Understanding merchant adoption of m-payments in South Africa

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Thesis presented in partial fulfilment for the degree of M.Sc. Information Technology

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2-15-2016

Abstract

Despite the proliferation of mobile communication technology and smartphone adoption, a number of barriers, most notably trust and security, and the lack of critical mass, have slowed the uptake of mobile payments (m-payments). Little is understood about the factors driving the success of novel, intermediating technologies such as m-payments, particularly in emerging markets. In this thesis, we empirically investigated the factors that affect the success of m-payments in Cape Town, from the merchant's perspective. The research model is based on the Perceived Characteristics of Innovation (PCI) instrument developed by Moore and Benbasat (1991) which measures an individual's perception of adopting m-payments. Our results found the main adoption drivers to be relative advantage, ease of use, results demonstrability, convenience, speed of transaction, and service provider brand value. The key barriers to adoption include cost as well as trust and security. Based on our findings, implications for practice and future studies are suggested.

Acronyms	
3G	Third Generation
4G	Fourth Generation
B2C	Business to consumer
C2C	Consumer to consumer
E-commerce	Electronic commerce
ICT	Information and Communication Technology
IS	Information System
IT	Information Technology
M-commerce	Mobile commerce
M-payment	Mobile payment
MPS	Mobile payment service
NFC	Near Field Communication
PCI	Perceived Characteristics of Innovation
POS	Point of Sale
QR	Query Response
SMS	Short Message Service
TAM	Technology Acceptance Model
URL	Uniform Resource Locator

Note: We define the term *m-payments* in '1.1 Background and Motivation,' and use it throughout the thesis to refer to 'mobile payments', 'mobile payment services' (MPS), or 'mobile payment systems.' Our questionnaire used the term MPS to refer to m-payments (see Appendix 2).

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1. Introduction

1.1. Background and motivation

The proliferation of mobile-friendly technology services demonstrates how strong the connection between technology and commerce has become. By 2016, it is estimated that the m-commerce market will reach US$800 billion worldwide (Ericsson, 2014). This is attributable to two main factors: the rapid increase in smartphone adoption; and consumers migrating to mobile broadband technology as 3G and 4G network availability and affordability increase (GSMA, 2015a). Analysts predict that, by 2015, 5.4 billion smartphones will be in circulation worldwide (Paymenteye, 2014). Moreover, the use of the smartphone as a multi-functional, transactional device has created a universal marketplace for consumers to transact anywhere, anytime (Van der Heijden, 2002). The 2015 Mobile Economy report estimates that, by 2020, the mobile industry will contribute US$3.9 trillion to the world's economy, comprising 4.2% of the projected global gross domestic product (GSMA, 2015b).

One phenomenon driving the new age of connected commerce is m-payments. M-payments are commonly defined as an alternative method of payment for goods, services and bills, using a mobile device such as a smartphone or tablet to facilitate the initiation, authorization and realisation of the payment process through wireless and other communication technology (Au and Kauffman, 2008; Mohammadi and Jahanshahi, 2008; Dahlberg et al., 2007; Pousttchi, 2003). This definition incorporates the two essential elements of m-payments: the use of a mobile device to facilitate the payment transaction, and the transfer of monetary value between two or more actors during the transaction (Au and Kauffman, 2008; Mohammadi and Jahanshahi, 2008; Dahlberg et al., 2007; Pousttchi, 2003).

Mohammadi and Jahanshahi (2008) identify three different scenarios[1] - differentiated with regard to the Point of Sale (POS) - where m-payment transactions take place. They are: m-commerce, which include applications and services on a mobile device; e-commerce, which include B2C and C2C transactions via the Internet; and stationary merchant transactions, which include brick and mortar transactions between a consumer and a merchant

[1] Our research excludes money transfers between individuals, known as mobile money transfers (Mohammadi and Jahanshahi, 2008).

(Mohammadi and Jahanshahi, 2008). The widespread appeal of m-payments is derived from its ability to deliver value in many domains (Lai and Chuah, 2010). Consequently, m-payments are applicable across a variety of retail contexts, including m-commerce, vending, electronic ticketing, and purchases for items in-store or at restaurants (Lai and Chuah, 2010; Mohammadi and Jahanshahi, 2008).

M-payments have become a valuable application in the exchange relationship between buyers and sellers. While existing adoption research often implicitly assumes a single adopting group - the consumer - intermediating technologies such as m-payments are applicable to multiple stakeholders, each of whom has a different adoption strategy (Plouffe et al., 2001b). Plouffe et al. (2001b: 66) define intermediating technologies as "technologies that use electronic data storage, transfer and communications to add value to the exchange relationship between at least two groups," most commonly the consumer and merchant. This is known as multigroup adoption since the success of the technology is reliant on the acceptance by more than just the consumer. This distinction is important because intermediating technologies fundamentally change the dynamic of the exchange process by engaging new stakeholders and developing new channels of distribution. Each stakeholder in the exchange therefore has a unique relationship with the adoption of m-payments since they have different requirements and applications in mind for the technology, including the fact that different stakeholders value different aspects of the technology (Van der Heijden, 2002; Plouffe et al., 2001b).

Pousttchi (2003) argues that the commercial success (widespread adoption) of an intermediating technology requires a comprehensive understanding of consumer behaviour. For consumers, the perceived value of m-payments is based on the utility they gain from using the technology (Plouffe et al., 2001b). Bertrand and Ahmad (2014), for example, note that consumers derive utility from m-payments because of the specific advantages it provides over debit or credit cards. For merchants, however, the perceived value of m-payments is primarily determined by the price-performance ratio (relative advantage), and whether the innovation enhances profit potential in the business (Plouffe et al., 2001b). Profit potential relates to both revenue-generating and cost-saving activities. The potential value of m-payments to merchants is then: the improvement in operational efficiency; the increase in sales; the decrease in costs; a solution to facilitate ubiquitous micropayments; and an alternative payment solution to cash- and card-based payments (Bertrand and Ahmad, 2014;

Lai and Chuah, 2010; Au and Kauffman, 2008; Ondrus and Pigneur, 2006). Moreover, merchants have a unique and evolving role in the success m-payments since they act as both users of the payment applications offered by the service providers, and serve as providers to consumers. The role of the merchant is crucial for securing multiple points of contact with multiple stakeholders, and managing supply and demand dynamics (Guo and Harry, 2014; Dahlberg et al., 2007).

Although the global adoption of m-payments was slow prior to 2015, many researchers and analysts believe that the uptake of m-payments is imminent (Bertrand and Ahmad, 2014; Kim et al., 2010; Au and Kauffman, 2008; Dahlberg et al., 2007). Paymenteye (2014) reports that the increased adoption of smartphones could result in $1 trillion of m-payments worldwide by 2015. The report estimates that m-payment subscribers will increase approximately five times from 206 million users worldwide in 2010 to 1.05 billion users in 2015 (Paymenteye, 2014). Deloitte (2015) reports that in-store POS m-payments are the fastest growing segment in m-payments. In this segment, transaction values are expected to grow over 30 times from 2014 levels to reach $118 billion in 2018 (Deloitte University Press, 2015). Peter Miller, head of retail at wiGroup, says technologies like m-payments can play a leading role in the success of South Africa's small business sector (wiGroup, 2015). He says the ability to transact with a mobile device will transform local businesses and make them more competitive against large companies (wiGroup, 2015). The optimism underlying m-payments extends to other domains at the intersection of commerce and technology (Bill and Melinda Gates Foundation, 2015). The 2015 Annual Gates Letter by Bill and Melinda Gates highlights the impact that digital banking will have in transforming the lives of the poor. The Letter states that, by 2030, 2 billion more people will have access to a mobile bank account (Bill and Melinda Gates Foundation, 2015).

Despite the proliferation of mobile communication technology and an optimistic sentiment favouring m-payments adoption and changing spending habits, a number of barriers, most notably trust and security, and the lack of critical mass, have slowed the uptake of m-payments (Ahmad et al., 2014; Mallat and Tuunainen, 2008; Mohammadi and Jahanshahi, 2008; Dahlberg et al., 2007). Since the early 2000s, numerous m-payment services, including electronic payments and Internet banking services, have been unsuccessfully introduced all over the world (Mallat and Tuunainen, 2008; Dahlberg et al., 2007). Notable examples include the Simpay initiative and Paybox launched in several European countries. These

payment initiatives were neither as widespread nor as rapidly adopted as expected (Mallat and Tuunainen, 2008). Globally, the uptake of m-payments in 2015 was slower than anticipated. Gartner has lowered its global growth forecast of m-payments to account for only 2% of total global transaction value in 2013 and 5% of the global transaction value in 2017 (Shen, 2013). Bertrand and Ahmad (2014) note two significant observations: first, in-store m-payments in 2013 were still relatively small, with only 7% of consumers using their phones for micropayments for items such as coffee, books and other physical goods; and, second, consumers still view m-payments as an extension of their existing credit and debit cards, rather than as a direct substitute for either the card- or cash-based payments. The authors further stated that m-payments will only become mainstream in the next three years (Bertrand and Ahmad, 2014). Mallat and Tuunainen (2005) report that merchants agree that the benefits of m-payments are mostly impending and are only expected to be realised in the future.

1.2. Research goal

The mobile phenomenon has revolutionised commerce in the 21st century. Novel, intermediating technologies such as m-payments fill a distinct yet vital function in the payment ecosystem. Despite this, relatively little is understood about the factors driving its success, particularly in emerging markets. This thesis has the following objective: to investigate the adoption factors of m-payments from the merchant's perspective, and provide new insight into m-payments in the South African context.

1.3. Research question

What are the factors driving the success of merchant adoption of m-payments in Cape Town?

1.4. Approach

Our study used the Perceived Characteristics of Innovation (PCI) instrument developed by Moore and Benbasat (1991) to empirically investigate merchant adoption of m-payments in a retail context. The instrument is applicable to study adoption behaviour since it captures rich, individual information from key antecedent constructs across many different contexts (Plouffe et al., 2001b). We gathered both quantitative and qualitative data through an online questionnaire carried out in June 2015 in the Greater Cape Town area. The key distinction in

our research is that the measurement items are intended to measure how merchants perceive IT innovation, and how they adopt new technology in their businesses.

1.5. Outline of thesis

The remainder of the thesis is organised as follows. In the next section we present the theoretical basis in technology acceptance and the literature review. This is followed by a description of the research methods. We then present the analysis with a detailed discussion of our findings, and the limitations of our study. Finally, we conclude the thesis. Based on our findings, implications for practice and future studies are suggested.

2. Literature Review

The literature review presents findings from existing research and reports on m-payments. We begin with a general examination of technology acceptance. We then evaluate the literature based on the adoption and implementation of m-payments within an organisation. Finally, we conclude the literature review with a synthesis of the drivers and barriers to adoption. A summary of the factors is presented in Table 2 and Table 3.

2.1. Technology Acceptance

Prior research on innovation and technological diffusion argues that in order to maximise the benefits from information technology (IT) investments, organisations must understand and manage the implementation process (Cooper and Zmud, 1990; Kwon and Zmud, 1987). Cooper and Zmud (1990) propose a staged model of IT implementation activities. The model's first stage - the initiation of the IT implementation - is driven by pressure on the organisation to evolve. The organisation attempts to match an organisational opportunity or problem with an IT solution. The second stage in the model is the adoption of the IT solution, whereby the organisation invests the resources needed to pursue the implementation. The adoption stage is followed by the adaptation, acceptance, routinisation, and infusion of the IT application. Our research examines the early phases of the m-payment diffusion process, namely the initiation and adoption, and evaluates the factors affecting the adoption of m-payments in organisations. Empirical research supports the application of the diffusion of innovation theory across different technologies, including the adoption of financial and mobile technologies, and m-commerce (Mohammadi and Jahanshahi, 2008; Mallat and Tuunainen, 2005). According to the diffusion of innovation theory, the overall value proposition for each adopting group is dependent on the specific nature of the innovation and the characteristics of the adopting group (Rogers, 1983).

Within the information systems (IS) field, models predicting technology adoption have primarily used attitudinal constructs taken from psychological theory. The Technology Acceptance Model (TAM), for example, has become a leading model to explain and predict technological adoption behaviour (intentions, actions, beliefs and attitudes) at the individual level (Davis et al., 1989). TAM is an extension of Fishbein and Ajzen's (1975) Theory of Reasoned Action and states that adoption behaviour of IS is determined by the *intention* of

the user to use a particular system. TAM and its variants are applicable to a wide range of technologies, user groups and organisations that favour the model's validity and reliability (Yang et al., 2012; Schierz et al., 2010; Kim, 2009; Plouffe et al., 2001b; Venkatesh & Davis, 2000; Davis et al., 1989). Furthermore, TAM is useful in that it provides a parsimonious framework with which to measure the effect of system and individual variables, such as subjective norm, perceived risks on the system or actual usage (Kim et al., 2009).

Broadening the range of innovation characteristics, the Perceived Characteristics of Innovation (PCI) instrument measures an individual's perceptions of adopting an IT innovation. The PCI instrument is applicable to study m-payments since adoption behaviour requires a robust instrument that captures rich, individual information from many constructs across many different contexts (Plouffe et al., 2001b). These constructs explain a high proportion of the variance in the context of real-world adoption decisions (Plouffe et al., 2001a). Moreover, the PCI instrument is intended to study the initial adoption of IT and the diffusion of technology within an organisation, where diffusion of innovation refers to the cumulative decision of individuals to adopt technology (Moore and Benbasat, 1991). Hence, it is the perception of using the innovation that is key to whether the innovation diffuses (Moore and Benbasat, 1991).

The perceptions of adoption are based on five key characteristics of innovation that determine the rate of diffusion of innovation (Rogers, 1983). They are: relative advantage; compatibility; complexity; observability; and triability (Rogers, 1983). The PCI instrument incorporates four of these constructs: relative advantage; compatibility; complexity (renamed, "ease of use"); and triability. The instrument includes four additional constructs: visibility, image, result demonstrability, and voluntariness. Moore and Benbasat (1991) support the inclusion of the image construct in the PCI model. Rogers argues that the need to gain social status is one of the most important motivations to adopt an innovation (Rogers, 1983: 215). Moore and Benbasat (1991) identified visibility and result demonstrability to replace Rogers' original construct, observability. Additionally, our research model includes trust and security as a construct based on findings in the literature and the significance of this variable in an emerging market context (Guo and harry, 2014; Mohammadi and Jahanshahi, 2008; Mallat and Tuunainen, 2008, 2005; Van der Heijden., 2002). Table 1 present a summary of the PCI constructs and their definitions (Moore and Benbasat, 1991).

Construct	Definition
Relative advantage	the degree to which an innovation is perceived as being better than its precursor
Compatibility	the degree to which an innovation is perceived as being consistent with the existing values, need, and past experiences of potential adopters
Triability	the extent to which a potential adopter believes that the innovation can be adequately tried prior to the adoption decision
Ease of use	the degree to which an innovation is perceived as being easy to use.
Image	the degree to which use of an innovation is perceived to enhance one's image or status in one's social system
Visibility	the degree to which an innovation is visible during its diffusion through a user community
Result demonstrability	the degree to which the benefits and utility of an innovation are readily apparent to the potential adopter

Table 1: Perceived Characteristics of Innovation (PCI) construct definitions

It is not always possible to measure actual adoption behaviour. For merchants that have not yet adopted m-payments, measures that make up overall attitude towards the innovation are thought to be the best approximation of actual behaviour. We thus focus on *intention* to adopt as the key dependent construct because it represents a suitable proxy for actual adoption behaviour (Plouffe et al., 2001b).

Diffusion of innovation theory dictates that some grouping of these antecedents should frame the technology adoption decision. For m-payments, different groupings of these antecedents will drive the value for merchants and consumers (Rogers, 1983). Finally, the PCI instrument is one model used to investigate the success factors of m-payments. We also use qualitative content analysis to draw greater insight from the open-ended questions in our questionnaire. This is presented in Section 3.4.

2.2. M-payment adoption

South Africa's m-payment industry is still in its infancy. The MasterCard Mobile Payments Readiness Index, a global survey measuring the readiness of 34 m-payment markets, ranked

South Africa 26th with an index score of 29.1, below the index average of 33.2 (MasterCard, 2012). The scores are calculated from data comprised of over 50 inputs, and shows that South Africa's weak position is primarily driven by a lack of partnerships between banks and telecommunication companies, as well as lagging infrastructure and a poor overall environment scores. Singapore, the survey's top-ranked country, by contrast, has an overall score of 45.6, which is indicative of an efficient regulatory system and mobile phone infrastructure, and robust financial services sector. Interestingly, no country progressed to the inflection score of 60, defined as the point where the mobile device consists of a considerable share of the payment mix (MasterCard, 2012).

The Small Merchants and Mobile Payments 2013 Survey measuring technology awareness and adoption found that 47% of respondents had no plan to implement mobile-based POS payments in the foreseeable future, while 22% were unsure and 20% were somewhat interested (ControlScan, 2013). The study also found that the percentage of small merchants using m-payments increased from 10% to 17%, with no corresponding decrease in the use of traditional POS payment solutions. This supports the idea that merchants view m-payments as a complementary payment method and not a substitute for existing methods. Interestingly, nearly half of merchants who *only* use an m-payment solution have less than ten employees, suggesting m-payments are mainly used by small businesses (ControlScan, 2013). Accenture's research shows 60% of South African mobile phone users are planning to adopt m-payments, with this number increasing to 66% among users aged 18 to 29 (Accenture, 2014). An estimated 65% of users aged 18 to 29 also noted they would be likely to use their phones to make payments if the phone generated instant discount vouchers (Accenture, 2014). Bertrand and Ahmad (2014) surveyed 25 000 consumers in the US and Western European markets. The study provides three key findings. First, more than 20% of consumers in these regions already shop on their mobile phones; second, in-store purchases are still small, but growing exponentially; and, third, half of consumers already know about m-payments. In France, the study found that 80% of consumers are aware of m-payments; it is the highest country segment in terms of awareness. Moreover, the study notes that the number of consumers using m-payments between 2012 and 2013 will nearly double. The study also found that m-payment users tend to be younger and more affluent than the average consumer (Bertrand and Ahmad, 2014). These users spend more than twice as much through digital channels. Mallat and Tuunainen (2005) conducted two concurrent empirical surveys on merchant adoption of m-payments in Finland. Over half of the interviewees and 43% of

the survey respondents reported that they plan to offer m-payments for customers in the future. Further, m-payments were perceived as an additional payment service, complementing existing methods rather than a substitute method that replaces existing payment methods. These findings suggest that while m-payments hold a lot of potential, particularly in certain businesses, the majority of merchants do not perceive m-payments as a mature technology ready for adoption (Mallat and Tuunainen, 2005). Mallat and Tuunainen (2008) identify the prerequisites, drivers and barriers to merchant adoption of m-payments. The four prerequisites are: wide penetration of mobile phones, a viable m-payment infrastructure, knowledge of m-payments, and the need for an alternate payment system (Mallat and Tuunainen, 2008). Finally, Ondrus and Pigneur (2006) conducted a multi-stakeholder and multi-criteria market analysis of m-payments. The study highlights the hesitation of the Swiss market to agree on a technology and standard for m-payment adoption. The findings also conclude that the contactless card was most suitable for merchants. Overall, existing literature on m-payments adoption provides mixed results regarding the success of the technology.

2.3. Factors affecting adoption

The benefits of m-payments are important because they form the foundation of the merchant's decision to adopt and implement the technology. Bertrand and Ahmad (2014) argue that mass adoption of m-payments will only be triggered when the benefits – both perceived and real - become clear to consumers and merchants. The Small Merchants and Mobile Payments 2013 Survey notes that because m-payments are still relatively new, the benefits largely pertain to the perceived potential until the service is adopted widely and the benefits accrue to everyone (ControlScan, 2013).

A study by Mohammadi and Jahanshahi (2008) established a framework for evaluating the barriers and drivers of customer and merchant adoption of m-payments. The authors defined four categories of barriers to merchant adoption: relative advantage, compatibility, complexity and costs. Network externalities and security and trustworthiness of the m-payments were also considered as relevant factors in m-payment adoption. Lai and Chuah (2010) developed a framework specific to retailing in Hong Kong to understand how the multi-factor, external forces and internal capabilities can influence merchant adoption decisions. The study defined four forces shaping m-payments adoption in retailing: provider

forces (supply-side push), consumer attitude (demand-side pull), organizational enablers (internal), and market drivers (external). The authors conclude that m-payments are subject to multiple influences, including market forces, organisational enablers, and the notion that both willingness to adopt and the capability to implement are likely to influence merchant adoption of m-payments. The study found the cost of switching and implementation efforts to be the key inhibiting factors influencing managerial attitude towards m-payment use. This shows that merchants are especially concerned about the implementation of m-payments. The study also suggests that merchants must enhance their appeal to younger consumers and micropayment transactions. Finally, Plouffe et al. (2001b) conducted a multi-stakeholder empirical study of m-payments adoption. The authors argue that merchants place more value on constructs that have the potential to enhance profit potential, noting that many constructs drive this result (Plouffe et al., 2001b).

2.3.1. Drivers for the adoption of m-payments

Section 2.3.1 presents the key drivers of m-payment adoption. First, we present the main factors in Table 2. Next, we present a summary of the literature on the drivers.

Main factors	Related factors	Key studies
Relative advantage	Convenience and efficiency of transactions, Impulse purchases, Enhanced customer service, Availability of products and services, Ability to offer new services, New customers, Speed, Results demonstrability, Visibility, Mobility, Micropayments, Ubiquity	Mohammadi and Jahanshahi (2008); Mallat and Tuunainen (2008, 2005); Linck et al. (2006); Ondrus and Pigneur (2006); Van der Heijden (2002); Plouffe et al. (2001b); Moore and Benbasat (1991)
Image	None	Mallat and Tuunainen (2008, 2005)
Complexity (ease of use)	Flexibility	Guo and Harry (2014); Mohammadi and Jahanshahi (2008); Mallat and Tuunainen

Main factors	Related factors	Key studies
		(2008, 2005); Ondrus and Pigneur (2006); Van der Heijden (2002); Plouffe et al. (2001b)
Competition	Coercive pressure, Imitation effect, Normative pressure, contingency forces	Guo and Harry (2014); Lai and Chuah (2010)
Collaboration	Educate, Advertise, Promote standards	Guo and Harry (2014)

Table 2: Key drivers of m-payment adoption

2.3.1.1. Relative advantage

Several existing studies (Plouffe et al., 2001a) identify relative advantage as the key driver of merchant adoption of m-payments. A research report by Plouffe et al. (2001a) on merchant adoption of a smart card-based payment system comparing the TAM and PCI instruments found relative advantage to be significantly linked to adoption intentions in both models. Plouffe et al. (2001a) found relative advantage to be the antecedent that accounted for the most (30%) explanatory power between participating merchants in their model. Similarly, relative advantage was the only significant antecedent among nonparticipating merchants. This accounted for 32% of the explanatory power in the model. Interestingly, this means that late merchant adopters only consider the price-performance financial benefit when making the adoption decision. Likewise, Mallat and Tuunainen (2005) and Lai and Chuah (2010) identify relative advantage as a key driver of m-payments. Mallat and Tuunainen (2005) argue that merchants and consumers have high expectations regarding the benefits of m-payments, in particular the utility of the m-payment technology, its profit potential, and the improvement in the purchasing experience.

M-payments offer distinct advantages over cash-based and legacy electronic payment systems such as magnetic tape credit and debit cards. First, using a mobile device to transact represents a novel way for both consumers and merchants to engage in the payment transaction (Lai and Chuah, 2010). Bertrand and Ahmad (2014) states that about a quarter of consumers say the novelty alone is a strong enough reason for them to try paying with a

mobile phone. Second, m-payments provide a much-needed solution to facilitate electronic micropayments. The need for electronic micropayments has arisen in several applications, including remote and proximity transactions (Linck et al., 2006). Third, m-payments facilitate quick mobile commercial transactions that take place in real-time (Lai and Chuah, 2010; Kim et al., 2009). Polasik et al. (2012) argue that m-payments are as fast as cash transactions in terms of time efficiency, while both are faster than traditional card-based payments. The authors highlight the importance of a fast checkout, stating that the time servicing a payment be regarded as part of the merchant cost (Polasik et al., 2012).

