerce.							
Hedonic Motivation							
UTAUT2-HM1 Using mobile commerce is fun.							
UTAUT2-HM2 I enjoy using mobile commerce.							
UTAUT2-HM3 M-commerce is very entertaining.							
Facilitating Conditions (Technical & Organisational Resources)							
UTAUT2-FC1 I am in possession of the resources required for me to use m-commerce.							
UTAUT2-FC2 I have the knowledge required to enable me to use mobile commerce.							
UTAUT2-FC3 The other technologies I utilise are compatible with m-commerce.							
UTAUT2-FC4 There are people who can help me whenever I face difficulties in using m-commerce.							
Perceived Risk							
UTAUT2-PR1 I am likely to worry a lot more about making purchases through m-commerce platforms than through other channels (e.g. face-to-face).							
UTAUT2-PR2 I have privacy and security concerns about purchasing goods through m-commerce.							
UTAUT2-PR3 I am likely to experience high uncertainty about financial loss if I purchase products through m-commerce.							
Perceived Behavioural Control (Knowledge Resources)							
TPB-PBC1 I can use m-commerce to purchase products whenever I want to.							
TPB-PBC2 I have the knowledge, resources, and the ability to use m-commerce.							
TPB-PBC3 I am capable of using m-commerce to purchase goods.							
TPB-PBC4 Using m-commerce would be difficult for me.							

Attitude Towards Behaviour TPB-ATB1 I like the thought of utilising m-commerce to buy products within the coming 6 months. TPB-ATB2 Purchasing goods through m-commerce within the coming six months is a good idea. TPB-ATB3 Purchasing goods through m-commerce within the coming six months is a positive idea. TPB-ATB4 Purchasing goods through m-commerce within the coming six months is a wise idea. **Perceived Financial Resources** PFR1 Financial resources (e.g. to buy data, products, and/or services) do not hinder me from using m-commerce. PFR2 I have the financial resources that are required for me to use m-commerce. **Trust** IBT1 I have confidence that m-commerce retailers will always perform their functions as expected whenever I interact with them. IBT2 I think doing business on m-commerce platforms is good because m-commerce retailers honour their agreements. IBT3 I believe that most m-commerce retailers have put in place sufficient policies (such as for returns) to safeguard my interests. IBT4 There are sufficient legal frameworks that safeguard customers shopping online.							

Section E: Additional Factors / Comments

In your opinion, apart from the factors listed above, are there any other factors that influence mobile commerce adoption by people residing in South Africa? Please comment below.

Please add any other comments (related to mobile commerce adoption) below:

Thank you for taking the time to complete the questionnaire. Please email me on 1470967@students.wits.ac.za if you have any queries or questions about the research.