Next, m-payments are advantageous because they are ubiquitous. The mobile device has become an indispensable tool for consumers because it can be used independent of time and location (Paymenteye, 2014; ControlScan, 2013). Jarvenpaa and Lang (2005) report that consumers have become used to keeping their mobile devices within arm's reach, and actually experience discomfort when turning them off. Frolic and Chen (2004) cite ubiquity as the most important driver of m-payments. The study notes that the ubiquity of m-payments allows merchants to sell their products and services at any time and from most locations. Similarly, Clarke (2001) states that ubiquity is the fundamental difference between mobile commerce and its predecessor, stationary e-commerce. This is due to the notion that the wider the reach of the telecommunication network, the greater the value of m-payments. A widespread mobile channel gives more merchants and consumers access to the network, creating a larger base of stakeholders that can transact remotely. Mallat and Tuunainen (2008) note that ubiquity enhances the value of m-payments, as transactions can take place in the context of mobile commerce, remote commerce, and POS transactions. Merchants are able to create more contact points with consumers via the mobile channel, and can even target them individually. The specific benefits of ubiquity are: the generation of additional sales because of the increase in the volume of transactions; new revenue streams; the formation of new relationships with prospective customers; an increase in impulse purchases; the increase in the availability of products and services; and the introduction of new types of services and customers (Lai and Chuah, 2010; Mallat and Tuunainen, 2008, 2005).

Impulse purchases are defined as the persistent urge to buy something immediately (Dennis Rook, 1987). Impulse purchases drive adoption insofar as m-payments allow merchants and consumers to transact immediately, when the desire arises. For customers, impulse purchases are useful in several scenarios: when one has to make an unexpected payment due to time

pressure; to avoid queuing; and when one is short on cash or forgets his or her wallet at home (Mohammadi and Jahanshahi, 2008). 55% of survey respondents in a study by Mallat and Tuunainen (2005) report that an increase in perceived impulse purchases is a specific advantage of m-payments over former payment systems. In a similar study by Mallat and Tuunainen (2008), merchants identified the potential to increase impulse purchases as a specific benefit of m-payments.

Finally, convenience is a key factor underpinning relative advantage. Several studies highlight convenience as a key driver of adoption for both merchants and consumers (Bertrand and Ahmad, 2014; Paymenteye, 2014; ControlScan, 2013). 73% of respondents in the Small Merchants and Mobile Payments 2013 Survey cite ubiquity and convenience as the key driver of m-payments adoption (ControlScan, 2013). Bertrand and Ahmad (2014) report that about two-thirds of consumers want a more convenient payment option.

2.3.1.2. Image

Mallat and Tuunainen (2008, 2005) found that m-payments had a positive effect on company image. The 2005 study found that two thirds of respondents considered companies offering mobile payments as innovative. The 2008 study, however, found that the effects of image were somewhat contradictory. Plouffe et al. (2001b) also found image to be a significant antecedent for participating merchants in their model. The authors stated that image explained 17% of the variance in intention to adopt in the group of participating merchants.

2.3.1.3. Complexity (ease of use)

Siau and Shen (2003) argue that system design has in the past placed limitations on the use of m-payments. These limitations included small displays and keyboards, poor battery life, limited processing power and memory, and stability and reliability issues. Mallat and Tuunainen (2005) identify the complexity of m-payment technology as a key barrier to adoption. The study notes that respondents found previous payment solutions to be "complex and difficult to use," citing too many steps in the payment process. Similarly, Mohammadi and Jahanshahi (2008) found that existing solutions are still perceived as too complex. Plouffe et al. (2001b) found ease of use to be an insignificant antecedent between both nonparticipating and participating merchants in their model.

2.3.1.4. Visibility

Plouffe et al. (2001b) found visibility to be a significant antecedent for nonparticipating and participating merchants in their model. The construct accounted for 13% of the explanatory power in the model.

2.3.1.5. Results Demonstrability

Plouffe et al. (2001b) found results demonstrability to be an insignificant antecedent for nonparticipating and participating merchants in their model. Results demonstrability is included in our research model because it is deemed relevant in the context of a retail environment.

2.3.1.6. Triability

Plouffe et al. (2001b) found triability to be an insignificant antecedent between both nonparticipating and participating merchants in their model. Triability is not included in our research model.

2.3.1.7. Engagement

M-payment technology allows merchants to engage with the consumer beyond the transaction by taking advantage of loyalty and couponing opportunities. Ahmad et al. (2014) found that consumers want additional value from m-payment applications through rewards programmes and personalised marketing offers. 13% of consumers are reportedly attracted by financial rewards, with many prepared to trade their personal data in exchange for these benefits (Ahmad et al., 2014). For merchants, m-payments present an opportunity to engage those consumers in a value-added experience. (Guo and Harry, 2014) argue that businesses are incentivised to invest in a mobile strategy that promotes greater engagement and a unified shopping experience in order to gain an advantage over traditional retailers. Merchants will likely use this to target and acquire new customers with personalised offers based on data collected from the payment applications (Bertrand and Ahmad, 2014). Moreover, Guo and Harry (2014) note that merchants can benefit from greater customer loyalty. In South Africa,

FlickPay, a POS-integrated closed-loop payments application, has partnered with the local coffee franchise Vida e Caffe, to encourage greater engagement through in-store benefits such as discounts (Le Cordeur, 2014).

2.3.2. Barriers to the adoption of m-payments

Section 2.3.2 presents the key barriers to m-payment adoption. First, we present the main factors in Table 3. Next, we present a summary of the literature on the barriers.

Main factors	Related Factors	Key studies
Universality	Transferability, divisibility, Standardisation, Ubiquity	Guo and Harry (2014); Mohammadi and Jahanshahi (2008); Mallat and Tuunainen (2008, 2005); Ondrus and Pigneur (2006); Van der Heijden (2002)
Critical mass	None	Lai and Chuah (2010); Mohammadi and Jahanshahi (2008); Mallat and Tuunainen (2008, 2005); Teo et al. (2005); Van der Heijden (2002); Plouffe et al. (2001b)
Trust and security	Reliability of technical solution, Secure transaction, Regulatory framework, Privacy, Anonymity, Consumer Protection, Trustworthiness	Guo and Harry (2014); Mohammadi and Jahanshahi (2008); Mallat and Tuunainen (2008, 2005); Ondrus and Pigneur (2006); Van der Heijden (2002)
Compatibility	Business practice and capability, Suitable charging models, Micropayments	Guo and Harry (2014); Mohammadi and Jahanshahi (2008); Mallat and Tuunainen (2008, 2005); Moore and Benbasat (1991)
Costs	High commission / transaction costs, Switching cost, Usage costs	Mohammadi and Jahanshahi (2008); Mallat and Tuunainen

Main factors	Related Factors	Key studies
		(2008, 2005); Ondrus and Pigneur (2006); Van der Heijden (2002)
Relative disadvantage	Profitability uncertain, networked effect	Mohammadi and Jahanshahi (2008); Mallat and Tuunainen (2005)
Strategic orientation of merchants	Capabilities and resources of organisation, M-payment Knowledge, Technological opportunism, Transaction strategy	Guo and Harry (2014); Lai and Chuah (2010)
Consumer readiness	Understanding the role, increased extrinsic and intrinsic motivation, MP Knowledge, Individual capacity	Guo and Harry (2014); Lai and Chuah (2010) Liljander et al. (2006)

Table 3: Key barriers to m-payment adoption

2.3.2.1. Critical mass

The broad acceptance of a highly networked, intermediating technology service such as m-payments is reliant upon the value added to the exchange relationship by multiple stakeholders (Plouffe et al., 2001b). Several authors identify the number of interdependent consumer and merchant participants, known as the critical mass, as the key challenge affecting adoption (Lai and Chuah, 2010; Mohammadi and Jahanshahi, 2008; Mallat and Tuunainen, 2008, 2005; Teo et al., 2005; Van der Heijden, 2002; Plouffe et al., 2001b). One of the main reasons why m-payments have not been adopted widely is the failure to create a roll-out with enough momentum to reach a tipping point for creating a critical mass (Guo and Harry, 2014).

The widespread adoption of m-payments is reliant on the acceptance by both merchants and consumers. This presents the common chicken-egg problem: consumers will not accept and use m-payments unless a significant number of merchants offer it, while merchants will not accept and offer m-payments unless a significant number of consumers use it (Pousttchi, 2007; Economides and Himmelberg, 1995). Network benefits arise when new consumers

adopting the technology indirectly increase the value or expected utility of the network for all consumers because they attract new merchants to join the network (Katz and Shapiro, 1992). Similarly, new merchants increase the value of the network for both merchants and consumers (Shapiro and Varian, 2013). Without either consumers or merchants, the value of a mobile payments platform is zero, and the expected utility for each participant is zero (Guo and Harry, 2014; Au and Kauffman, 2008). Moreover, the consumer's decision to adopt m-payments is based in-part on the size of the consumer base, as well as how universally available the payment system is (Mohammadi and Jahanshahi, 2008; Van der Heijden, 2002). The benefits of m-payments are only realised once enough consumers and merchants are using the service (Kauffman et al., 2000). This is made more difficult by the fact that the value proposition to these two segments is different (Mallat and Tuunainen, 2008).

Guo and Harry (2014) developed an analytical framework for m-payments acceptance from the merchant's perspective. The study identifies five categories of barriers and drivers that will achieve critical mass, the key driver of merchant acceptance. They are: technology, demand, organisations, ecosystem and environment. The authors note that the development of m-payments is reliant on multiple stakeholders, especially service providers (Guo and Harry, 2014). Van der Heijden (2002) explored the factors that affect the early implementation of m-payments in a qualitative study conducted with executives in Sweden and the Netherlands. The study found that a dynamic relationship between merchants and consumers in the early stages was a significant adoption factor. Overall, the study also found that stakeholders were sceptical about m-payments. Mallat and Tuunainen (2008) explored the drivers and barriers of merchant adoption of m-payment systems in Finland. They found the lack of critical mass to be the main adoption barrier. Mallat and Tuunainen (2005) further underlined that only a large consumer-base would make m-payments profitable for merchants and other service providers to offer the technology.

Broadly speaking, the value of m-payments is largely determined by strategic relationships and interests between a diverse group of stakeholders in the payment ecosystem (Guo and Harry, 2014; Lai and Chuah, 2010; Van der Heijden, 2002). These stakeholders comprise the retail, financial services and telecommunication sectors, and include governments, banks, payment service providers, mobile network operators, mobile hardware manufacturers, merchants, and other service-related participants (Guo and Harry, 2014; Au and Kauffman, 2007). Building the mobile channel and retail payment architecture is a shared responsibility

that relies on both collaborative and competitive forces between key stakeholders (Guo and Harry, 2014; Lai and Chuah, 2010). Ghezzi et al. (2010) argues that the strongest inhibitors of m-payment adoption could be value chain relationships and the lack of cooperation among participants. Similarly, Ahmad et al. (2014) report that executives agree unanimously that the success of a dynamic, highly interrelated payment market is reliant on the growth and contribution of each market participant, who in turn benefits from their own relationship with this market. Mobile network operators, for example, are incentivised to capitalise on new revenue opportunities enabled by m-payments. Banks, on the other hand, can increase their customer-base by targeting a new segment of consumers (Lai and Chuah, 2010). Finally, Iansiti and Levien (2004) argue that keystone participants – those participants at the core of the ecosystem – have a duty to improve the overall state of the system by facilitating value creation and value sharing with other participants (Iansiti and Levien, 2004).

2.3.2.2. Trust and security

Trust and security measures validate the use and integrity of m-payment technology (Guo and Harry, 2014). Security is crucial within the mobile domain because it protects confidential information from being misused when financial transactions occur independently over the network, and it guarantees the users' privacy (Guo and Harry, 2014; Mohammadi and Jahanshahi, 2008). The core security concerns include privacy, confidentiality, authentication, authorization, reliability, accountability, integrity, availability, and non-repudiation (Guo and Harry, 2014; Mohammadi and Jahanshahi, 2008; Mallat and Tuunainen, 2005; Van der Heijden, 2002). Several studies identify trust and security as an important prerequisite or factor for merchant and service provider adoption (Guo and Harry, 2014; Chen, 2008; Mohammadi and Jahanshahi, 2008; Mallat and Tuunainen, 2005; Van der Heijden, 2002). Mallat and Tuunainen (2005) argue that trust and security is an important but not key barrier for m-payment adoption. Half of the respondents in the study perceived banks as trustworthy. Similarly, Mohammadi and Jahanshahi (2008) found security to be an important factor, but not as crucial as issues related to network externalities and costs. Respondents reported that the reliability of the technical solution and the trustworthiness of the service provider are important for adoption (Mohammadi and Jahanshahi, 2008). Teo et al. (2005) conducted a study on inhibitors and facilitators of m-payment adoption in Australia. The study identified security as the major obstacle to growth.

2.3.2.3. Compatibility

Mallat and Tuunainen (2005) found m-payments to be most compatible with micro purchases. However, the study found that the frequency of the purchases for goods and services are low, suggesting that merchants do not consider m-payments as the best solution to pay for small-value purchases. Moreover, many respondents mentioned that m-payments are not compatible with existing business systems and operations. Half of respondents did not consider m-payments to be compatible with their products, work routines, or existing payment methods (Mallat and Tuunainen, 2005). Mohammadi and Jahanshahi (2008) argue that existing m-payment solutions are perceived to be compatible with micro purchases but incompatible with business practices. Plouffe et al. (2001b) found compatibility to be a significant antecedent between participating merchants in their model. The construct accounted for 17% of the explanatory power in the model. Finally, Lai and Chuah (2010) argue that the incompatibility with retail POS and ICT infrastructure will inevitably hinder the pace of adoption. The authors state that this is strongly linked to a lack of standardisation and inconsistent interfaces. In summary, the literature on compatibility indicates mixed results.

2.3.2.4. Standardisation

Today, the prevalence of different technology standards (SMS, QR code and NFC), 3G and 4G, and the introduction of several stakeholders in competition with each other, including mobile operators, third party payment providers, and large financial institutions, has created widespread heterogeneity, and a challenge for applying an industry-wide standard to m-payments (Guo and Harry, 2014). Several studies have found the lack of standardisation to be a key barrier to both consumer and merchant adoption, as well as a hindrance to compatibility (Guo and Harry, 2014; Shapiro and Varian, 2013; Mallat and Tuunainen, 2008; Kadhiwala and Zulfiquar, 2007; Ondrus and Pigneur, 2006; Van der Heijden, 2002). Tirole (1988) argues that standardisation helps the consumer to adopt new technology immediately, choose among alternatives, and reduces the consumer's search cost. Mallat and Tuunainen (2008) argue that respondents had trouble linking m-payment applications to existing banking and telecommunication services. The respondents stated that they would prefer standardised solutions that are applicable to a wider customer base. Furthermore, the interviewees were concerned that the increase in competition for payment solutions, and the lack of standards

would cause both providers and consumers to become disinterested in creating a common collaborative solution. Finally, Guo and Harry (2014) state that stakeholders have heterogeneous interests that result in complexity in standards and the degradation of the ease of use of the system and its experience.

2.3.2.5. Cost

Finally, merchants and service providers require a cost-effective solution to incentivise and sustain the use of m-payments. Cost comprises several subcategories, including: setup costs, monthly fees, transaction fees, service provider fees, hardware and software upgrades, and training personnel (Mohammadi and Jahanshahi, 2008; Mallat and Tuunainen, 2008, 2005; Van der Heijden, 2002).

Several studies found perceived transaction fees to be a significant factor inhibiting merchant adoption of m-payments (Lai and Chuah, 2010; Mallat, 2005; Van der Heijden, 2002). Mallat (2005) argues that m-payment adoption rises when the transaction fees and usage costs are perceived to be lower than existing payment methods. The author found that m-payments were unprofitable for some merchants due to the high commission charged. Moreover, the author found that respondents did not find any particular cost advantages to m-payment use, and noted that lower processing costs were not likely. Lai and Chuah (2010) found that merchants want minimal setup charges and low transaction fees. Van der Heijden (2002) argues that merchants are at the mercy of large financial institutions that have greater flexibility in setting transaction fees due to their large customer base. Finally, it is worth noting that m-payments are free for consumers because of the ease with which they can switch back (Van der Heijden, 2002).

In summary, the literature indicates that m-payments have been studied across a variety of contexts, using the PCI instrument. This is an indication that the PCI instrument is reliable and widely applicable. Furthermore, the drivers and barriers identified in the literature provide a useful overview of the factors driving the success of m-payments. In the next section, we present the research methodology.

3. Research methodology

The objective of our research is to empirically investigate merchant adoption of m-payments by gathering both quantitative and qualitative data. As such, the questionnaire incorporates both open- and close-ended questions. Section 3 is organised as follows. First, we present a discussion of the constructs and how they are measured. This is followed by an outline of the data collection procedure and the sample. We then present an overview of qualitative content analysis. Finally, we conclude with a brief discussion on missing data.

3.1. Construct measurement

We conducted an empirical study using the Perceived Characteristics of Innovation (PCI) instrument to investigate the factors affecting merchant adoption of m-payments. The measures for the PCI model were operationalized and modified to fit the merchant's perception of m-payments, and the retail context of m-payments adoption (Plouffe et al., 2001b). The key distinction in our research is that the measurement items are intended to measure how merchants perceive IT innovation, and how they adopt new technology in their businesses. All items were measured on a 7-point scale, anchored by "strongly agree" (1) and "strongly disagree" (7). On this scale, we assume that the mathematical middle (4) is neutral.

For the PCI belief constructs, we selected the short-form scales of ten PCI measurement items, and one additional image item (see Appendix 2) (Moore and Benbasat, 1991). The remaining measurement items in Moore and Benbasat's list were rejected as they were deemed irrelevant to the context of our study. A trust and security construct consisting of six measurement items was included in the questionnaire. The voluntariness construct was excluded from the study.

We identified two measurement items to capture the dependent construct, intention to adopt (Plouffe et al., 2001b). They are:

1. I intend to use an MPS in my business in the future.

2. I intend to use an MPS in my business as often as possible.

The two selected measurement items are task-focused and were modified to capture "the respondent's sense of urgency to formally adopt the innovation once it becomes widely

available" (Plouffe et al., 2001b). We assume that, for participating merchants, their intention to use m-payments in the future, and as often as possible, is equivalent to the continuation of its use.

The questionnaire was initially tested in a small-scale pilot study involving 14 merchants. The pilot study resulted in the removal of five items from the questionnaire as the questionnaire was deemed too long. They are:

Relative advantage

- Mobile payments decrease business costs
- Using an MPS enables me and my staff to process payments more quickly

Ease of use

- It is easy to instruct customers on how to use an MPS

Trust and security

- When using an MPS to receive payments, I double-check confirmation of the payment transaction with the customer
- The MPS application PIN and/or fingerprint authentication provides a necessary layer of security

The final questionnaire consisted of 25 measurement items (see Appendix 2). The questionnaire has three sections. The first section comprises general questions, and one open-ended question. These questions include the age of the business, the industry type, the payment channels used, and the reason merchants chose their particular m-payment service provider. The second section includes 25 main quantitative questions relating to m-payments adoption, grouped by construct. These include questions relating to intention to use, relative advantage, image, compatibility, ease of use, visibility, trust and security, and results demonstrability. The third section includes one open-ended question. The question asked merchants if they had further comments regarding the use and impact of m-payments in their business.

3.2. Data collection procedure

The data required for this study was not readily available. A questionnaire was drawn up and the measures were pre-tested in a small-scale pilot study in Cape Town. First, we dropped 100 flyers at individual merchant stalls at the Old Biscuit Mill and Woodstock Palms markets in Woodstock, Cape Town on the morning of 30 May 2015. We asked merchants to visit a website identified by a URL printed on the flyer. The response rate was 0. Following this failure, we visited 14 merchants in-person between 4 and 6 June 2015 in Rondebosch and Observatory in Cape Town and filled the questionnaires during interviews. The visits were not scheduled.

Each interview had roughly the following structure. First, we introduced ourselves and gave some background about the research. We then carried out the interview with the merchant. Following this, we had a general discussion around m-payments, where the merchants were asked to speak and question freely. The merchants were generous to give us up to 15 minutes of their time to discuss our research and complete the questionnaire. We guaranteed that the merchant's confidentiality would be protected if they so wished. One questionnaire was discarded at this stage as there were too many missing responses. These interviews concluded the pre-test.

The questionnaire was then revised. Five items were removed from the questionnaire as it was deemed too long. Our data sample and subsequent analysis was drawn only from the revised questionnaire to ensure consistency.

The final questionnaire was distributed over email from a Gmail account (mobilepaySA@gmail.com) created especially for this research project. Google Forms was used to capture the questionnaire answers in an electronic format. Approximately 1652 merchants in the Greater Cape Town area received our mail between 8 and 18 June 2015. Each email contained a cover letter, questionnaire design and instructions for the merchants (Dillman, 1978). The email addresses of the businesses and merchants were collected individually over the Internet. These were all publically available on the Internet.

Collecting email addresses individually was a challenge. Many merchants did not have up-to-date information online. All emails were specifically addressed to the owners or managers, as

these individuals were likely to be the ones making the decision to adopt and implement m-payments in the business. On 22 June 2015, a final reminder email was sent out to all invitees who had not yet responded.

All the merchants who received and responded to the final questionnaire were eligible for a R1000 cash prize that was funded by the University of Cape Town Computer Science Department. The cash prize was used to incentivise merchants to respond.

3.3. Sample

Existing literature provided a useful guideline on the sample of merchants we intended to target. Our sample included small- and medium-sized retailers operating in the Greater Cape Town area who conduct B2C POS transactions (see Appendix 1). This included both merchants that use m-payments and those that do not. All merchants considered were assumed to have had the opportunity to adopt and use m-payments. All information pertaining to these merchants was publicly available, either on the Internet, or on the merchant maps built into the Snapscan, Zapper and FlickPay m-payment applications. The merchant maps were up-to-date, accurate and generally reliable.

The selection criteria for the individual interviewees in the pre-test included persons who were in managerial positions, whose responsibilities included adopting and implementing m-payments in the business, and who were thus knowledgeable enough to discuss the issue. (Mallat and Tuunainen, 2008).

Questionnaires were distributed to merchants with a valid email address in our target population. We eliminated businesses where we did not have up-to-date contact information, or otherwise where we deemed the merchant not applicable to the target population.

In total, 82 completed questionnaires were collected, representing an effective response rate of 5%. We are mindful of the fact that the number of merchants in our sample not using m-payments is low. As such, strong conclusions are not drawn. Table 4 summarises the number of final invitations sent out and the resulting response rate.

Demographic data collected from merchants indicated a diverse profile of respondents in terms of business age and industry. These results are presented in Section 4.

Group	Total Questionnaires Outgoing	Total Questionnaires Returned	Response Rate Percentage
Source: Data sample of retailers in the Greater Cape Town area	1652	82	≈5

Table 4: Summary of questionnaire response

3.4. Qualitative content analysis

Content analysis broadly refers to systematic and objective qualitative research techniques that are used to analytically interpret the characteristics of written, verbal or visual communication (Hsieh and Shannon, 2005; Cole, 1988). The research method scrutinises language for the purpose of classifying data into categories to derive contextual meaning, and provide knowledge and new insights (Hsieh and Shannon, 2005). The type of approach used largely depends on the specific interest of the researcher and the problem being studied (Weber, 1990). Our goal was to use content analysis to identify themes and categories from our qualitative analysis, and give further meaning to novel data on m-payments adoption in South Africa. Finally, content analysis is not to be confused with the quantitative analysis of qualitative data, where textual data is coded and analysed statistically (Morgan, 1993).

Hesih and Shannon (2005) identify three distinct approaches in the application of content analysis: conventional, directed, and summative. Our research focuses on conventional content analysis, whereby coding categories are derived from textual data. The analysis begins with a naïve overview of the data, after which an initial coding instances are generated. The codes are then sorted into categories and grouped into meaningful clusters (Coffey and Atkinson, 1996). One can then count the frequencies of the codes or categories to elicit insights into the data. This approach to content analysis is appropriate when existing theory cannot be leveraged, application is limited due to the novelty of the research, or when

one may want to avoid using preconceived categories. (Kondracki et al., 2002). The benefit of the conventional approach is that the researcher is able to obtain a unique perspective from participants that is grounded in actual data. Moreover, this approach is void of any biases found in preconceived theories (Hsieh and Shannon, 2005).

Elo and Kyngäs (2007) argue that the content analysis process is either deductive or inductive in nature. A deductive approach is used when the purpose of the analysis is to test existing data or theory in different contexts or over different time-periods. Inductive content analysis is used when there is no or little prior research on the topic (Elo and Kyngäs, 2007). Our research hence follows an inductive approach, where specific instances of data are observed and then combined into larger categories. This process comprises open coding which refers to the process of tagging instances of the data, and then transferring the instances onto a coding sheet (Elo and Kyngäs, 2007). Categories of instances are then generated to reduce the number of instances. Larger, high-level categories are then generated (Hsieh & Shannon, 2005). The distinction in inductive analysis is that the researcher has the freedom to decide what to put in each category (Dey, 1993). The purpose of grouping data into categories is that it allows a comparison to be made between categories, allowing for greater insight and understanding.

The objective of our content analysis was to categorise the data collected from two open-ended questions in order to draw additional insights to support the overall thesis question. To begin, the data collected from the open-ended questions was tabulated in Microsoft Excel. Each textual answer was separated into distinct instances, and tagged by service provider and sentiment, as either positive or negative. Where a data point or instance was represented by two service providers (the case where a merchant used two service providers), the instance was represented separately by each service provider. High-level, group categories were then generated from the instances. Responses with similar patterns and wording were coded under the same categories. This process was carried out twice to ensure that categories were applied consistently and with no errors. After revising and categorising all the interviews, a comprehensive list of factors was produced. These results are discussed in Section 5.

3.5. Missing data

For the most part, missing data was not an issue in the sample. Most responding merchants provided full information for the measures of interest. None of the responses were removed due to an unacceptably large number of missing responses. The final sample size was 82. Nine merchants answered most, but not all, of the measures of interest. A total of 73 merchants completed the entire questionnaire.

4. Results

Section 4 presents the results of our research. First, we present the demographic analysis. This is followed by a detailed analysis of each construct. Next, we present the qualitative content analysis. This is followed by the reliability and validity analysis. Finally, we conclude with a detailed discussion of our findings.

4.1. Demographic Analysis

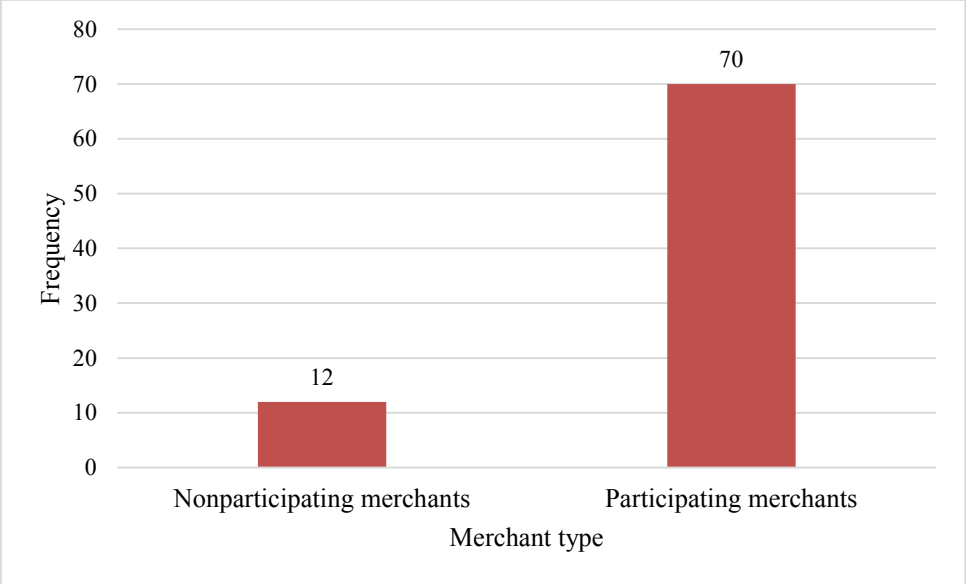

Figure 1: Distribution by merchant type

Figure 1 presents the distribution of merchants by type. The final sample consisted of a total of 82 merchants. 85% of the sample are categorised as "participating merchants," meaning these merchants currently use m-payments in their business. 15% merchants are categorised as "nonparticipating merchants," meaning these merchants do not use m-payments in their business.

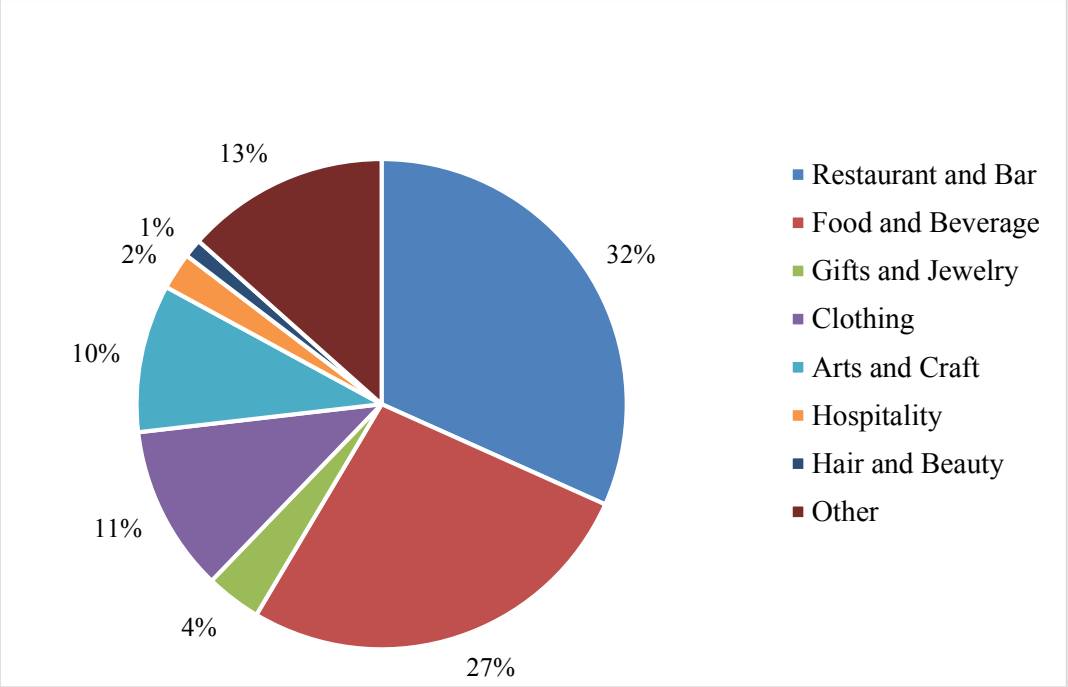

Figure 2: Distribution of merchants by industry

Figure 2 presents the percentile distribution of merchants in our final sample by industry. Figure 2 does not include merchant data collected during the pre-test.

The distribution of merchants by industry indicates that m-payments are present in at least eight different industries in South Africa.

32% of merchants are from the Restaurant and Bar industry. This industry is predominantly made up of service-based retailers operating in restaurants, food trucks and coffee shops. 27% of merchants are from the Food and Beverage industry. This largely refers to the wholesale retailers that distribute food and beverage products.

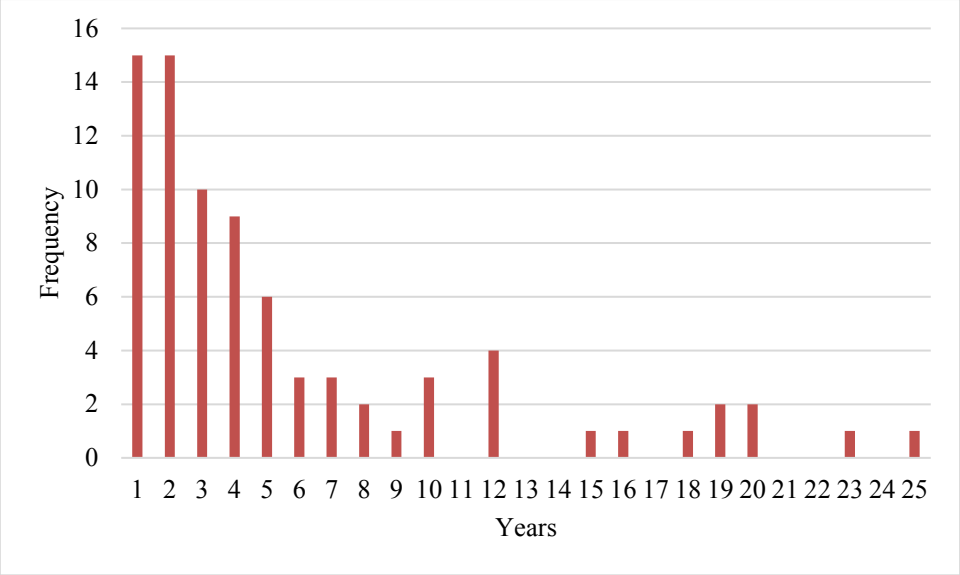

Figure 3: Distribution of merchants by experience

Figure 3 presents the distribution of merchants by experience (in years). Two outliers from the sample - 40 and 75 years – are excluded from the graph.

69% of businesses have been in operation for 5 years or less. The mode is represented by years 1 and 2; there are 15 merchants in each of these age segments.

Table 5 presents the statistical output for the correlation between merchant experience and the intention to use items: Q1 and Q2. The 75 year outlier has been removed from the sample. At the 5% significance level, the p-values indicate that there is not enough evidence to reject the null hypothesis of no correlation (non-significant results). We conclude that there is no correlation between merchant experience and Q1 and Q2.

Correlations				
			Q1. I intend to use an MPS in my business in the future.	**Q2.** I intend to use an MPS in my business as often as possible.
Spearman's rho	Experience (Years)	Correlation Coefficient	.180	.200
		Sig. (2-tailed)	.109	.073
		N	81	81

Table 5: Merchant experience correlation with Q1 and Q2

4.2. Intention to use

Several studies have shown that the correlation between behavioural intent and subsequent behaviour is high, given that intention to adopt represents the final precursor to actual adoption behaviour (Sheppard et al., 1988). We assume that intention to adopt is a reasonable proxy for actual adoption behaviour, which is the key outcome of our research (Plouffe et al., 2001b).

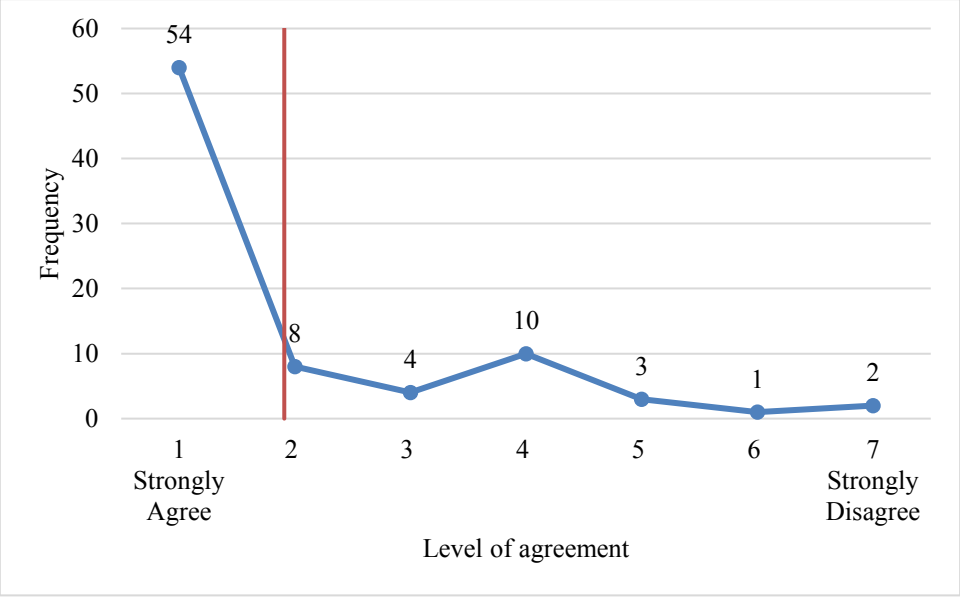

Figure 4: The extent to which merchants intend to use m-payments in their businesses in the future

Figure 4 presents data on the extent to which merchants intend to use m-payments in their businesses in the future.

66% of merchants strongly agree that they intend to use m-payments in their business in the future, while only 2% of merchants strongly disagree with this statement.

The average response was 1.9, which is more closely related to agreement than disagreement. This is shown by the red vertical line. Accordingly, 80% of merchants provided a positive (agree) response of varying degrees on the extent to which merchants intend to use m-payments in their business in the future.

12% of merchants provided a neutral response regarding whether merchants intend to use m-payments in their business in the future.

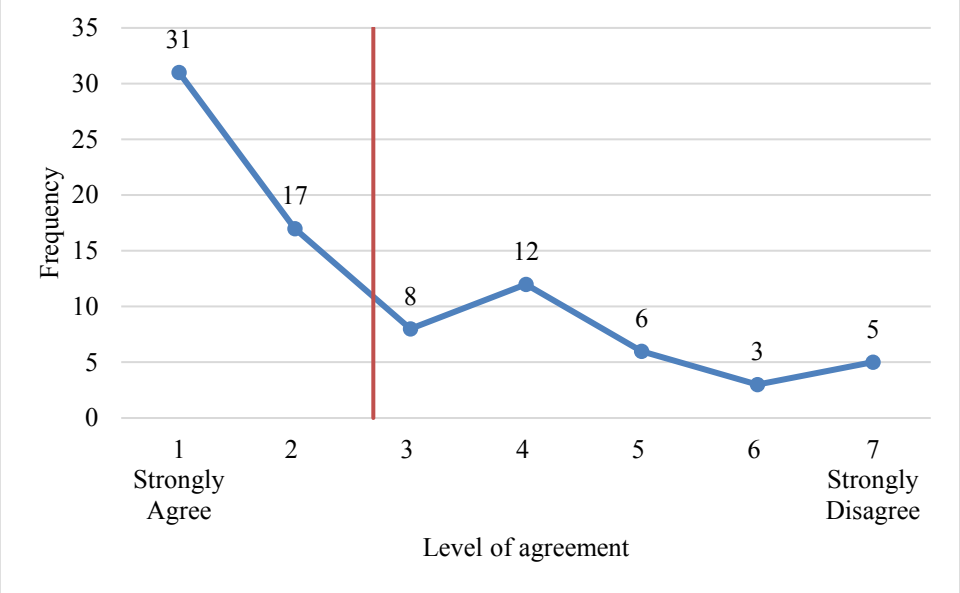

Figure 5: The extent to which merchants intend to use m-payments in their business as often as possible

Figure 5 presents data on the extent to which merchants intend to use m-payments in their businesses as often as possible.

38% of merchants in the sample strongly agree that they intend to use m-payments in their business as often as possible, while only 6% strongly disagree with this statement.

The average response was 2.7, which is more closely related to agreement than disagreement. This is shown by the red vertical line. Accordingly, 68% of merchants provided a positive

(agree) response of varying degrees on the extent to which merchants intend to use m-payments in their businesses as often as possible.

15% of merchants provided a neutral response regarding whether merchants intend to use m-payments in their business as often as possible.

			Number of Items	Q1. I intend to use an MPS in my business in the future.	Q2. I intend to use an MPS in my business as often as possible.
Spearman's rho	Relative Advantage	Correlation Coefficient		.611	.639
		Sig. (2-tailed)	**6**	<.0005	<.0005
		N		81	81
	Image	Correlation Coefficient		.557	.482
		Sig. (2-tailed)	**2**	<.0005	<.0005
		N		81	81
	Compatibility	Correlation Coefficient		.632	.559
		Sig. (2-tailed)	**3**	<.0005	<.0005
		N		78	78
	Ease of Use	Correlation Coefficient		.689	.506
		Sig. (2-tailed)	**3**	<.0005	<.0005
		N		81	81
	Visibility	Correlation Coefficient		.398	.310
		Sig. (2-tailed)	**1**	<.0005	.005
		N		82	82
	Trust and Security	Correlation Coefficient		.614	.550
		Sig. (2-tailed)	**6**	<.0005	<.0005
		N		74	74
	Results Demonstrability	Correlation Coefficient		.660	.508
		Sig. (2-tailed)	**2**	<.0005	<.0005
		N		80	80

Table 6: Spearman's Rank correlation coefficients

Table 6 presents Spearman's rank correlation coefficient between each of the seven constructs in our questionnaire and the intention to use items: Q1 and Q2. All the p-values are small and below the conventional significance level of 0.05, suggesting that there is evidence to reject the null hypotheses of no correlation. We conclude that, at the 5% significance level, all correlations are significant.

The Spearman's rank coefficients range between 0.398 and 0.689 in Q1, and 0.31 and 0.639 in Q2.

There is a strong positive correlation between relative advantage and Q1 and Q2.

There is a moderate positive correlation between image and Q1 and Q2.

There is a strong positive correlation between compatibility and Q1, and a moderate positive relationship between compatibility and Q2.

There is a strong positive correlation between ease of use and Q1, and a moderate positive relationship between ease of use and Q2.

There is a weak positive correlation between visibility and Q1 and Q2.

There is a strong positive correlation between trust and security and Q1, and a moderate positive relationship between trust and security and Q2.

There is a strong positive correlation between results demonstrability and Q1, and a moderate positive relationship between demonstrability and Q2.

4.3. Construct analysis

Section 4.3 presents an analysis of each of the seven constructs. For each construct, we present selected line graphs, a box plot, and a histogram analysis. The box plot and histogram are segmented by nonparticipating merchants (No), participating merchants (Yes), and all merchants (All). Table 7 presents a summary of the construct results.

The y-axis on each box plot and the x-axis on each histogram is labelled as the construct in question, and represents the total construct score. This is equal to the sum of the items that form the construct.

	Average response	Participating merchants	Nonparticipating merchants	Participating merchants	Nonparticipating merchants	Histogram variability	Histogram interpretation (all merchants)
		Median score		Interquartile range			
Relative advantage	2.8	14.5	21	10.5	14	Greater variability in response for nonparticipating merchants	Slightly skewed to the left
Image	3.3	6	8	4	4	Greater variability in response for nonparticipating merchants	Slightly skewed to the left
Compatibility	2.7	7	10	6	4	Greater variability in response for nonparticipating merchants	Skewed to the left
Ease of Use	2.2	5	9	5	5	Greater variability in response for nonparticipating merchants	Slightly skewed to the left
Visibility	2.9	3	3	3	2.75	Greater variability in response for nonparticipating merchants	Slightly skewed to the left
Trust and security	2.4	13	16	9	9	Greater variability in response for nonparticipating merchants	Skewed to the left
Results demonstrability	2.2	3	7.5	3	4.25	Greater variability in response for nonparticipating merchants	Slightly skewed to the left

Table 7: Summary of construct results

4.3.1. Relative advantage

Section 4.3.1 presents the line graphs of selected items from the relative advantage construct. The average response in Figure 6, 7, 8 and 9 was 2.8, 2.9, 2.6 and 2.8 respectively. In all cases, these tend more towards agreement, as indicated by the red line. Accordingly, 65%, 63%, 73% and 68% of merchants provided a positive (agree) response of varying degrees to the items in question.

The average response for all items in the relative advantage construct was 2.8, which is more closely related to agreement than disagreement. Merchants were most in agreement (2) that their business's products can be paid for with m-payments (average response 2). This may be due to the nature of the products being small in value, the type of retailer e.g. a market retailer, or the need for quick, over-the-counter transactions. Mechants were least in agreement (3.6) that using m-payments allows them to collect useful data about customers and their purchases. At the time of our research, it was apparent that most merchants merely used m-payments for its basic functionality i.e. to facilitate the payment transaction, or as an alternative to cash-based and credit and debit card payments.

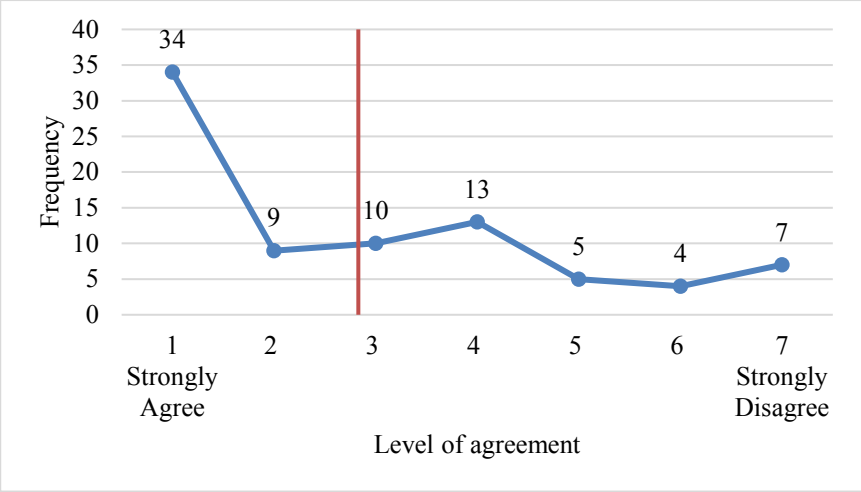

Figure 6: The extent to which m-payments increase business sales

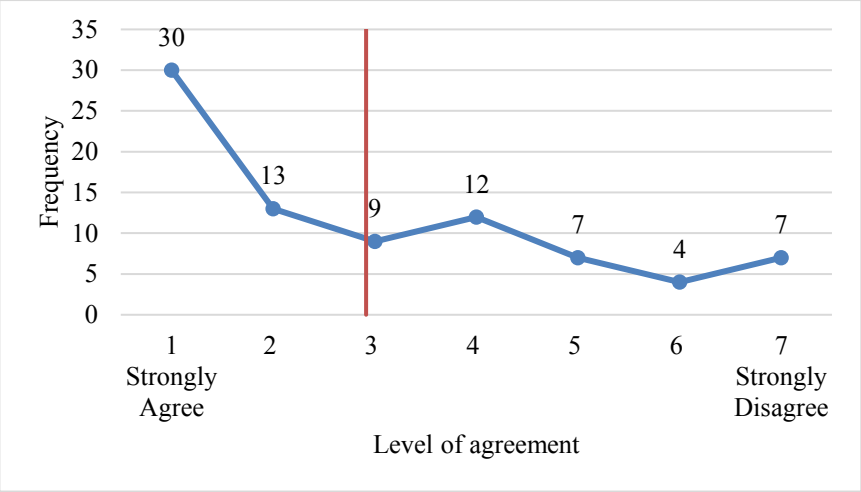

Figure 7: The extent to which m-payments increase impulse purchases

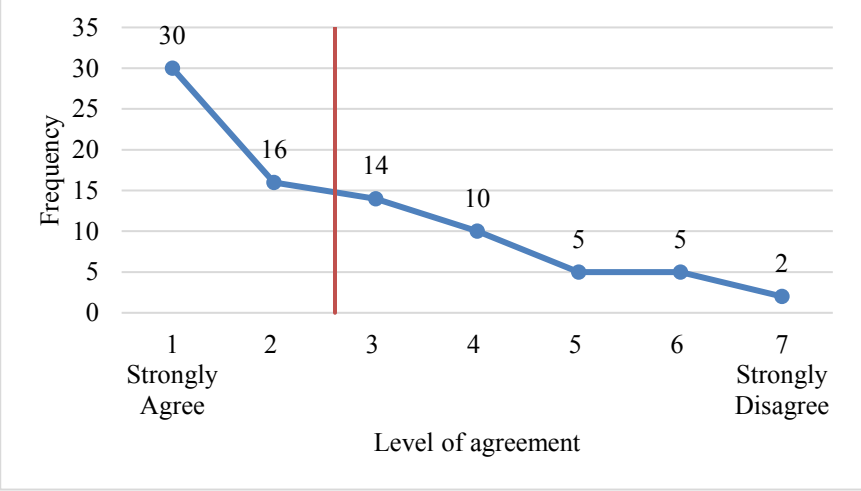

Figure 8: The extent to which paying with a mobile phone speeds up payments

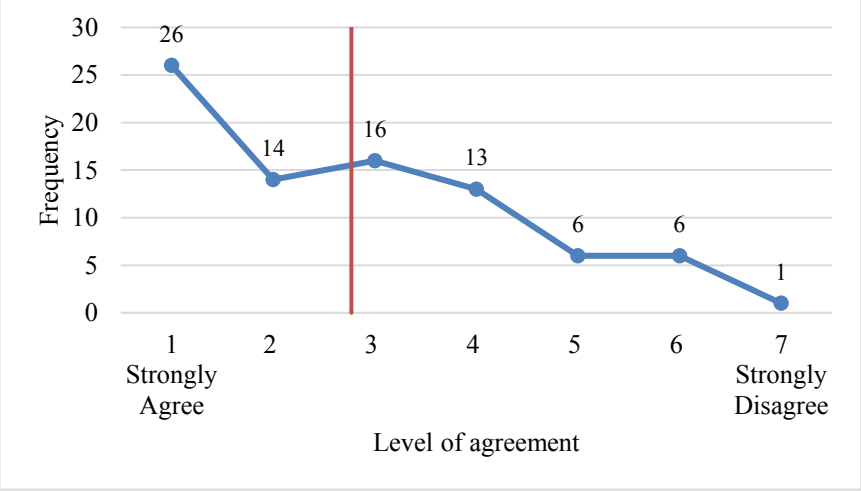

Figure 9: The extent to which using m-payments enhances the merchant's effectiveness on the job