Appendix C: Assumptions

Assumptions for the determinants/factors influencing mobile commerce adoption

Linear Relationship Assumption

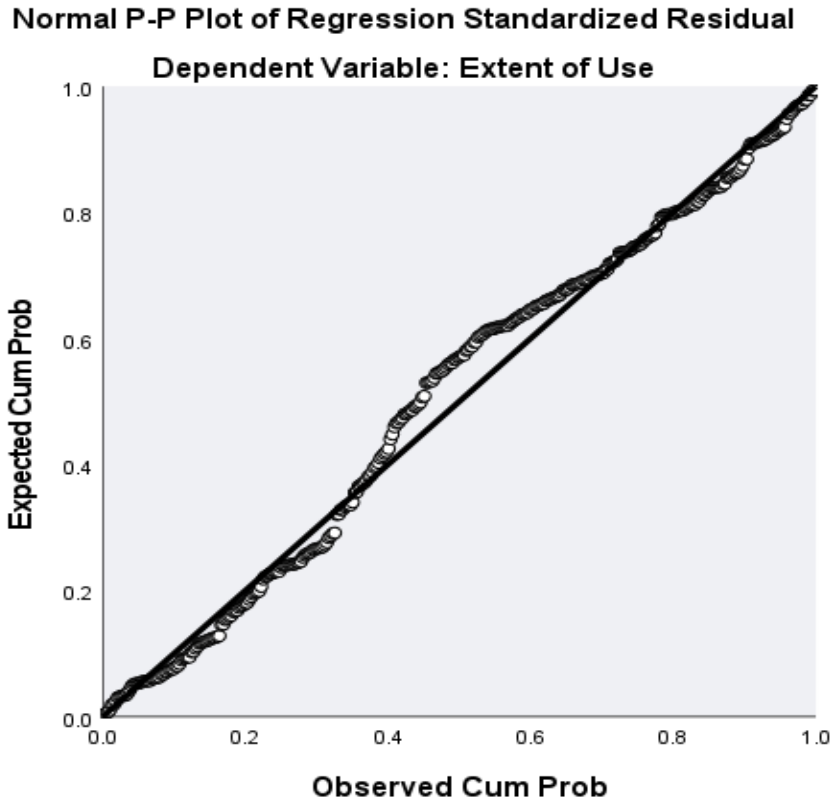


Figure 22: UTAUT2 factors - Linear relationship

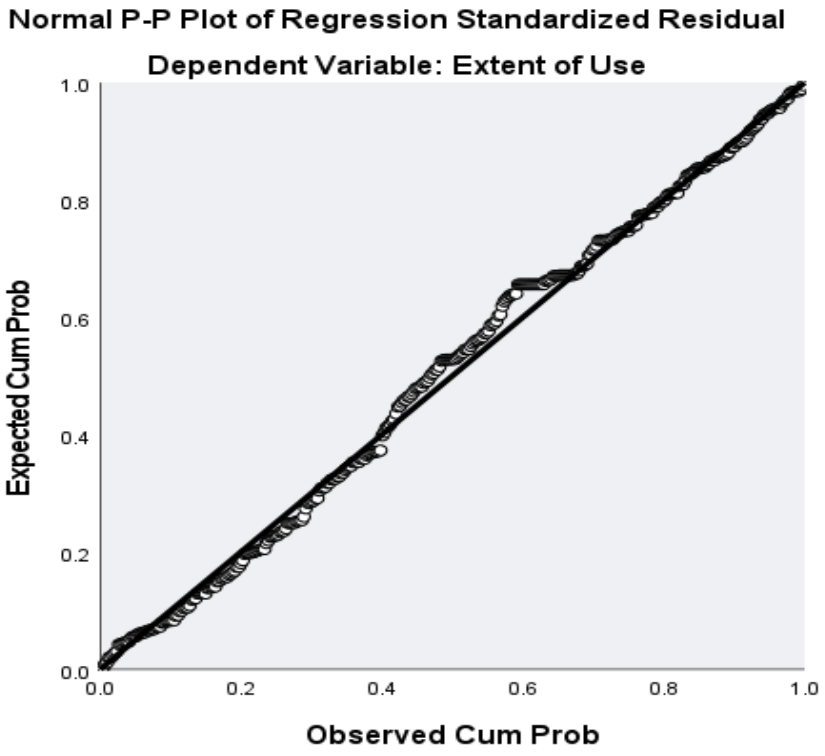