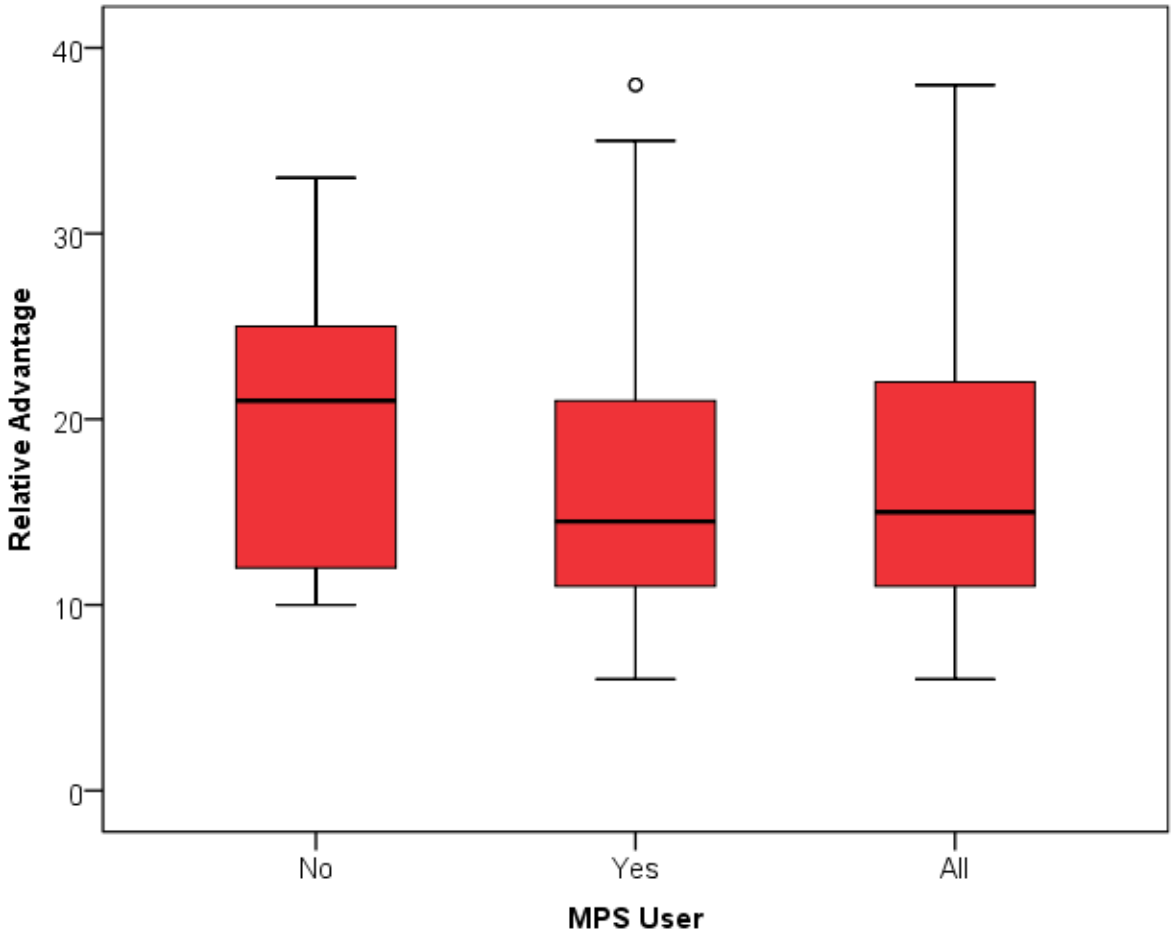

Figure 10: Relative advantage box plot

Figure 10 presents a box plot of the aggregate relative advantage sample data.

Participating merchants have a smaller median score (14.5) than nonparticipating merchants (21), suggesting that participating merchants have a more favourable attitude about relative advantage than nonparticipating merchants.

Participating merchants have an interquartile range that is shorter (10.5) than nonparticipating merchants (14). Participating merchants may have a higher level of agreement with one another regarding the relative advantage of m-payments in their business.

Overall, merchants surveyed appear to have a favourable attitude towards the relative advantages of m-payments.

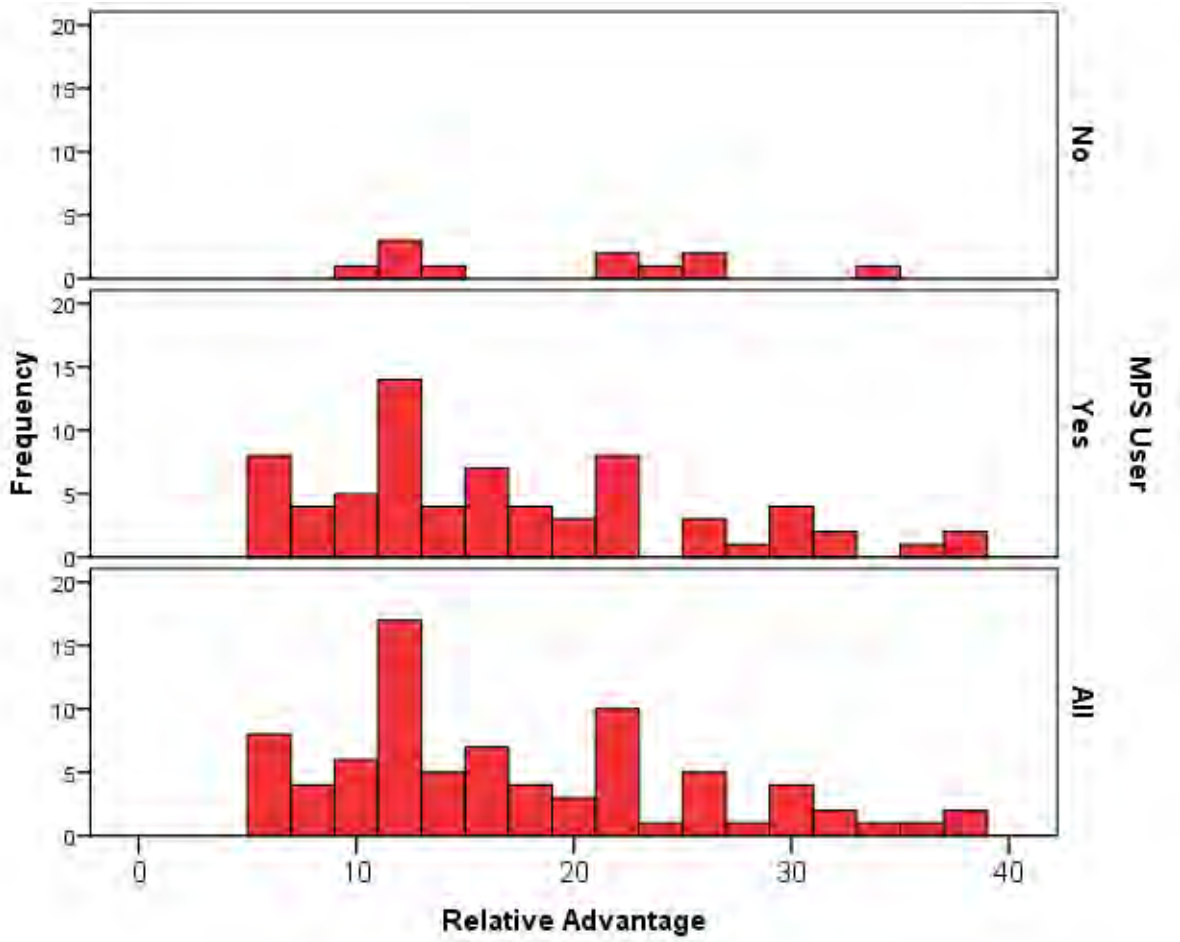

Figure 11: Relative advantage histogram

Figure 11 presents a histogram of the relative advantage sample data.

There is greater variability in response for nonparticipating merchants but a clearer trend towards agreement for participating merchants.

For all merchants, the histogram is slightly skewed to the left, indicating a trend towards agreement.

4.3.2. Image

Section 4.3.2 presents the line graphs of selected items from the image construct. The average response in Figure 12 and 13 was 2.7 and 3.9 respectively. In both cases, these tend more

towards agreement, as indicated by the red line. Accordingly, 74% and 43% of merchants provided a positive (agree) response of varying degrees to the items in question.

The average response for all items in the image construct was 3.3, which is more closely related to agreement than disagreement. Merchants were most in agreement (2.7) that offering m-payments enhances their business's image among customers. Business owners may agree that since m-payments represents an innovative technology solution, it increases the appeal and status of a business. At many of the markets we visited, merchants advertised at their stalls that they offered a m-payment option. In a retail environment such as a farmer's market, merchants offering m-payments are highly visible to customers, and other merchants. This sends a positive signal about their status. Merchants were less in agreement (3.9) that merchants who use m–payments have more credibility than those who do not. The neutrality of this answer indicates that the credibility of merchants may be more strongly linked to other factors, some of which may be more or less relevant in a market environment given the range of answers.

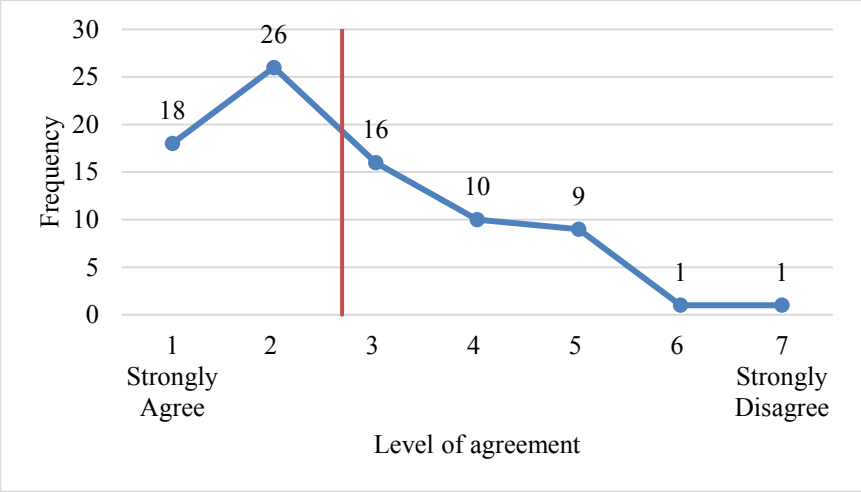

Figure 12: The extent to which offering m-payments enhances the merchant's image among customers

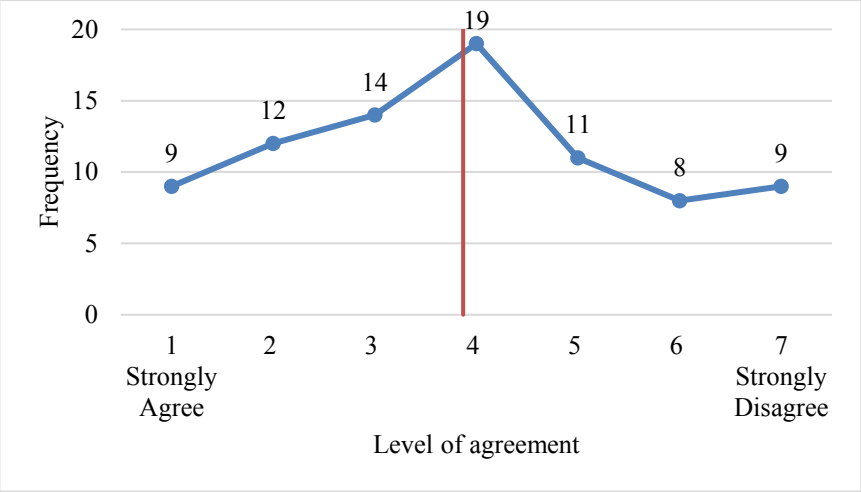

Figure 13: The extent to which merchants who use m-payment have more credibility than those who do not

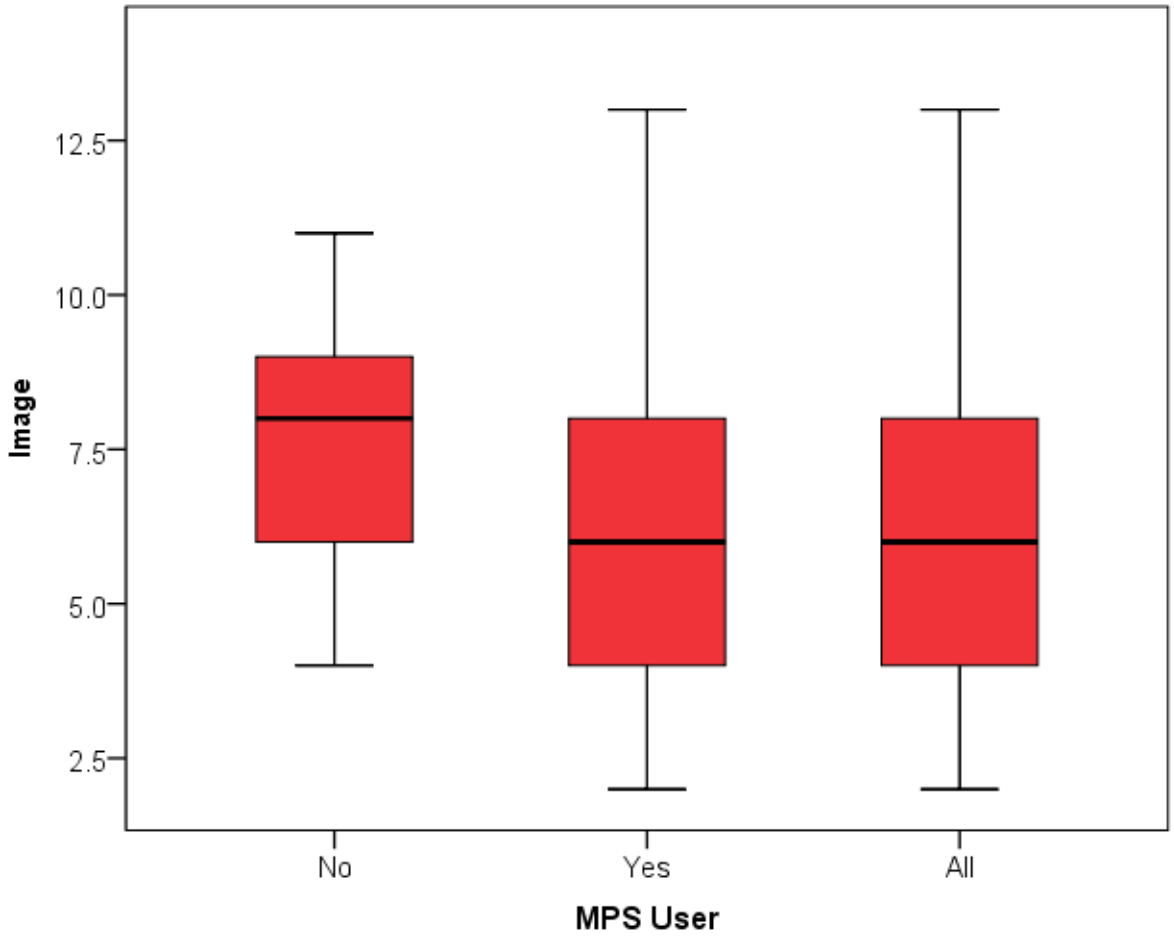

Figure 14: Image box plot

Figure 14 presents a box plot of the aggregate image sample data.

Participating merchants have a smaller median score (6) than nonparticipating merchants (8), suggesting that participating merchants have a more favourable attitude about image than nonparticipating merchants.

Participating merchants have an interquartile range that is equal (4) to nonparticipating merchants (4). Participating and nonparticipating merchants may have the same level of agreement with one another regarding the image of m-payments in their business.

Overall, merchants surveyed appear to have a favourable attitude towards the image of m-payments.

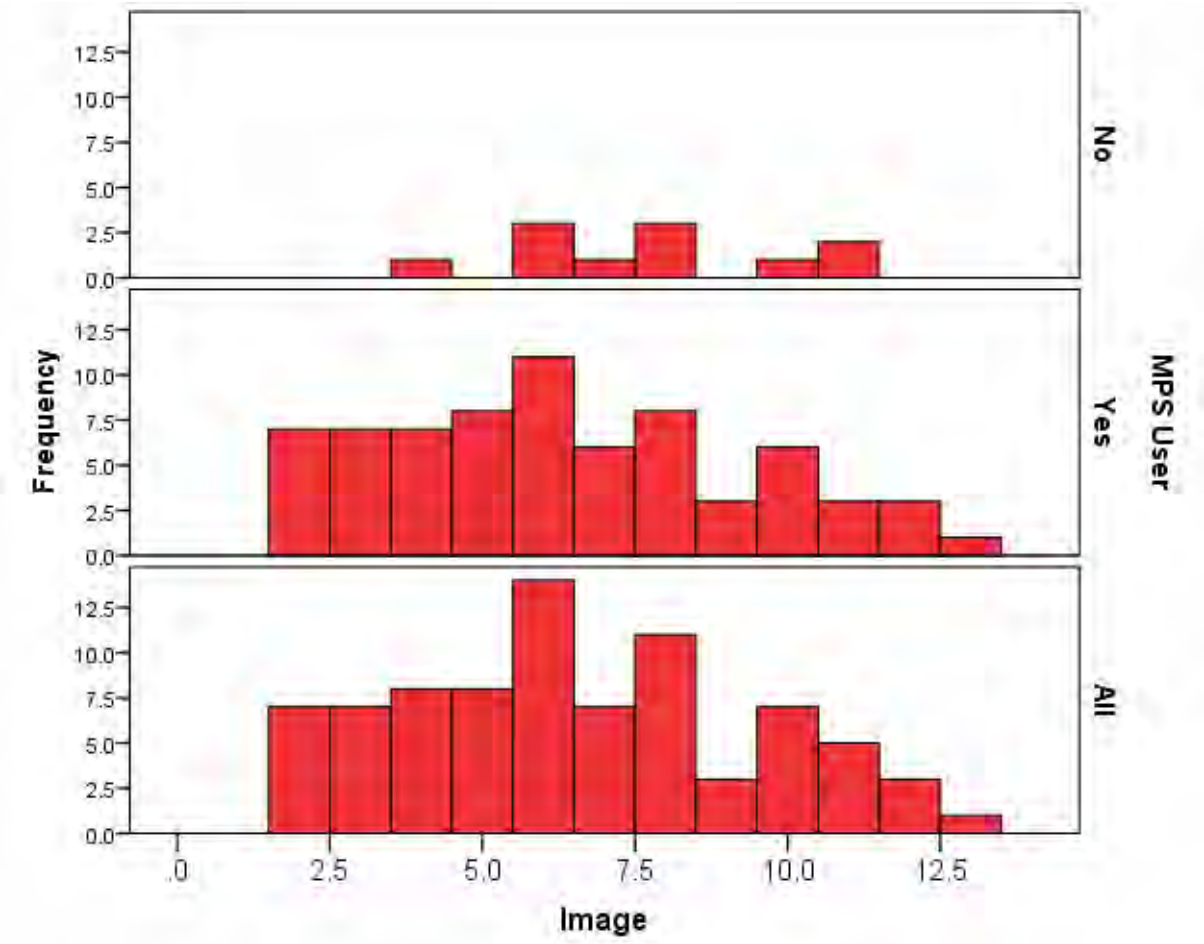

Figure 15: Image histogram

Figure 15 presents a histogram of the image sample data.

There is greater variability in response for nonparticipating merchants but a clearer trend towards agreement for participating merchants.

For all merchants, the histogram is slightly skewed to the left, indicating a trend towards agreement.

4.3.3. Compatibility

Section 4.3.3 presents the line graphs of selected items from the compatibility construct. The average response in Figure 16, 17 and 18 was 2.9, 2.8 and 2.3 respectively. In all cases, these

tend more towards agreement, as indicated by the red line. Accordingly, 67%, 68% and 62% of merchants provided a positive (agree) response of varying degrees to the items in question.

The average response for all items in the compatibility construct was 2.7, which is more closely related to agreement than disagreement. Merchants were most in agreement (2.3) that m-payments are compatible with their business's POS system. This may be due to the easy sign up and integration with many different POS systems offfered by service providers. Similarly, mechants were in agreement that: m-payments are compatible with all aspects of their business's sales transactions (2.9); and using m-payments fits well with the way their staff and they like to receive payment for goods and services (2.8). This may be due to factors that may include compatibility with micropurchases, the business's products and services, existing business operations or practices, and work routines. Additionally, this is likely linked to higher levels of standardisation.