Figure 23: TPB factors - Linear relationship

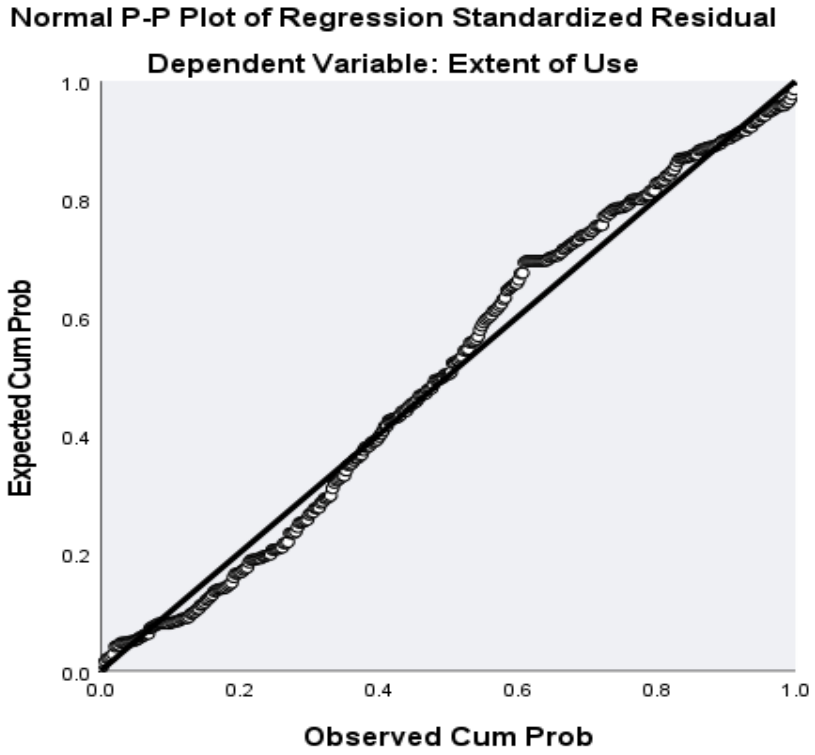


Figure 24: Additional factors (PFR, IBT) - Linear relationship

Assumption of Homoscedasticity

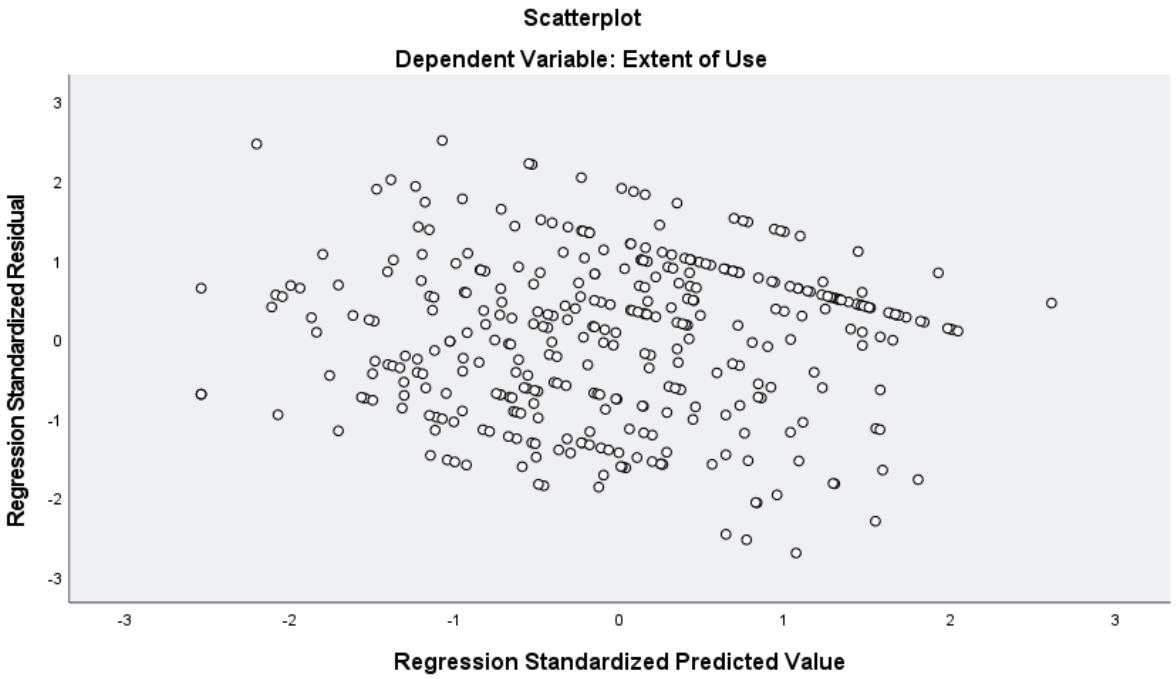


Figure 25: UTAUT2 factors - Homoscedasticity

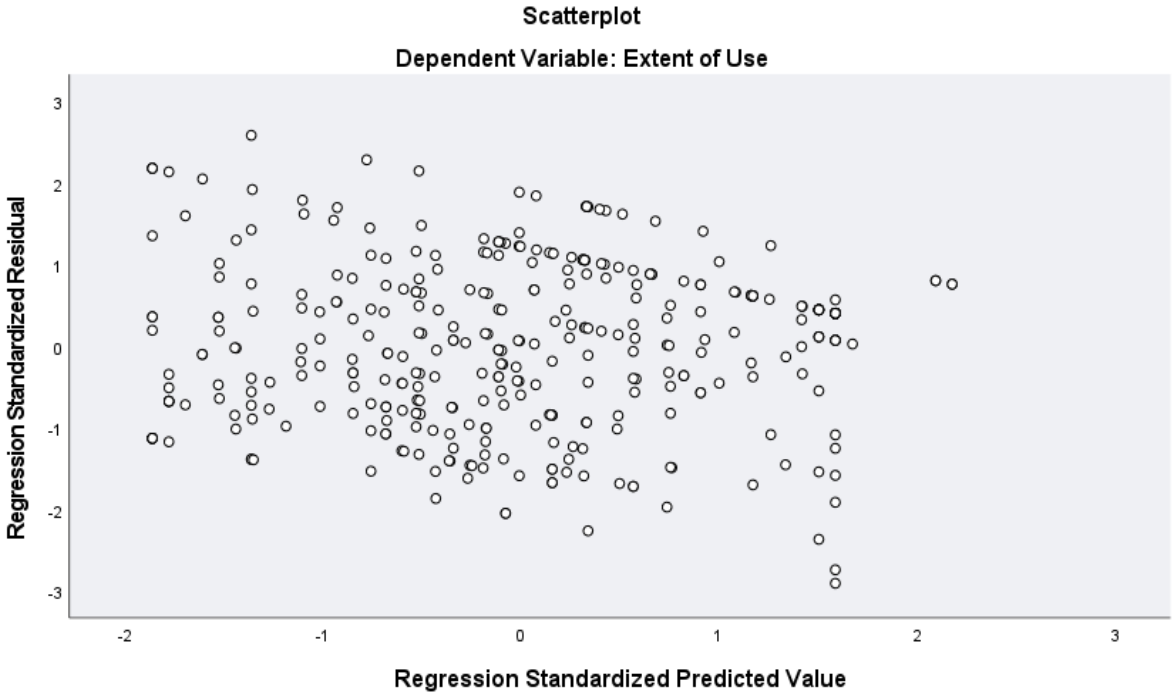