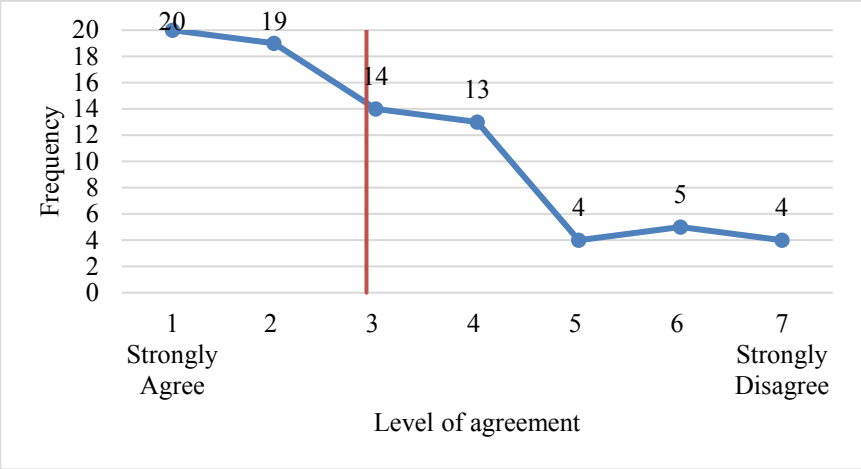

Figure 16: The extent to which using m-payments is compatible with all aspects of a business's sales transactions

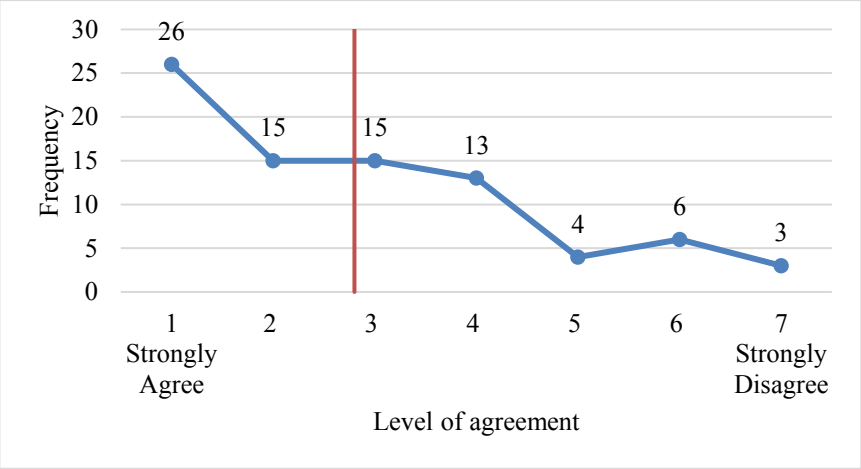

Figure 17: The extent to which using m-payments fits well with the way merchants like to receive payment for goods and services

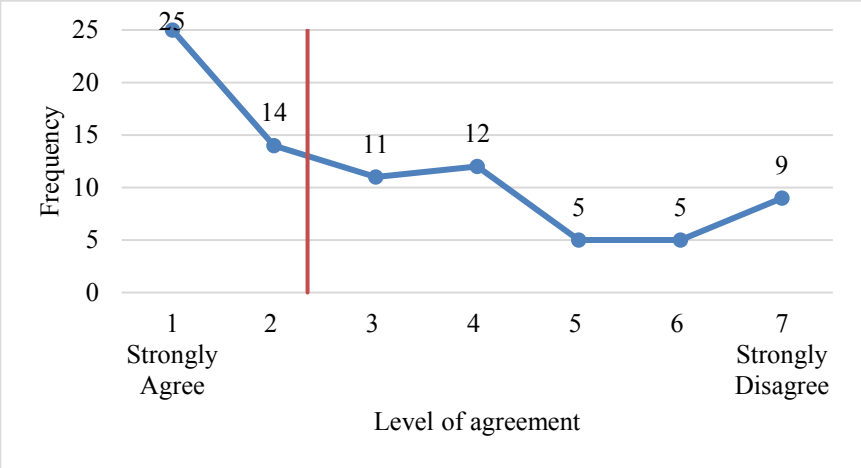

Figure 18: The extent to which m-payments is compatible with a business's Point-of-Sale system

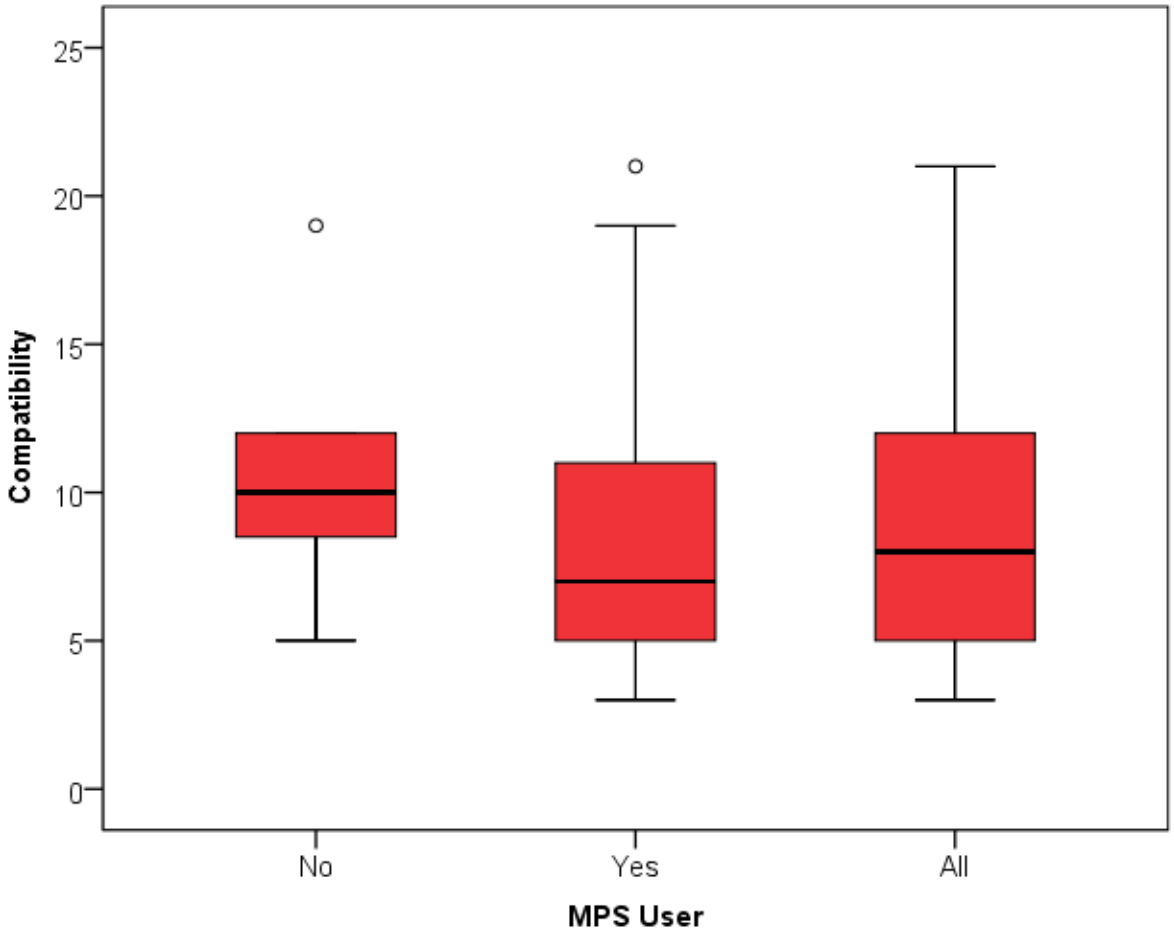

Figure 19: Compatibility box plot

Figure 19 presents a box plot of the aggregate compatibility sample data.

Participating merchants have a smaller median score (7) than nonparticipating merchants (10), suggesting that participating merchants have a more favourable attitude about compatibility than nonparticipating merchants.

Participating merchants have an interquartile range that is taller (6) than nonparticipating merchants (4). Participating merchants may have a lower level of agreement with one another regarding the compatibility of m-payments in their business.

Overall, merchants surveyed appear to have a favourable attitude towards the compatibility of m-payments.

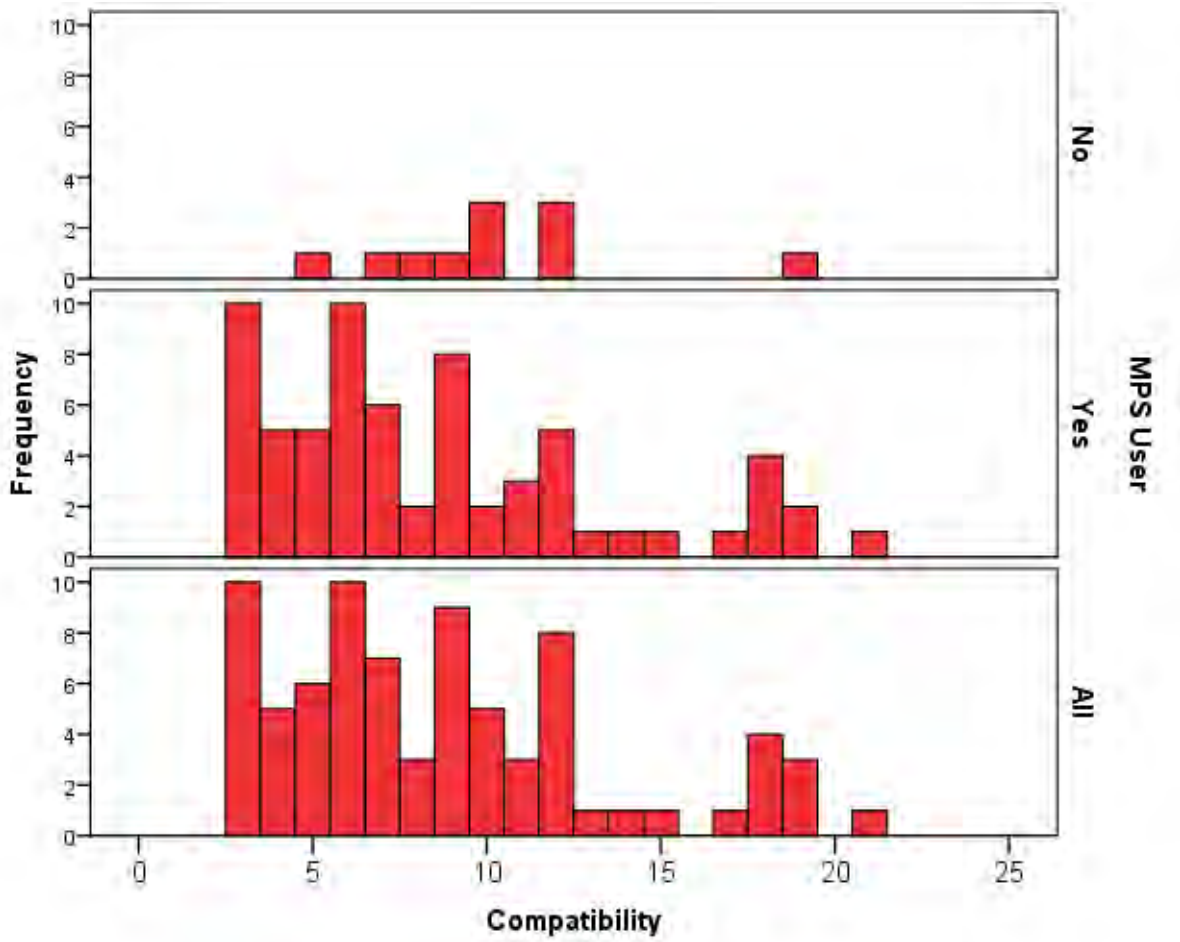

Figure 20: Compatibility histogram

Figure 20 presents a histogram of the compatibility sample data.

There is greater variability in response for nonparticipating merchants but a clear trend towards agreement for participating merchants.

For all merchants, the histogram is skewed to the left, indicating a trend towards agreement.

4.3.4. Ease of use

Section 4.3.4 presents the line graphs of selected items from the relative advantage construct. The average response in Figure 21, 22, and 23 was 2.1, 2.2 and 2.2 respectively. In all cases, these tend more towards agreement, as indicated by the red line. Accordingly, 84%, 81% and

85% of merchants provided a positive (agree) response of varying degrees to the items in question.

The average response for all items in the ease of use construct was 2.2, which is more closely related to agreement than disagreement. Merchants were most in agreement (2.1) that learning to operate m-payments is easy for them and their staff; similarly, merchants were in agreement (2.2) that overall, they and their staff find m-payments easy to use. Merchants and their staff using m-payments in their business are assumed to be more progressive and technology savvy as an m-payment solution is offered to customers, and they would need to be able to use it. Hence they may would find learning to operate or use m-payments easy. Merchants were also in agreement (2.2) that it is easy to pay with a mobile phone. This may be due to the simple design of the m-payment interface and reliability of modern smartphones. Additionally, staff members with a high level of skill may find m-payments easy to operate. These staff members may be familiar with applications on modern smartphones.

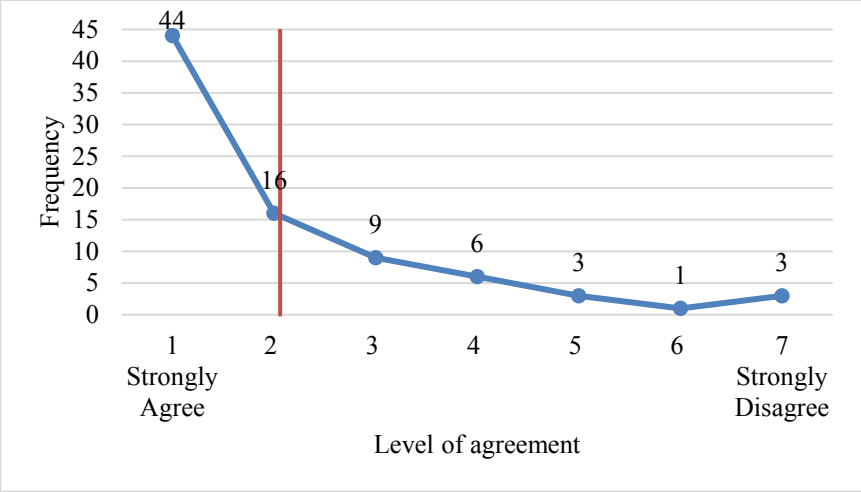

Figure 21: The extent to which learning to operate m-payments is easy for merchants and their staff

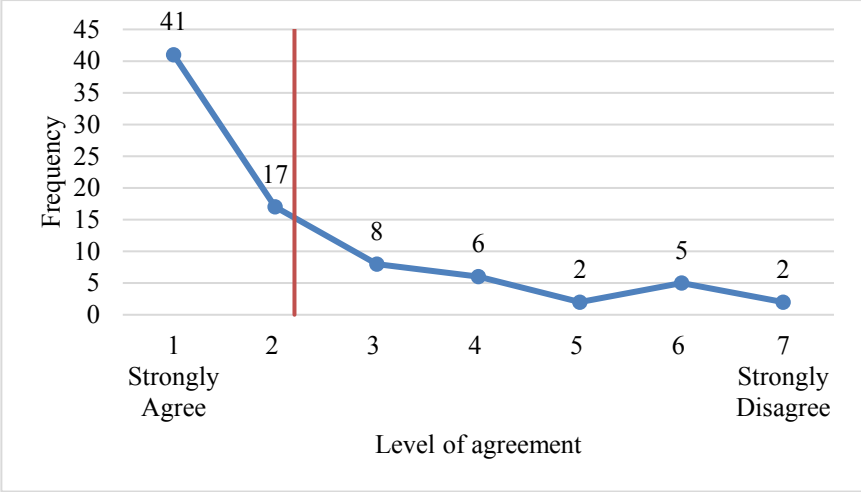

Figure 22: The overall extent to which merchants and their staff find m-payments easy to use

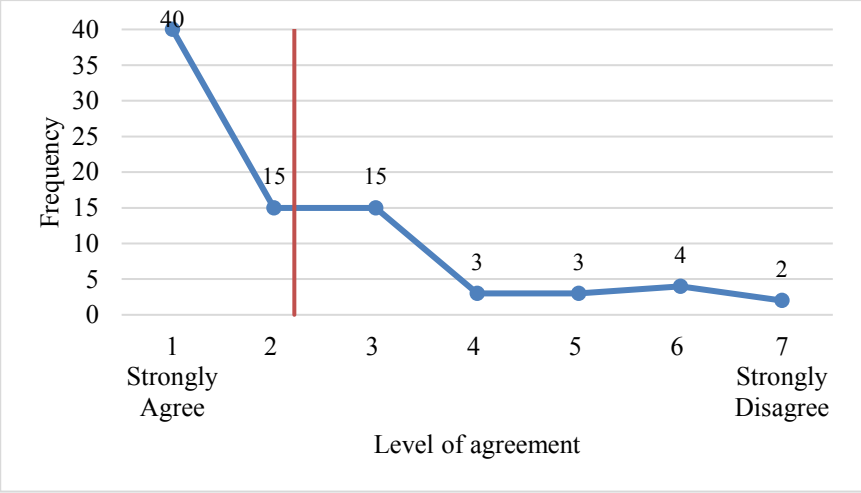

Figure 23: The extent to which it is easy to pay with a mobile phone

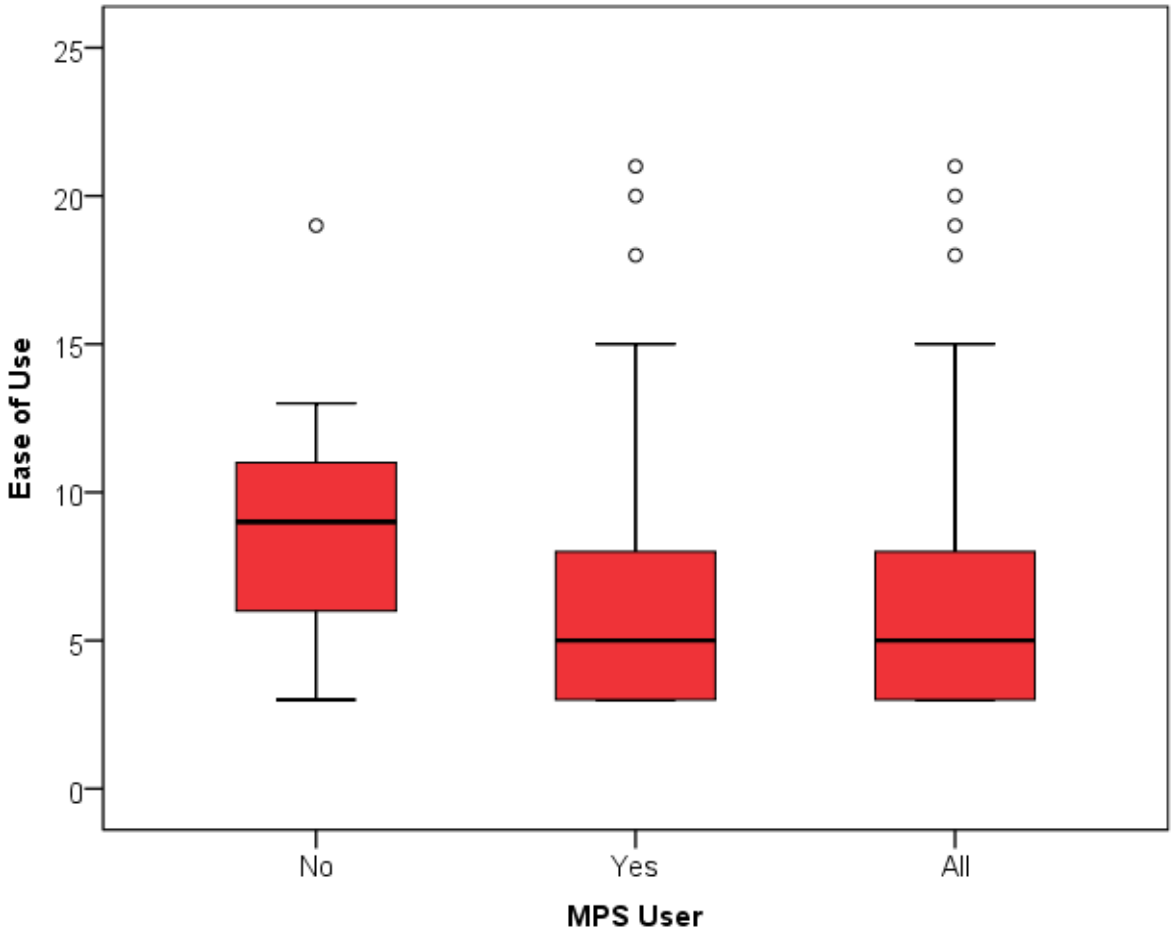

Figure 24: Ease of use box plot

Figure 24 presents a box plot of the aggregate ease of use sample data.

Participating merchants have a smaller median score (5) than nonparticipating merchants (9), suggesting that participating merchants have a more favourable attitude about relative advantage than nonparticipating merchants.

Participating merchants have an interquartile range that is equal (5) to the interquartile range of nonparticipating merchants (5). Participating and nonparticipating merchants may have the same level of agreement with one another regarding the ease of use of m-payments.

Overall, merchants surveyed appear to have a favourable attitude towards the image of m-payments.

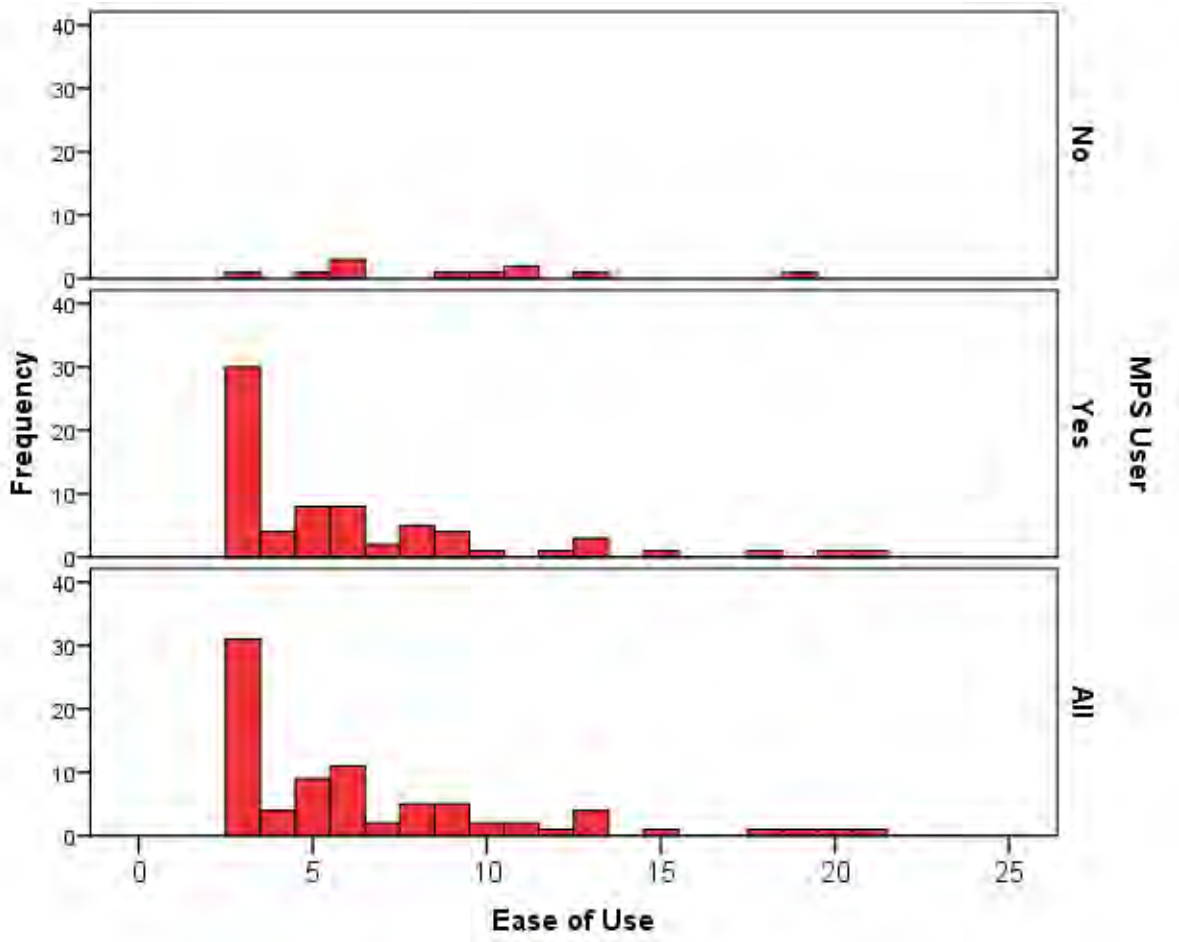

Figure 25: Ease of use histogram

Figure 25 presents a histogram of the ease of use sample data.

There is greater variability in response for nonparticipating merchants but a clear trend towards agreement for participating merchants.

For all merchants, the histogram is slightly skewed to the left, indicating a trend towards agreement.

4.3.5. Visibility

Figure 26 presents the sample data on the extent to which merchants see many other merchants using m-payments in their community.

30% of merchants strongly agree that they see many other merchants using m-payments in their community, while only 4% strongly disagree with this statement.

The average response was 2.9, which is more closely related to agreement than disagreement. This is shown by the red vertical line. Accordingly, 72% of merchants provided a positive (agree) response of varying degrees that merchants see many other merchants using m-payments in their community. This may be explained by the fact that either participating merchants are likely concentrated in a retail environment such as a famer's market where other participating merchants are visible, or where merhcants are aware of the techology solutions competitiors are using. At many of the markets we visited, merchants advertised at their stalls that they offered a m-payment payment option.

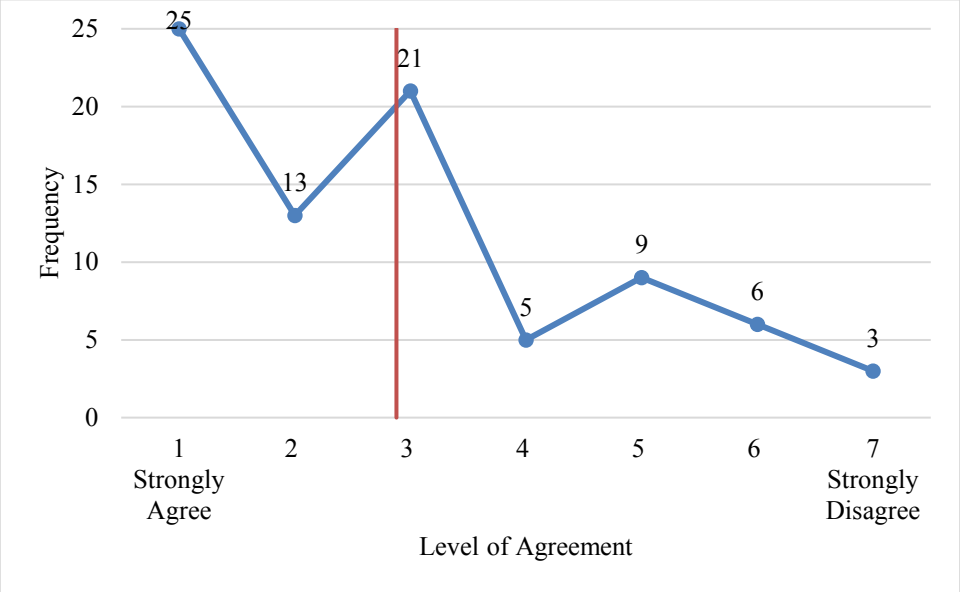

Figure 26: The extent to which merchants see many other merchants using m-payments in their community

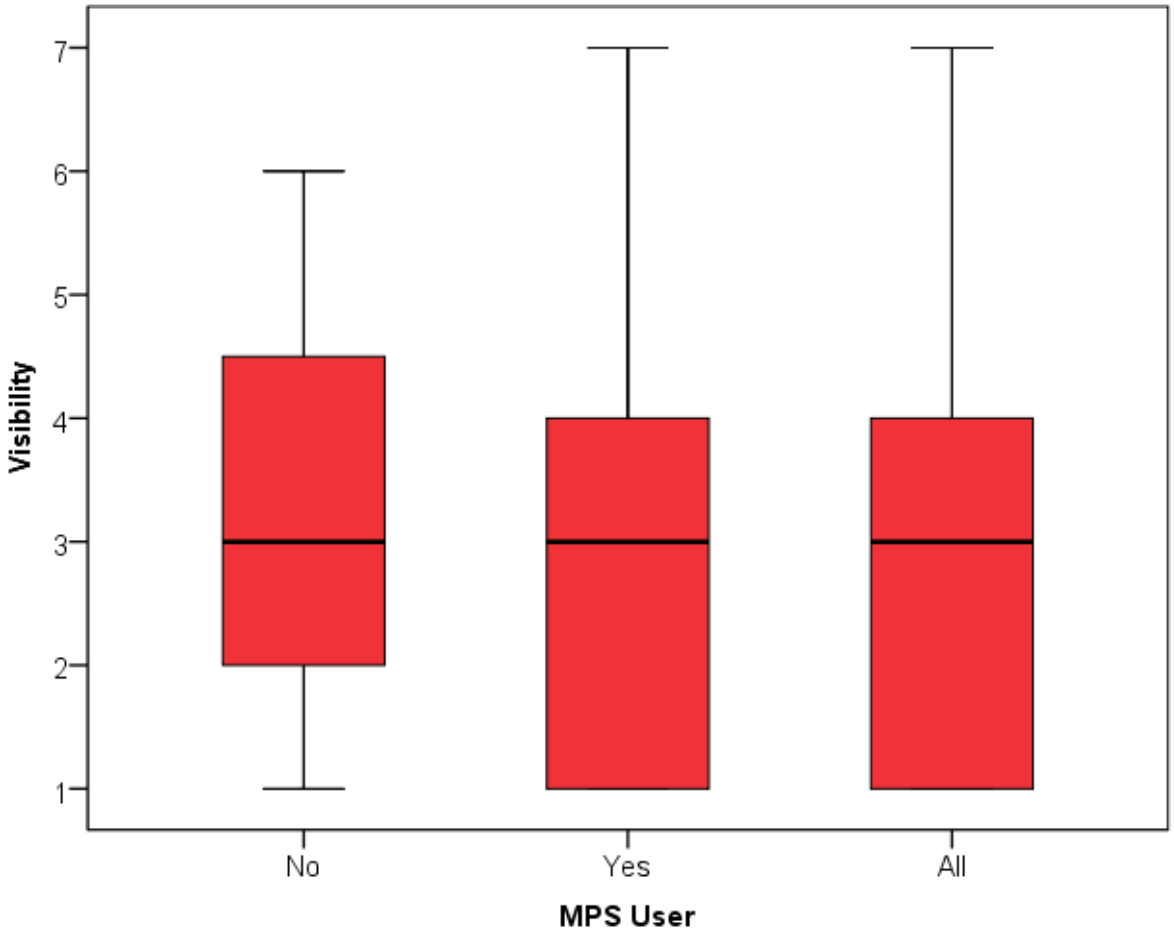

Figure 27: Visibility box plot

Figure 27 presents a box plot of the aggregate visibility data.

Participating merchants have an identical median score (3) to nonparticipating merchants (3), suggesting that both groups have the same attitude towards the visibility of m-payments.

Participating merchants have an interquartile range that is taller (3) than the interquartile range of nonparticipating merchants (2.75). Participating merchants may have a lower level of agreement with one another regarding the visibility of m-payments in their business.

Overall, merchants may have a favourable attitude towards the image of m-payments, but more data is needed to confirm this.

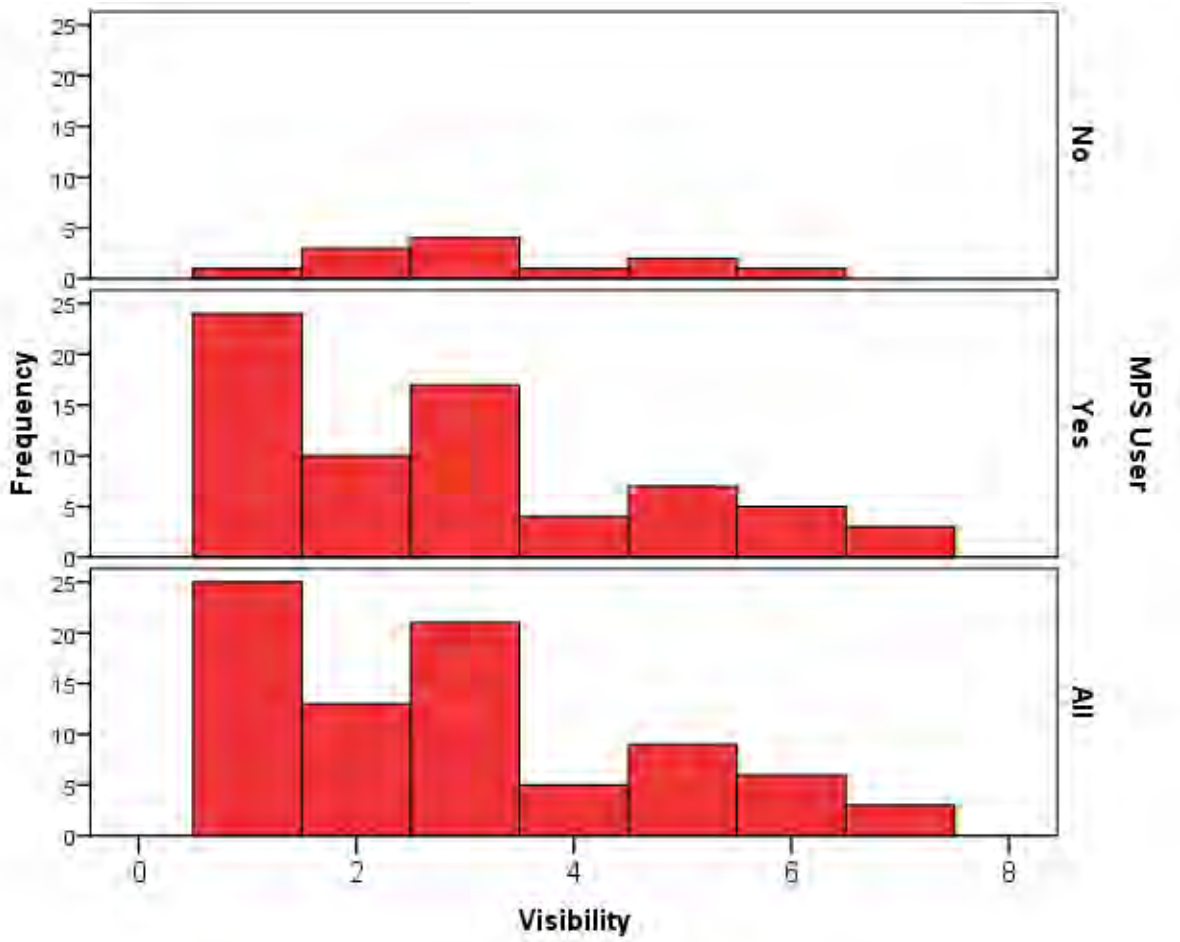

Figure 28: Visibility histogram

Figure 28 presents a histogram of the visibility sample data.

There is greater variability in response for nonparticipating merchants but a clear trend towards agreement for participating merchants.

For all merchants, the histogram is slightly skewed to the left, indicating a trend towards agreement.

4.3.6. Trust and security

Section 4.3.6 presents the line graphs of selected items from the rust and security construct. The average response in Figure 29, 30, 31 and 32 was 2.5, 2.6, 2.8 and 2.4 respectively. In all cases, these tend more towards agreement, as indicated by the red line. Accordingly, 80%,

80%, 77% and 73% of merchants provided a positive (agree) response of varying degrees to the items in question.

The average response for all items in the trust and security construct was 2.4, which is more closely related to agreement than disagreement. Merchants were most in agreement (2) that when using m-payments to receive payments, they get immediate SMS or POS confirmation of the payment transaction. In practice, the staff member facilitating the payment is equipped with a mobile phone to confirm to the customer that the payment has been received and approved. Similarly, merchants were in agreement that: m-payments are trustworthy (2.5); mobile phones are reliable enough for payment transactions (2.6); mobile networks are reliable enough for payment transactions (2.8); the data sent by the MPS during the transaction is confidential (2.4); and m-payment technology is secure.

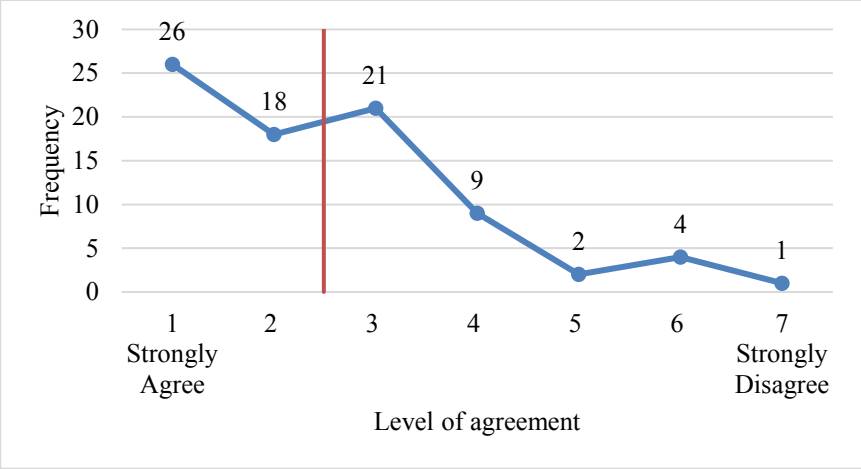

Figure 29: The extent to which m-payment service providers are trustworthy

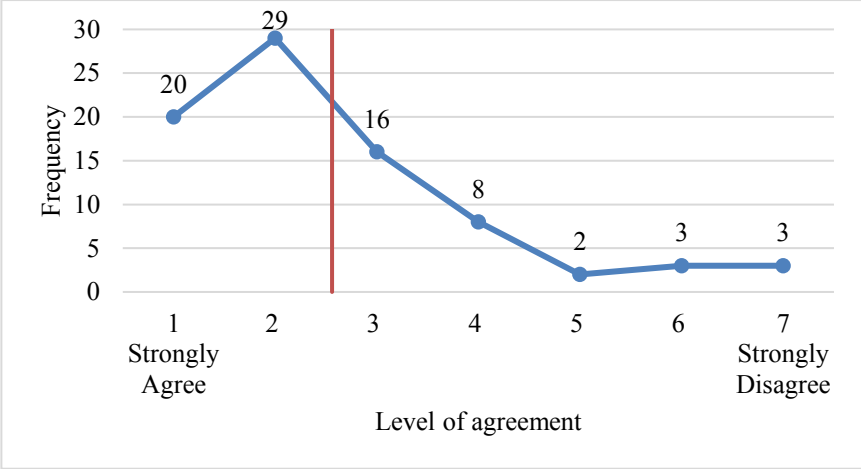

Figure 30: The extent to which mobile phones are reliable enough for payment transactions

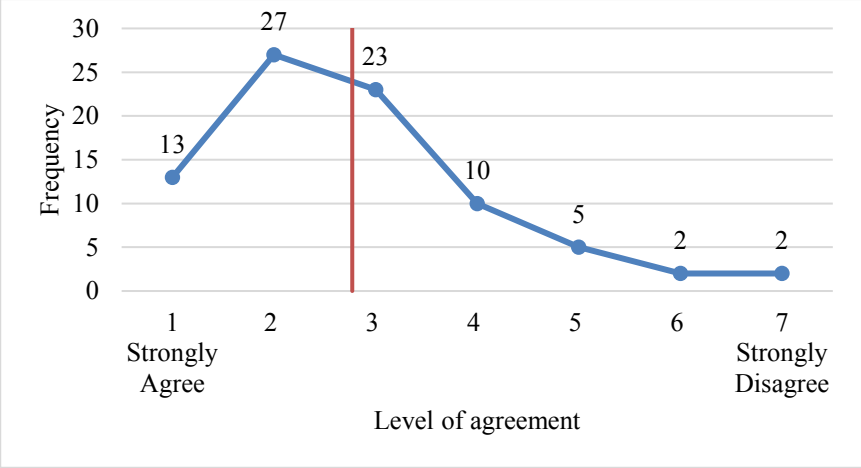

Figure 31: The extent to which mobile networks are reliable enough for payment transactions

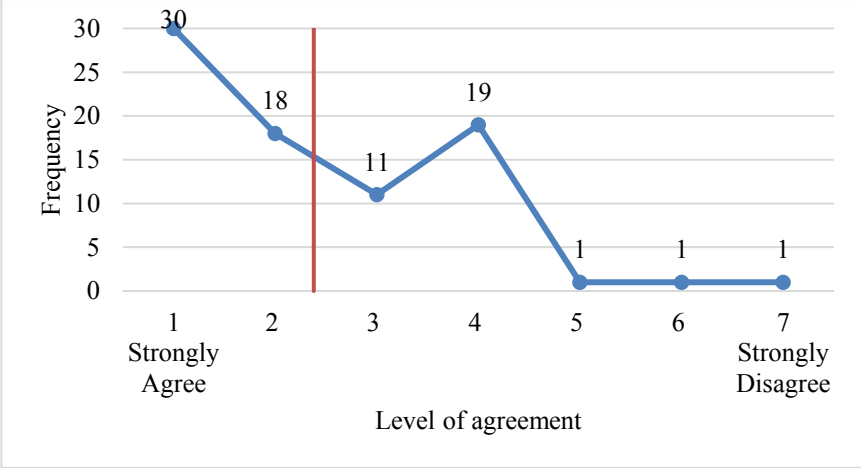

Figure 32: The extent to which data sent during a m-payment transaction is confidential

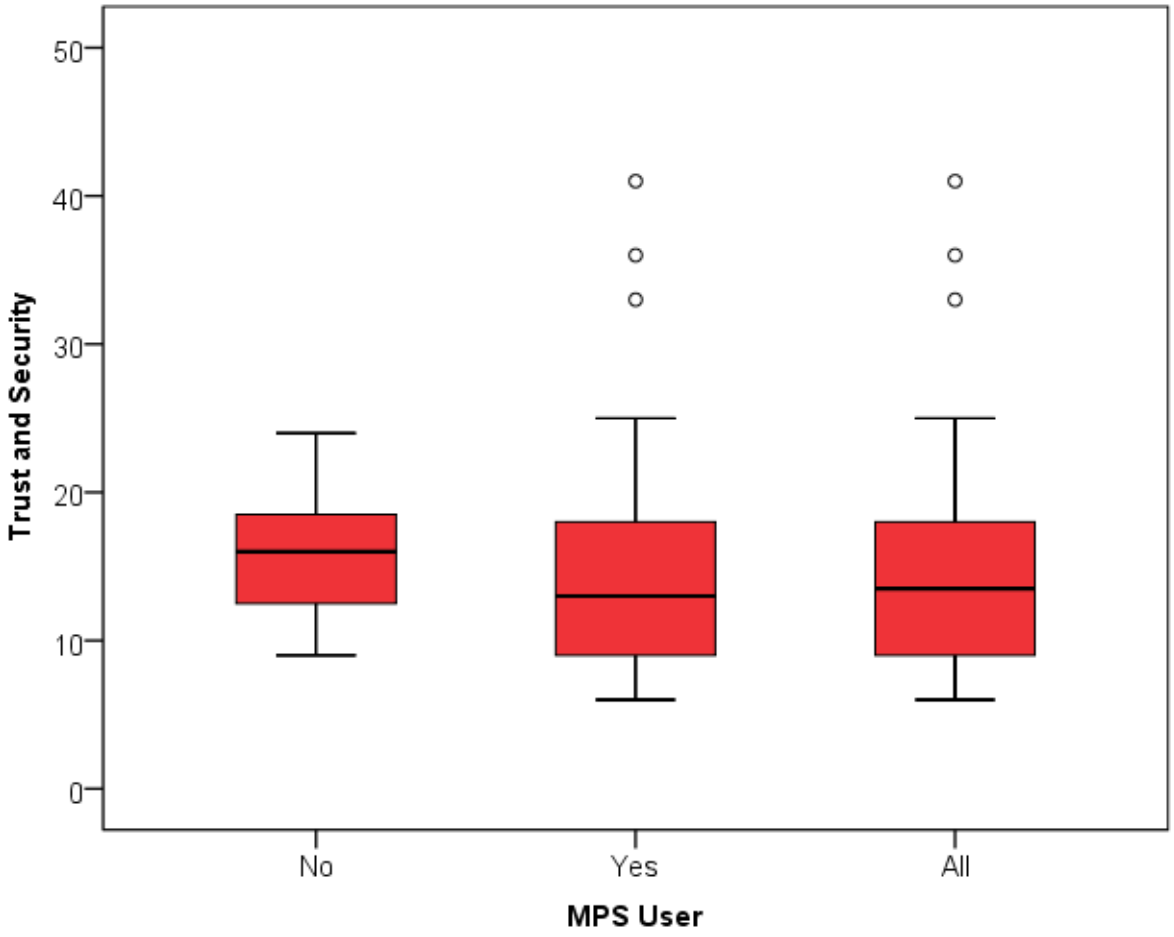

Figure 33: Trust and security box plot

Figure 33 presents a box plot of the aggregate trust and security sample data.

Participating merchants have a lower median score (13) than nonparticipating merchants (16), suggesting that participating merchants have a more favourable attitude about trust and security than nonparticipating merchants.

Participating merchants have an interquartile range that is equal (9) to the interquartile range of nonparticipating merchants (9). Participating and nonparticipating may have the same level of agreement with one another regarding the trust and security of m-payments.

Overall, merchants surveyed appear to have a favourable attitude towards the image of m-payments.

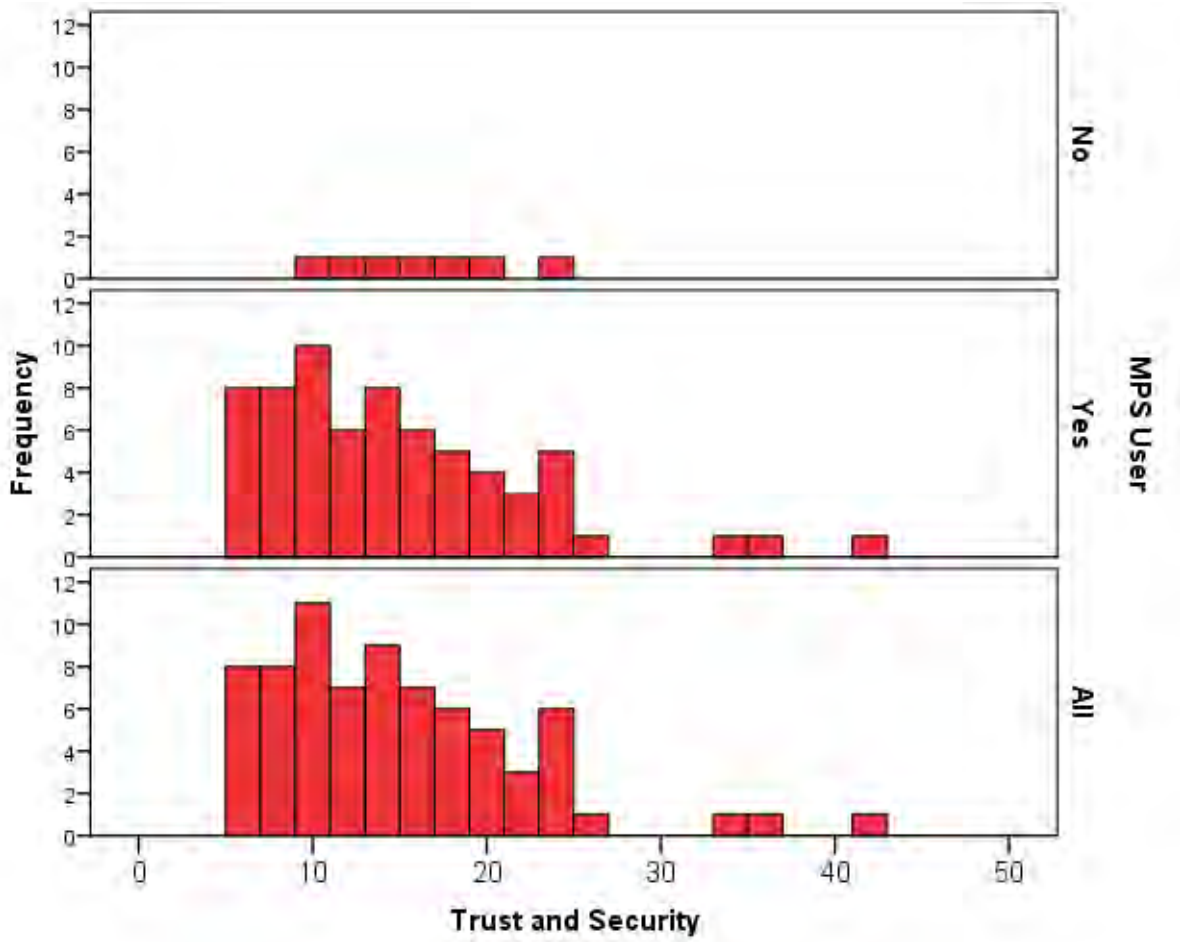

Figure 34: Trust and security histogram

Figure 34 presents a histogram of the trust and security sample data.

There is greater variability in response for nonparticipating merchants but a clear trend towards agreement for participating merchants.

For all merchants, the histogram is skewed to the left, indicating a trend towards agreement.

4.3.7. Results demonstrability

Section 4.3.7 presents the line graphs of selected items from the results demonstability construct. The average response in Figure 35 and 36 was 2 and 2.4 respectively. In all cases, these tend more towards agreement, as indicated by the red line. Accordingly, 84% and 75% of merchants provided a positive (agree) response of varying degrees to the items in question.

The average response for all items in the results demonstrability construct was 2.2, which is more closely related to agreement than disagreement. Merchants were most in agreement (2) that their staff and they would have no difficulty telling others about their experience or results using m-payments. Merchants may have no difficulty communicating with other merchants in an environment where all merchants are closely located. In addtion, whether the experience is positive or negative, merchants can quickly determine – after perhaps a few transactions – their feelings about m-payments, and communicate these to others. There would be no difficulty telling others as the transactions are visible to all. Similarly, merchants were in agreement (2.4) that the results of using the m-payments are apparent to their staff and them. In a retail environment such as a farmer's market, type and speed of over-the-counter transactions are conducive to the results of using m-payments being apparent to other businesses and merchants in the ecosystem. Competing merchants are immediately able to see other customers using m-payments, and their reaction to using the technology. In addition, businesses may be aware of the technology solutions their competitiors are using, and thus may be enticed to adopt similar to techology in order to remain competitive.