Figure 26: TPB factors - Homoscedasticity

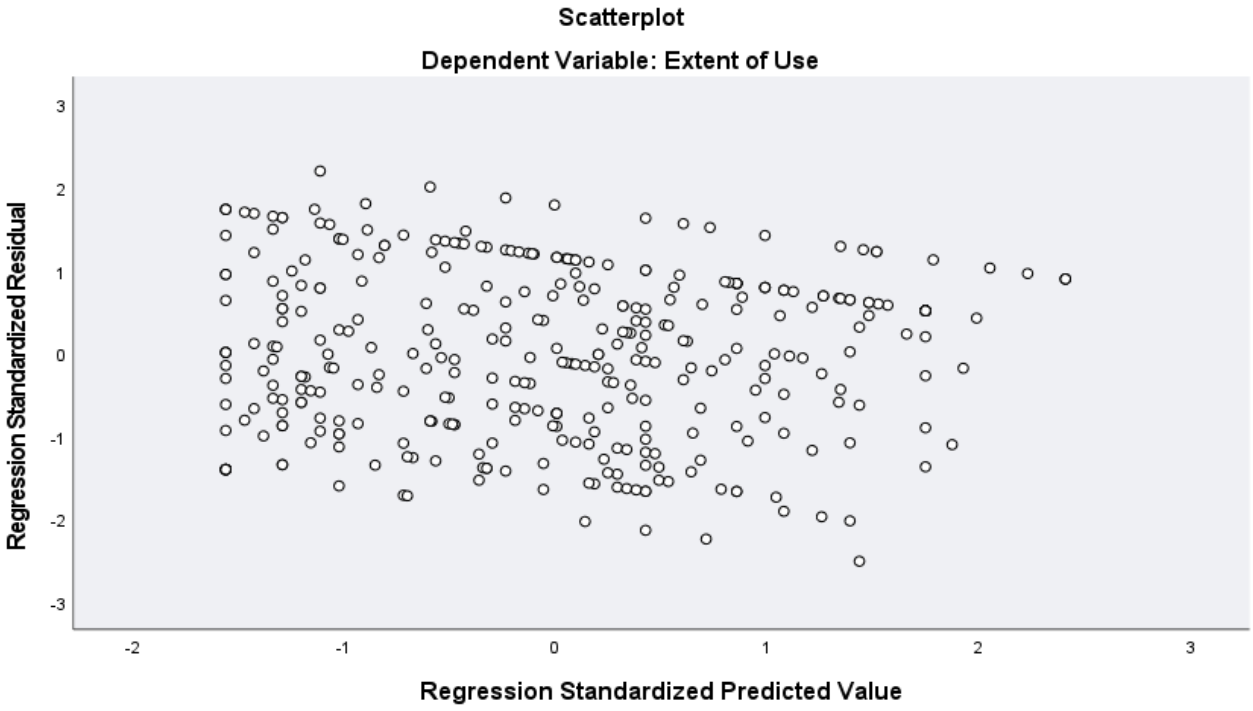


Figure 27: Additional factors (PFR, IBT) - Homoscedasticity

Residual Distribution Normality

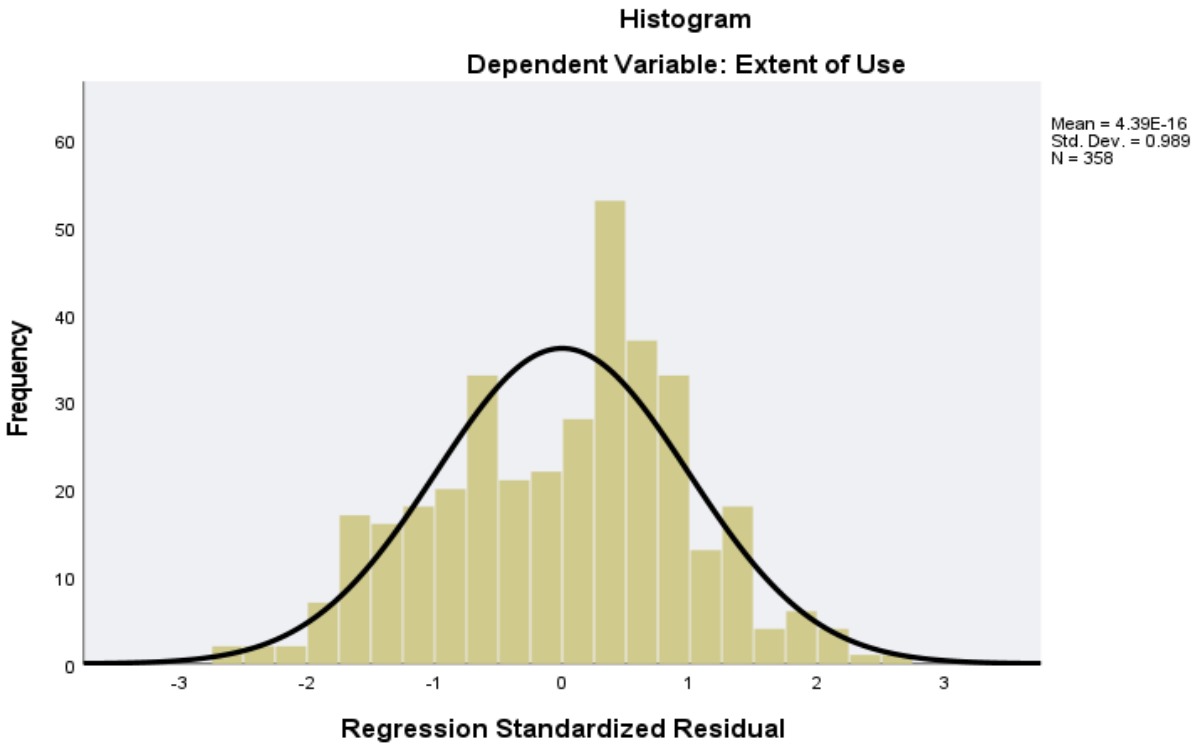


Figure 28: UTAUT2 factors - Residual distribution