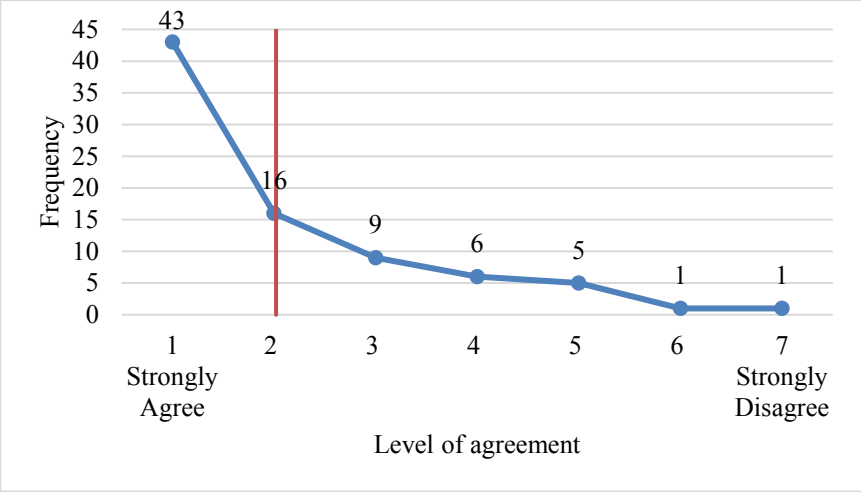

Figure 35: The extent to which merchants and their staff would have no difficulty telling others about their experiences or results using m-payments

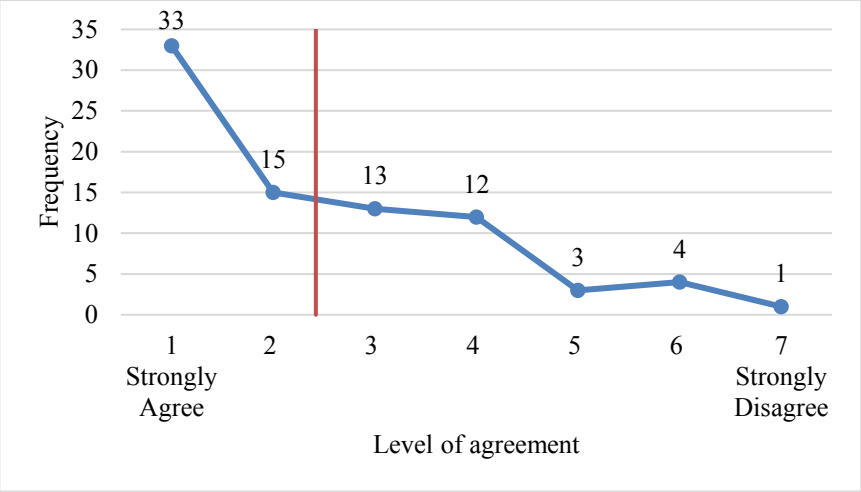

Figure 36: The extent to which the results of using m-payments is apparent to a merchant and their staff

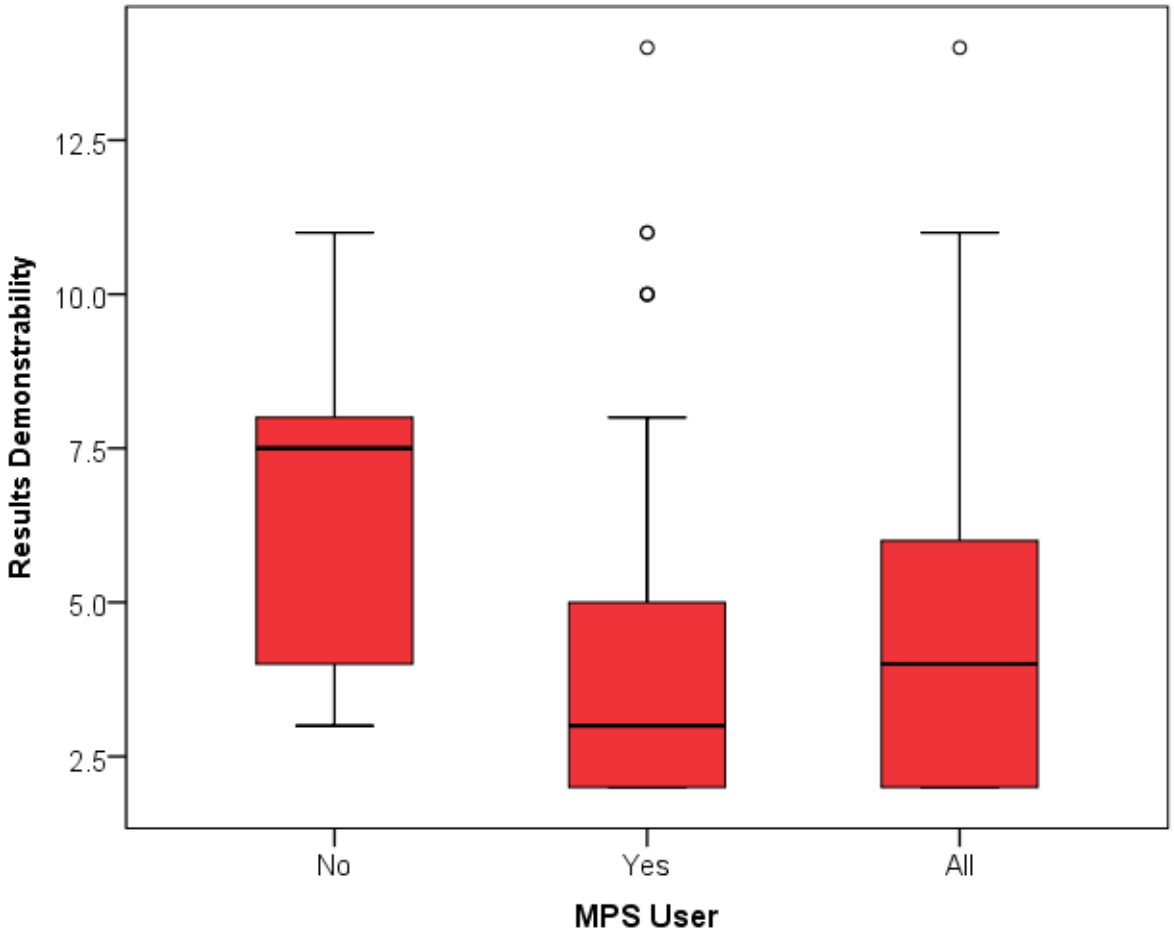

Figure 37: Results demonstrability box plot

Figure 37 presents a box plot of the aggregate results demonstrability data.

Participating merchants have a significantly lower median score (3) than nonparticipating merchants (7.5), suggesting that participating merchants have a more favourable attitude about results demonstrability than nonparticipating merchants.

Participating merchants have an interquartile range that is shorter (3) than the interquartile range of nonparticipating merchants (4.25). Participating merchants may have a higher level of agreement with one another regarding the results demonstrability of m-payments.

Overall, merchants surveyed appear to have a favourable attitude towards the ability to demonstrate the results of m-payments.

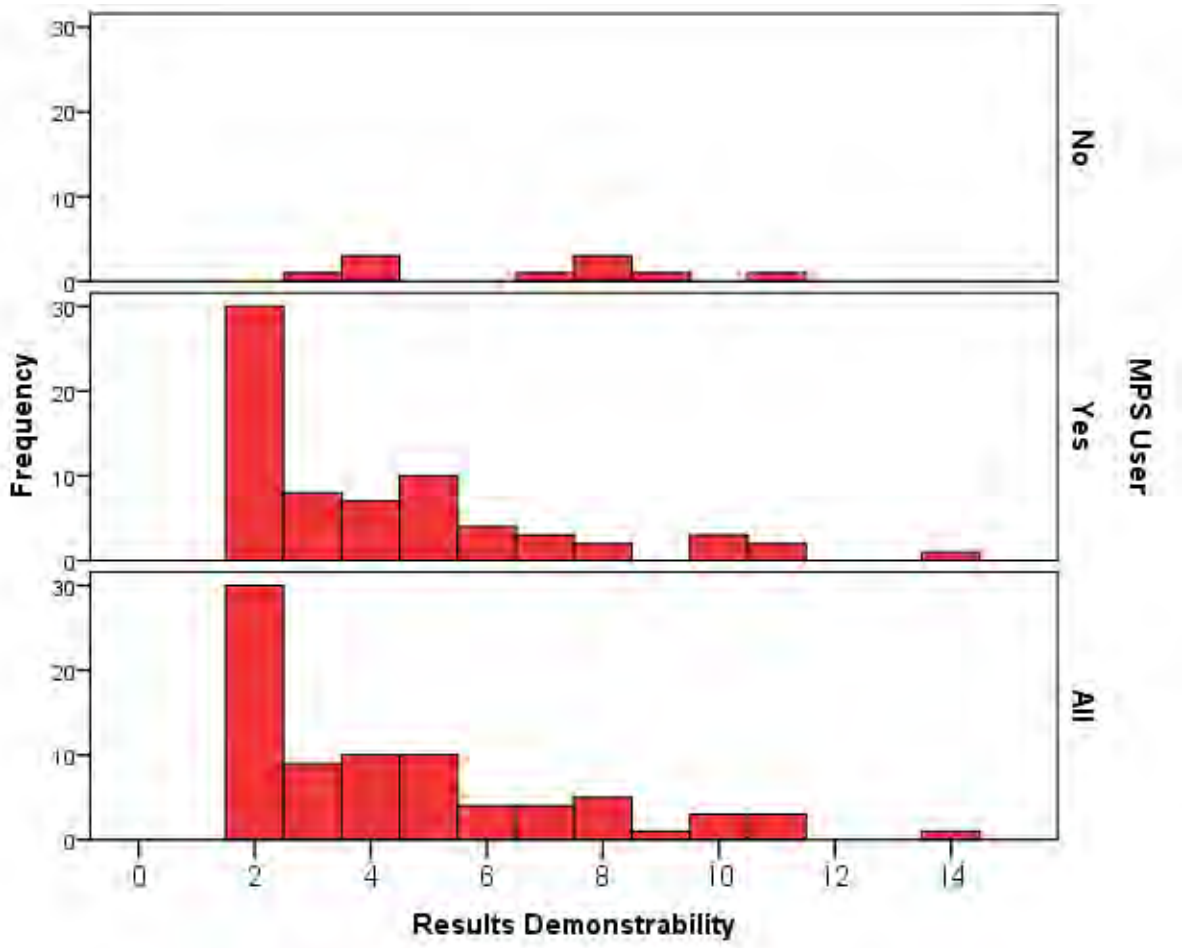

Figure 38: Results demonstrability histogram

Figure 38 presents a histogram of the results demonstrability sample data.

There is greater variability in response for nonparticipating merchants but a clear trend towards agreement for participating merchants.

For all merchants, the histogram is slightly skewed to the left, indicating a trend towards agreement.

4.4. Qualitative content analysis

The objective of the qualitative content analysis was to draw additional insight from our sample data. First, we analyse the open-ended question that asked merchants why they chose their particular m-payment service provider. Second, we analyse the open-ended question that

asked merchants whether they had any comments regarding the use of m-payments in their business.

4.4.1. Merchant's reason for choosing their particular service provider

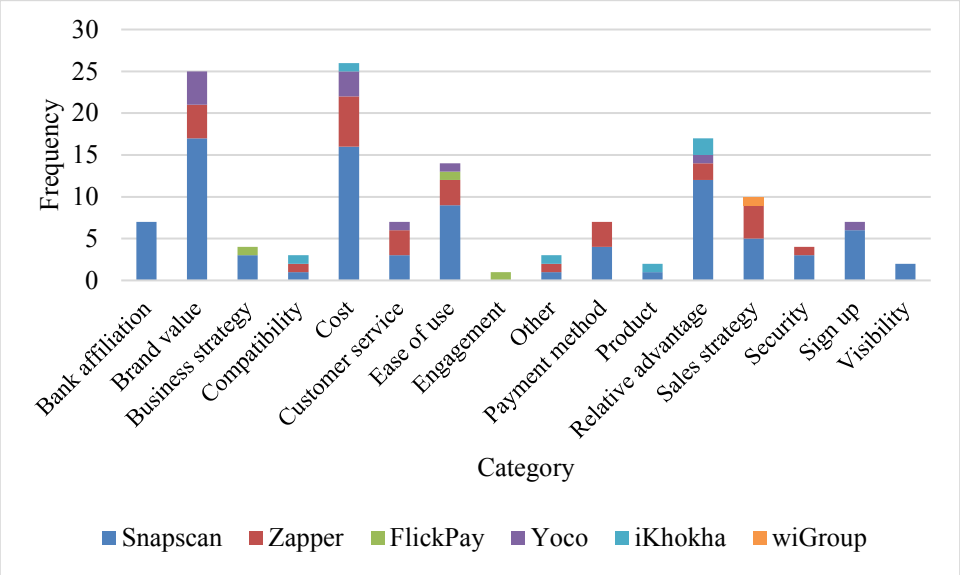

Figure 39: Merchant reason(s) for choosing their particular payment service provider by category

Figure 39 presents the data collected from the first open-ended question in the questionnaire that asked merchants why they chose their particular m-payment service provider.

A total of 139 responses were collected. These comprise 16 distinct categories across five service providers: Snapscan, Zapper, FlickPay, Yoco, and wiGroup. Snapscan represents 65% of all responses, followed by Zapper (20%), Yoco (8%), iKhokha (4%), FlickPay (2%), and wiGroup (1%).

Figure 39 comprises only positive responses from the merchants. This is expected, given the nature of the question. One negative response was excluded as it was deemed irrelevant. The response was: "[I] was bitterly disappointed with my bank's service (none) and payment structure."

Bank affiliation comprises 5% of all responses and is represented by one service provider - Snapscan. Merchants acknowledge that the primary reason for using Snapscan is its

affiliation with Standard Bank. One merchant stated: “We bank with Standard Bank, who is also the authority behind Snapscan.” The affiliation with a well-known commercial bank may enhance the value of the service provider because it gives the service provider additional credibility.

Cost is the largest category in the data sample and comprises 19% of all responses. It is represented by four service providers, of which Snapscan and Zapper comprise 62% and 23% respectively. 54% of merchants in the cost category state that “low” transaction fees are the primary reason for choosing their particular m-payment service provider. Merchants also stated that using their particular service provider was “cost-effective” and involved “no monthly fees.” Given the frequency of responses in this category, it appears that merchants prioritise cost-saving activities in their businesses.

Customer service comprises 5% of all responses and is represented by three service providers: Snapscan, Zapper, and Yoco. One merchant stated that their service provider provided “impeccable service.” Another stated that their service provider was “great to work with.” Good customer service is not surprising, considering the competition between service providers for merchants, and the ease with which merchants can switch between service providers.

Sales strategy comprises 7% of all responses. It is represented by three service providers, of which Snapscan and Zapper comprise 50% and 40% respectively. Merchants in this category state that they were either approached in-person or contacted by a representative of the service provider.

Engagement comprises 1% of all responses and is represented by one service provider: FlickPay. The merchant stated that the reason for choosing their particular service provider is because they offer points or rewards. Importantly, this merchant also had an affiliation with FlickPay.

Business strategy comprises 3% of all responses and is represented by two service providers: Snapscan and FlickPay. Merchants in this category state that they chose their particular service provider because they were "first to market." One merchant stated: "At the time they were the only people offering the service."

Visibility comprises 1% of all data points and is represented by one service provider. One merchant stated: "[I] saw a lot of other traders at markets use them"

Brand value comprises 18% of all responses. It is represented by three service providers, of which Snapscan, Zapper and Yoco comprise 68%, 16% and 16% respectively.

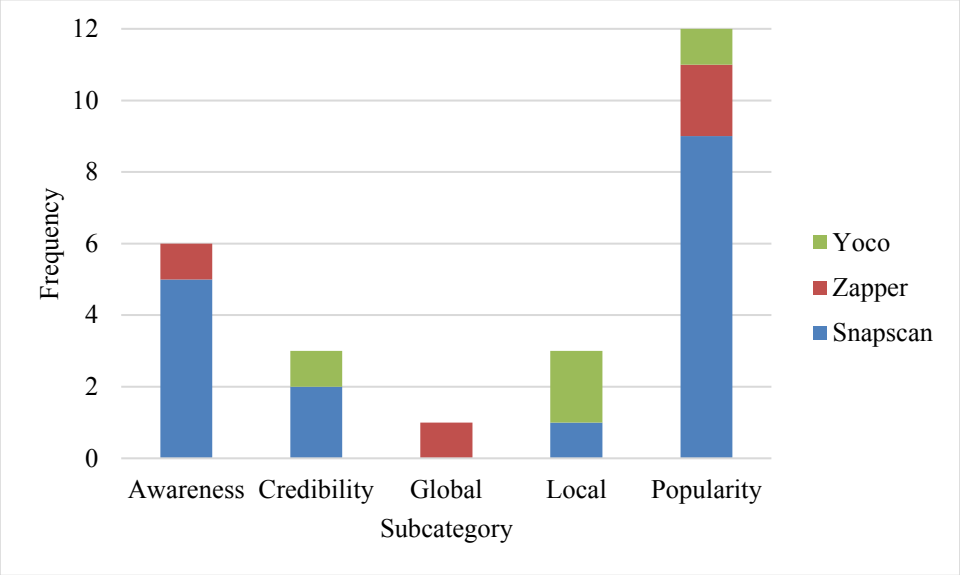

Figure 40: Brand value analysis

Figure 40 presents the subcategories in the brand category. They are: awareness, credibility, global, local, and popularity.

We expect the brand value of the service provider to carry substantial weight given the novelty of the technology to the market and consumers. This may seem counterintuitive since many of the service providers are young. Consequently, brand awareness, credibility, local and popularity comprise the key subcategories in this category.

Popularity is the largest subcategory in the brand category and comprises 48% of all responses. It is represented by three service providers, of which Snapscan comprises 75%. Merchants in this subcategory simply stated that Snapscan is the most popular service provider, or the service provider that they recognise the most.

The awareness, local, credibility, and global subcategories comprise 24%, 12%, 12%, and 4% respectively.

Relative advantage comprises 12% of all responses. It is represented by four service providers, of which Snapscan, Zapper, iKhokha and Yoco comprise 71%, 12%, 12% and 6% respectively. This category is presented in more detail below.

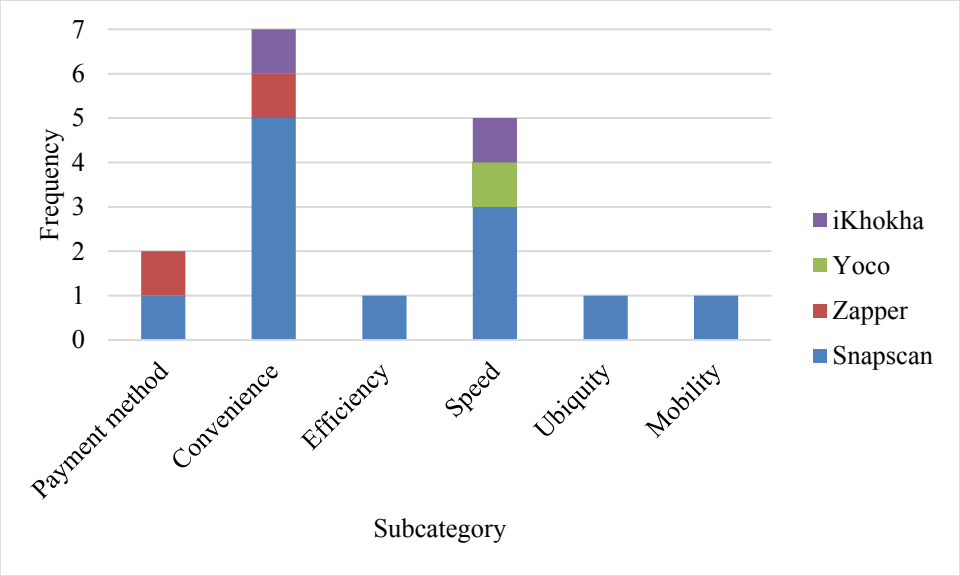

Figure 41: Relative advantage analysis

Figure 41 presents the subcategories in the relative advantage category. They are: payment method, convenience, efficiency, speed, ubiquity, and mobility.

Convenience is the largest subcategory in the relative advantage category and comprises 41% of all responses. It is represented by three service providers, of which Snapscan comprises 71%. Merchants in this subcategory stated that Snapscan is convenient for both merchants and consumers. One merchant stated: “Convenience for customers when they want to buy but don't have cash on them”

Speed is the second largest subcategory in the relative advantage category and comprises 29% of all responses. It is represented by three service providers: Snapscan, Yoco, and iKhokha. Quick POS transactions may be particularly beneficial in a busy retail environment. One merchant stated "quick processing time" as the reason for choosing their particular service provider.

In summary, merchants have a myriad of reasons for choosing their particular m-payment service provider. We found that merchants across service providers state similar (positive) reasons for choosing their service provider.

The key reasons why merchants choose their particular m-payment service provider are: brand value, cost, relative advantage, and ease of use.

Furthermore, for participating merchants, each category represents a specific value-add to their business. Merchants likely realise multiple benefits in their business, some more explicitly than others.

4.4.2. Open comments from merchants regarding the use of m-payments in their business

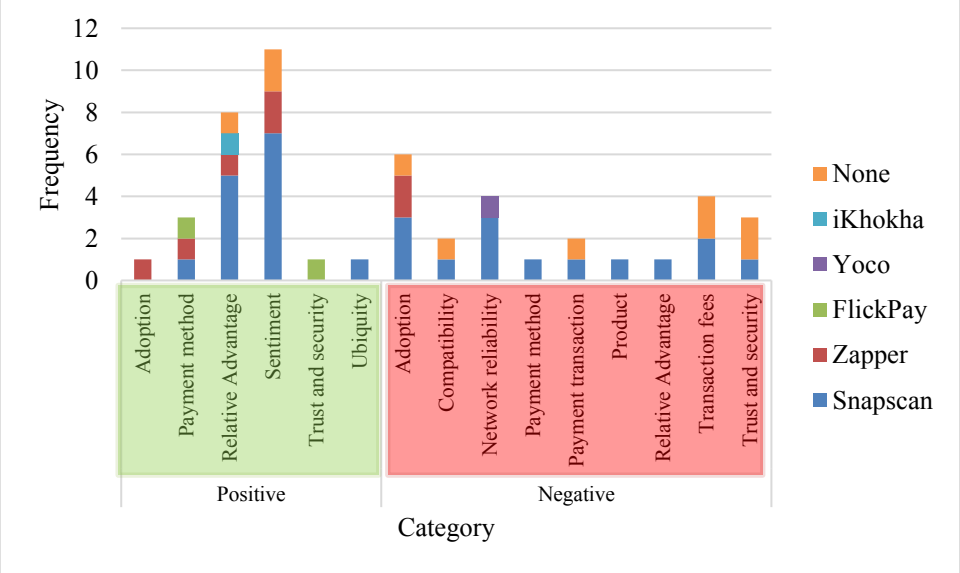

Figure 42: Taxonomy of merchant comments regarding the use of m-payments in their business

Figure 42 presents the data collected from the second open-ended question in the questionnaire, which asked merchants whether they had any comments regarding the use of m-payments in their business.

A total of 49 responses or data points were collected. These comprise 11 distinct categories across four service providers: Snapscan, Zapper, FlickPay, and Yoco. There is a category for merchants that do not use m-payments, labelled "None."

The categories were also categorised as either positive or negative. 49% of responses are positive; 51% of responses are negative.

Snapscan represents 57% of all responses, followed by None (20%), Zapper (14%), FlickPay (4%), Yoco (2%), and iKhokha (2%).