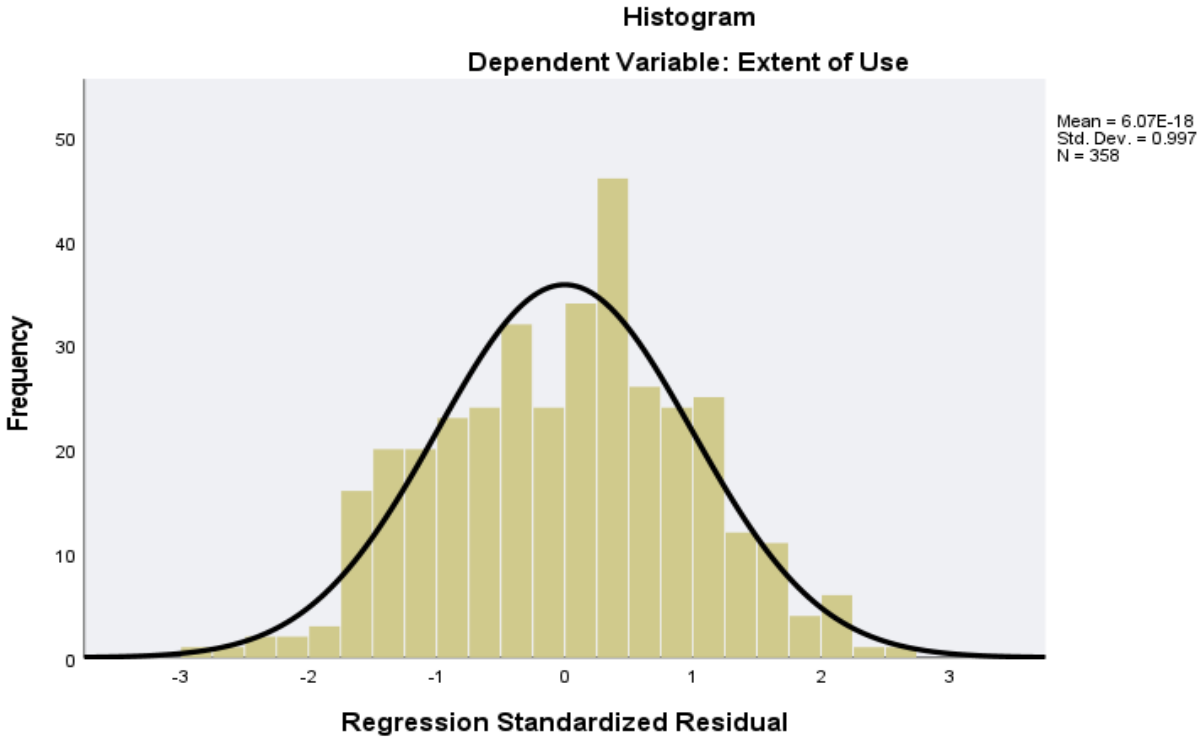


Figure 29: TPB factors - Residual distribution

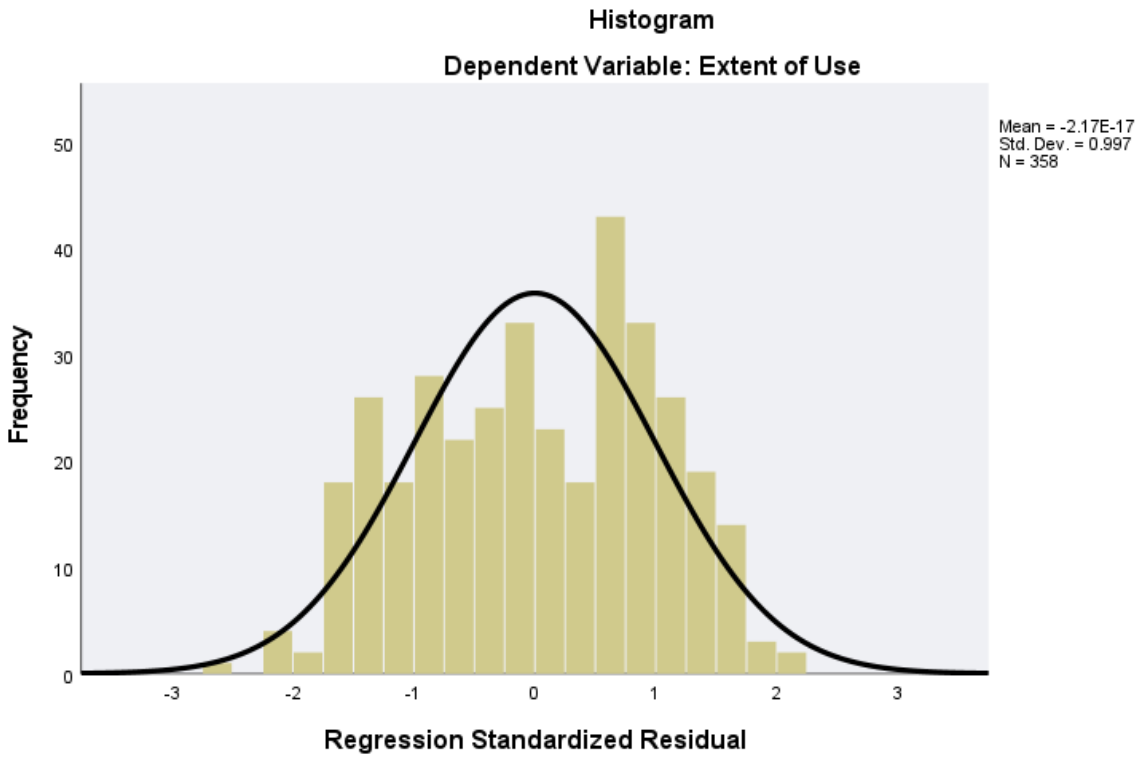


Figure 30: Additional factors (PFR, IBT) - Residual distribution

Appendix D: Ethics Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

SCHOOL OF BUSINESS SCIENCES ETHICS COMMITTEE
CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: CBUSE1909**
PROJECT TITLE	Determinants of mobile commerce adoption by consumers in South Africa: A UTAUT2 and TPB Perspective
INVESTIGATOR	Ndebele Nomusah
SCHOOL/DEPARTMENT OF INVESTIGATOR	School of Business Sciences
DATE CONSIDERED	17 August 2021
DECISION OF THE COMMITTEE	Approved unconditionally
RISK LEVEL	Minimal Risk
EXPIRY DATE	31 December 2023

ISSUE DATE OF CERTIFICATE 24 August 2021 **CHAIRPERSON** _____
(Neetu Ramsaroop)

cc: Supervisor: Dr Thembekile Mayayise