We define sentiment as any view regarding the use of m-payments that is expressed (Oxford Dictionary, 2016). Positive sentiment comprises 22% of all responses and is represented by two service providers: Snapscan and Zapper, and None. Merchant responses included: "we love using it," "It is the future of payments," "I like Snapscan to replace cash purchases," and "It is one of the best possible inventions." Interestingly, even merchants not using m-payments had favourable views about the use of m-payments, and its future.

Relative advantage is represented in both the positive and negative categories. In the positive category, relative advantage comprises 16% of all responses and is represented by three service providers: Snapscan, Zapper and iKhokha, and None. Merchant responses included: "It is a very effective form of payment," "It has definitely increased my overall sales," and "It is very convenient during load shedding." In the negative category, relative advantage comprises 2% of all responses and is represented by one service provider: Snapscan. The merchant stated: "Using Snapscan is free but it doesn't offer many benefits over a regular card machine."

Ubiquity is represented in the positive category. It comprises 2% of all responses and is represented by one service provider: Snapscan. One merchant stated: "it makes payment at various locations easier, seeing that my staff and I do not have to carry a card machine, but

rather only the piece of paper with the QR code. Very convenient for both ends of the transaction!"

Network reliability refers to the reliability of the overall network to provide communication in the event of failure of a component (Medhi, 1999). Network reliability is represented in the negative category. It comprises 8% of all responses and is represented by two service providers: Snapscan and Yoco. Merchant responses included: "[m-payments are] heavily reliant on the networks which make them inconsistent" and "My only negative feedback would be connectivity to my MPS network."

Trust and security is represented in both the positive and negative categories. In the positive category, trust and security comprises 2% of all responses and is represented by one service provider: FlickPay. In the negative category, trust and security comprises 6% of all responses and is represented by one service provider: Snapscan, and None. Merchant responses included: "[many customers] aren't confident with its [m-payment] security" and "my staff would feel unsure about challenging someone if they felt that they were trying to fraudulently receive goods by faking a MPS transaction."

Adoption is represented in both the positive and negative categories. In the positive category, adoption comprises 2% of all responses and is represented by one service provider: Zapper. In the negative category, adoption comprises 12% of all responses and is represented by two service providers: Snapscan and Zapper, and None. Merchant responses included: "Despite offering Zapper as a payment option for the past 6 months, we've had very few payments" and "Customer take up is low." Moreover, merchants also recognised that m-payments are suitable for different customer segments, especially younger customers. Merchant responses included: "MPS suited for different customers, especially younger customers" and "Adopters tend to be younger."

In summary, the open merchant responses regarding the use of m-payments in their business were mixed in terms of the sentiment (positive or negative), by category type, and by service provider. Participating merchants comprise 80% of all responses, of which 56% are positive

and 44% are negative. These merchants may have a slightly more favourable attitude towards m-payments. Nonparticipating merchants comprise 20% of all responses, of which 30% are positive and 70% are negative. These merchants may have a less favourable attitude towards m-payments.

There are two key positive results from this question. First, there is considerable excitement surrounding m-payments. The strength and volume of positive responses, particularly from Snapscan merchants, was noteworthy. This may be due to m-payments being an innovative technology. Second, merchants recognise relative advantage as a key positive result. This may be due to the wide-ranging and practical benefits of m-payments. For example, one merchant stated that m-payments is convenient during load shedding. Moreover, merchants across different service providers stated similar positive responses relating to relative advantage.

The key negative result from this question was trust and security. Merchants appear to be concerned about the reliability of the network, m-payments security, and fraudulent activity. This may be due to the reliability of m-payments since it represents a novel technology facilitating monetary transactions. Two merchants made negative statements about the reliability of the network.

4.5. Reliability and validity analysis

IBM SPSS Statistics (Version 22, IBM Corporation) was used to estimate the PCI model. The adequacy or internal consistency of a measurement model can be assessed by looking at the individual item reliabilities (Fornell and Larcker, 1981). Individual items with a Cronbach alpha coefficient of more than 0.7 are deemed reliable (Nunnally, 1978). All measurement items had a positive coefficient greater than 0.7 (see Table 8). The values range between 0.719 and 0.911, indicating a high reliability. All measurement items were thus retained. Visibility is not applicable to this analysis as only one item was used to construct the scale.

Scale Item	Cronbach's Alpha
Relative Advantage	0.841
Image	0.719
Compatibility	0.790
Ease of Use	0.884
Visibility	N/A
Trust and Security	0.911
Results Demonstrability	0.878

Table 8: Reliability statistics

4.6. Discussion

The objective of our research was to empirically investigate merchant adoption of m-payments in South Africa. The PCI measurement instrument developed by Moore and Benbasat (1991) was used to study the initial adoption of m-payments in organisations, and capture rich, individual information from key antecedent constructs. Our sample data comprised 82 merchants, of which 70 were participating merchants, and 12 nonparticipating merchants. Nearly 70% of retailers in our sample had been in operation for 5 years or less, and are from more than 10 different industries. The Restaurant and Bar industry comprised 32% of the merchants in our sample.

The average response for items in the intention to adopt construct was 2.3, which is more closely related to agreement than disagreement. Merchants were more in agreement that they intend to use m-payments in their businesses in the future (1.9) than that they intend to use m-payments in their business as often as possiblev (2.7). At the 5% significance level, all seven constructs in our model had a significant Spearman's rank correlation coefficient with each of these variables. Notably, relative advantage had a strong positive correlation with both variables. Furthermore, all individual items had a Cronbach's alpha coefficient greater than 0.7, indicating high reliability.

Scale Item	Average response
Relative Advantage	2.8
Image	3.3
Compatibility	2.7
Ease of Use	2.2
Visibility	2.9
Trust and Security	2.4
Results Demonstrability	2.2

Table 9: Average response per construct

Table 9 summarises the average response, for each construct. For each of the seven constructs, the average response was more closely related to agreement than disagreement. Merchants provided a positive (agree) response of the strongest degree for ease of use (2.2) and results demonstrability (2.2).

Scale Item	Mean	Minimum	Maximum	Variance	No. of Items
Relative Advantage	.474	.268	.869	.032	6
Image	.579	.579	.579	.000	2
Compatibility	.571	.490	.716	.013	3
Ease of Use	.719	.598	.928	.027	3
Trust and Security	.633	.433	.938	.017	6
Results Demonstrability	.787	.787	.787	.000	2

Table 10: Summary item statistics

Table 10 presents a summary table of the pairwise correlation coefficients. The correlations within each construct are positive. The mean of ease of use (0.719) indicates a strong positive correlation between variables in the construct. The mean of results demonstrability (0.787) indicates a strong positive correlation between variables in the construct. This supports the idea that ease of use and results demonstrability are the key constructs in our model.

In summary, the median box plot scores indicate that participating merchants have a more favourable attitude towards each construct, except visibility, where participating and nonparticipating merchants have an identical median score. Participating and nonparticipating merchants may operate in a retail "community" where they are equally visible.

The interquartile box plot range indicates mixed results regarding the level of agreement between participating and nonparticipating merchants. These results indicate that participating and nonparticipating merchants may have a higher, lower or equal level of agreement with one another, for each construct. Participating merchants have a lower level of agreement with one another for the visibility and compatibility constructs. Participating merchants may argue that using m-payments does not always fit with the way they and their staff like to receive payments for goods and services, or that m-payments is not compatible with all aspects of the business's sales transaction, or POS system. Subsequently, each histogram confirms that there is greater variability in response for nonparticipating merchants but a clear trend towards agreement for participating merchants. In other words, there is a mostly positive response from participating merchants but uncertainty in response from nonparticipating merchants.

Finally, the qualitative content analysis provided deeper insight into the use and attitudes towards m–payments. Merchant responses comprise 20 categories across six service providers: Snapscan, Zapper, FlickPay, Yoco, wiGroup, iKhokha, and None. First, we found that many merchants held similar key beliefs about m-payments. Cost was the most common response in the first question. Merchants were particularly concerned about transaction fees and setup and maintenance costs compared to existing payment methods. Lower transaction fees may be a significant incentive for merchants to adopt m-payments. Next, relative advantage was a key factor in both questions. Relative to existing payment methods,

merchants noted a wide-range of benefits that m-payments provide. In particular, the speed, ubiquity, and convenience of the payment method stood out.

Trust and security was a key factor with mixed results. Merchants stated that they were concerned about network reliability, fraud, and general security. This may be due to the novelty of the payment method. One merchant stated that "many many customers aren't confident with its security." Conversely, merchants in the first question specifically stated that the safety of m-payments was a key driver for adoption.

Finally, adoption was also a key factor with mixed results. In both questions, merchants made positive comments about the use and future of m-payments. Merchants additionally stated that m-payments were common amongst a younger segment. However, both participating and nonparticipating merchants noted slow adoption rates. Adoption was the most common negative response found in the qualitative analysis.

5. Conclusion

With this thesis, we have contributed to the body of knowledge on mobile payments by empirically investigating the adoption factors of m-payments from the merchant's perspective, and providing new insight into m-payments in the South African context. The research model is based on the Perceived Characteristics of Innovation (PCI) instrument developed by Moore and Benbasat (1991) to measures various perceptions of using an information technology innovations. To our knowledge, this study is one of the first to empirically develop a comprehensive PCI model of the factors affecting the merchant adoption of m-payments in South Africa.

On the driver's side, our findings suggest that ease of use and results demonstrability are the most significant variables in our PCI model. We also found relative advantage, convenience, speed and brand value to be key drivers for adoption. Regarding the barriers to adoption, trust and security, and cost, especially transaction fees, were found to be concerns for merchants. Finally, while there is considerable excitement surrounding m-payments, our findings suggest a varied sentiment regarding intention to adoption.

5.1. Implications

Our findings provide several contributions to emerging m-payment research. First, our research ventures from existing technology adoption research and adds to the theoretical discussion on the adoption of new technologies using the PCI framework. Our model uses selected constructs that were identified in a structured format, and offers a comprehensive instrument for existing and future m-payment research. In addition, a well-rounded understanding of merchant adoption can be achieved when considering the drivers and barriers to adoption using this PCI framework. Second, our results contribute to the knowledge-base on m-payments, and provide key insights to numerous stakeholders such as service providers, merchants and consumers. This is important given the need for new payment methods, and merchants' uncertainty about the market, adoption, and operational and strategic objectives such as profitability. Third, since m-payment adoption is a novel research field in South Africa, our research includes both quantitative and qualitative data to

understand merchant perceptions and the implications of the constructs. We hence elicit a more comprehensive yet parsimonious conceptualisation of IT artifacts in different contexts (Orlikowski and Iacono, 2001).

In addition, our findings have several implications for management, and the development of m-payments. Service providers and merchants should consider the drivers and barriers as levers for adoption. First, the drivers of m-payment adoption provide insight into the areas that service providers should focus on. Our findings suggest that m-payments should be easy to use, convenient, quick, and have a positive brand value that appeals to both merchants and consumers, thus driving a critical mass. To realise these benefits, service providers and developers need to foster a collaborative relationships in the development of m-payment systems. Second, the barriers provide insight into the areas of m-payment development that require immediate attention. Our findings suggest that customers need to be convinced of the security, reliability and transaction costs related to m-payments. These concerns were particularly evident in the qualitative analysis. Service providers can ensure that transaction costs are competitive against existing payment systems such as credit and debit card payments. Third, there is a mixed sentiment regarding m-payment technology. This needs to be address in a way that makes the technology appear user-friendly and reliable to all stakeholders. Fourth, we recommend that service providers conduct market research to evaluate whether merchants are ready to adopt.

5.2. Limitations

Our research has several limitations. First, despite the fact that over 1650 questionnaires were distributed, the response rate of approximately 5% was poor. I believe the questionnaire was too long, including the fact that all the questions were presented directly after one another without reading breaks. In addition, the incentive cash prize did not appear to work. Second, because the data was collected via an electronic questionnaire, we work under the assumption that merchants had a full understanding of the questions, and had no biases when self-reporting. Third, and in contradiction to the questionnaire being too long, there were too few questions for each construct. Hence the way in which data was gathered did not allow for a comprehensive understanding of the results. Fourth, our sample size of 82 respondents is

small, and compels us to not draw strong conclusions from our data. Fifth, our findings were obtained in only one specific empirical context. As a result, we cannot generalise our findings beyond the current sample and adoption context (Plouffe et al., 2001b). Sixth, the dependent construct in our model represents behavioural intent rather than actual adoption behaviour (Plouffe et al., 2001b). However, in this context, intention to adopt and actual adoption behaviour are highly correlated. We therefore assume that intention to adopt is a reasonable proxy for actual adoption behaviour (Plouffe et al., 2001b). In addition, because novel technologies such as m-payments represent a small, incremental improvement in payment technology, consumers and merchants may be hesitant to adopt the technology simply because the benefit does not clearly outweigh the cost. As a result it is difficult to measure merchant's true perception of m-payments without the having tried the technology. Finally, there is the lack of recent research studies on the topic, and research studies conducted in similar, developing markets. This is important given that m-payment technology is evolving quickly which means more recent studies are more applicable. In addition, this limited the understanding of the research problem in a developing market context.

5.3. Future research

Our findings provide several contributions for future research on m-payments. First, we suggest that additional research is carried out using empirical methods to investigate the relationship between selected PCI constructs and adoption intent. The researcher should aim to generate a larger sample size and better response rate in order to draw stronger conclusions from the data. A shorter questionnaire will help drive these objectives. In addition, this research should be carried out for merchants and consumers separately since the success of both groups is interdependent. Second, since our research identifies key adoption factors using a comprehensive approach, we suggest that future research uses our model as a base for adoption research in different countries. This will further test and validate our model. Third, since m-payments represent a novel technology, we suggest using a quantitative and qualitative approach to develop a greater understanding of the nuances of m-payment success and a more comprehensive conceptualisation of m-payments in different contexts. Fourth, we recommend that service providers and developers of payment systems collaborate with merchants and consumers to gain a better understanding of the requirements to go to market

with a more robust m-payment service. These requirements should anticipate the needs of changing business and revenue sharing models. In addition, more research is needed to examine viable revenue sharing models for m-payments. Fifth, more research is needed to understand the potential network externalities and their effects on both customer and merchant adoption of m-payments. Finally, more research is needed to understand how to promote cooperation and standardisation in the South African industry.

6. Acknowledgements

The process of writing a thesis is long and arduous – and I have been fortunate to have the support of several people that deserve a special mention. First, I would like to thank my family and girlfriend for their unwavering encouragement and understanding. It would not have been possible to achieve my goals without them. Second, I would like to extend my deepest gratitude to my supervisor, Dr. Hussein Suleman. Without his guidance, expertise and patience, this research and thesis would not have happened. I would also like to thank the University of Cape Town Computer Science Department for giving me the opportunity to pursue this undertaking. Finally, I would like to acknowledge the Statistical Consulting Services from the Department of Statistical Sciences at the University of Cape Town for their assistance in computing my results.

Any opinion, findings and conclusions or recommendations expressed in this document are those of the author. The Statistical Consulting Service (UCT) does not accept responsibility for the statistical correctness of the research results reported.

7. Appendix

Appendix 1

Appendix 1 presents a summary of the markets in Greater Cape Town by area visited to collect data.

Area	Market
Cape Town	City Bowl Market; V&A Market Wharf; V&A Watershed; Oranjezicht City Farm Market; Earth Fair Food Market
Woodstock	The Palms Woodstock; Old Biscuit Mill; Neighbourgoods Market; Day Before Thursday
Southern Suburbs	Vineyard Oval; Access Park
Constantia and Tokai	The Range Function and Conference Centre; Constantia Waldorf Night Market; Tokai Forest Market
Hout Bay	Bay Harbour Market; Blue Bird; Vlei Market
Paarl, Stellenbosch and Somerset West	Root 44, Slow Market Stellenbosch, Winelands Chocolate Festival, Lourensford Harvest market, Blaauenklip Family Market, Spice Route Destination

Table 11: Markets in Greater Cape Town by area

Appendix 2

Appendix 2 presents the questionnaire used in the thesis.

Questionnaire

What is your name? This information is used only to track respondents.

What is the name of your business? This information is used only to track respondents.

How many years has your business been in operation (round to the nearest year)?

What industry is your business in?

What payment channel(s) does your business use to receive payments? Please tick the appropriate box (es).

- Cash
- Credit Card
- Debit card
- Electronic Fund Transfer (EFT)
- Cheque
- Mobile Payment Service (MPS)
- In kind
- Other: _____

What mobile payment service does your business use to receive payments, if any? Please tick the appropriate box (es).

- Snapscan
- Zapper
- FlickPay
- None
- I don't know
- Other: _____

Why did you choose your particular mobile payment service provider? This question is only for merchants currently using an MPS.

In the following choices, please circle the number which corresponds most closely to your desired response for each statement. Please answer all questions.

The terms “mobile payment” and “mobile payment service (MPS)” are used interchangeably.

Intention to Use

1. I intend to use an MPS in my business in the future.

2. I intend to use an MPS in my business as often as possible.

Relative advantage

3. Mobile payments increase business sales.

4. Mobile payments increase impulse purchases.

5. Our business’s products can be paid for with an MPS.

6. Paying with a mobile phone speeds up payments.

* 7. Using an MPS enhances the merchant’s effectiveness on the job.

8. Using an MPS allows me to collect useful data about customers and their purchases.

Image

^ 9. Offering mobile payments enhances our business’s image among customers.

* 10. Merchants who use an MPS have more credibility than those who do not.

Compatibility

* 11. Using an MPS is compatible with all aspects of my business’s sales transactions.

* 12. Using an MPS fits well with the way my staff and I like to receive payment for goods and services.

13. MPS is compatible with my business’s Point-of-Sale system.

Ease of Use

* 14. Learning to operate an MPS is easy for me and my staff.

* 15. Overall, my staff and I find an MPS easy to use.

* 16. It is easy to pay with a mobile phone.

Visibility

* 17. In my community, I see many merchants using mobile payment services.

Trust and security

18. MPS providers are trustworthy.

19. Mobile phones are reliable enough for payment transactions.

20. Mobile networks are reliable enough for payment transactions.

21. The data sent by the MPS during the transaction is confidential.

22. MPS technology is secure.

23. When using an MPS to receive payments, I get immediate SMS or Point-of-Sale confirmation of the payment transaction. [Only for current users]

Results Demonstrability

* 24. My staff and I would have no difficulty telling others about our experience or results using the MPS.

* 25. The results of using the MPS are apparent to my staff and me.

Do you have any other comments regarding the use of mobile payments in your business?

Key

* = short form scale item taken from Moore and Benbasat's list of items by construct

^ = item taken from Moore and Benbasat's list of items by construct

Appendix 3

Appendix 3 presents an overview of the different m-payment service providers in South Africa is present below:

Service provider	Brief
Snapscan	**Description:** Snapscan is a South African m-payment service provider developed by Stellenbosch-based FireID Payments and backed by Standard Bank. Snapscan was the recipient of the MTN Business App of the Year Award 2013 **Growth:** Snapscan was developed and introduced to market in 2013. As of August 2015, the application boasted 18 000+ merchants country-wide. **Product Description:** Snapscan application allows individuals and merchants to use a mobile device to pay for and receive goods, services and bills under R5000. **Primary function**: restaurants, bills **Technology:** Snapscan is compatible with Android, iOS and Blackberry devices. It uses static QR-code and iBeacon technology. Snapscan integrates with leading POS providers, including TabletPOS and Humble. **Cost:** Snapscan does not require the merchant to pay a signup or monthly fee. **Limitations:** POS integration limited. Application supports three cards Mobile device requires camera. M-payment application reliant on Internet access and mobile device battery **Security:** The m-payment application encrypts the individual's card details and requires an app specific PIN.
Zapper	**Description:** Zapper is a global m-payment service provider. **Growth:** Zapper was developed in 2011. As of August 2015, the application boasted 250+ merchants country-wide **Product Description:** The Zapper application allows individuals and merchants to use a mobile device to pay for and receive goods, services and bills **Primary function:** taxis, restaurants, bills, ecommerce, donations **Technology:** Zapper is compatible with Android, iOS and Windows devices. It uses dynamic QR-code technology. The key POS features include: ecommerce-enabled, customer engagement

Service provider	Brief
	Cost: Zapper does not require a signup or monthly fee. **Security:** The m-payment application encrypts the individual's card details and requires an app specific PIN.
FlickPay	**Description:** FlickPay is a South African m-payment service provider **Product Description:** FlickPay application allows individuals and merchants to use a mobile device to pay for and receive goods, services and bills **Primary function:** restaurants, bills Technology: FlickPay is compatible with Android, iOS and Blackberry devices. It uses static QR-code and iBeacon technology. The key POS feature is customer engagement **Cost:** FlickPay does not require a signup or monthly fee. **Security:** The m-payment application encrypts the individual's card details and requires an app specific PIN
iKhokha	**Description:** iKhokha is a South African mobile POS payment solution that facilitates credit and debit card payments through a smartphone or tablet **Product Description:** The Edge is a portable mobile-friendly magstripe and chip and PIN card reader that plugs into a smartphone or tablet. An iKhokha m-payment application works in conjunction with the card reader to allow the merchant to process payments. **Primary function**: restaurants, bills, airtime **Cost:** Merchants are required to buy The Edge for a once-off price of R1139, or rent it for R80 pm (x24months). Additionally, iKhokha charge an activation cost of R250 once-off. Commission is charged at: 2.75% per transaction (ex. VAT). Settlement for day's transaction charged at R2. **Regulation:** iKhokha requires merchants to be FiCA approved to purchase The Edge.
Yoco	**Description:** Yoco is a South African mobile POS payment solution that facilitates credit and debit card payments through a smartphone or tablet. **Product Description:** The payment solution uses Yoco's Contact Card Reader, or Wireless Card Reader. A Yoco m-payment application works in conjunction with the card reader to allow the merchant to process payments.

Service provider	Brief
	Primary function: restaurants, bills??? **Cost:** Verifone Contact Card Reader: R1299 once-off (iOS only). The Miura M010 Wireless (Bluetooth) Card Reader: R1899 once-off (iOS and Android) Transaction fee: less than 3.5% for debit cards and credit cards. There are no monthly fees. **Regulation:** Yoco requires merchants to be FiCA approved to purchase one of its card readers.
wiGroup	**Description**: wiGroup is a platform provider specializing in POS integrated mobile transacting. As of November 2015, the total in-store mobile transaction value through the wiPlatform was R4 331 000 000. **Product Description:** A wiCode platform integration enables banking and mobile wallet customers to pay for goods and services from any bank account using any mobile application through the wiCode platform **Primary function**: wiPlatform services: mobile coupons and vouchers, mobile money transfer, mobile rewards, insights and competitions, mobile payments
Absa's Payment Pebble	**Description:** ABSA's Payment Pebble is a South African POS m-payment solution that facilitates credit and debit card payments through a smartphone or tablet. **Product Description:** A Payment Pebble m-payment application works in conjunction with the card reader to allow the merchants to process payments. **Cost:** Monthly rental: R50 (ex. VAT) for the first 12 months. R20 (ex. VAT) thereafter. Initiation fee: R160 (ex. VAT) for the first Payment Pebble. Transaction fee: 3.2% per transaction for Absa customers. 3.75% per transaction for non-Absa banking customers. **Limitations:** Merchants require an Absa bank account. **Regulation:** ABSA requires merchants to be FiCA approved to purchase one of its card readers
Nedbank PocketPOS™	**Description:** Nedbank's PocketPOS is a South African POS m-payment solution that facilitates credit and debit card payments through a smartphone or tablet. **Product Description:** The PocketPOS™ m-payment application works in

Service provider	Brief
	conjunction with the card reader to allow merchants to process payments. **Cost:** Device cost: Nedbank Current Account clients: R2000 (ex. VAT). No Nedbank current account: R2500 (ex. VAT) Transaction cost: Nedbank Current Account clients: 3.5% (ex. VAT). No Nedbank current account: 4% (ex. VAT) Initiation fee: Nedbank Current Account clients: R100 (ex. VAT). No Nedbank current account: R150 (ex. VAT) **Regulation:** Nedbank requires merchants to be FiCA approved to purchase one of its card readers
PayFast	**Description:** PayFast is a South African online payment processing service that enables easy, secure and instant transfer of money between online buyers and sellers. **Growth:** PayFast serves tens of thousands of online merchants and hundreds of thousands of online buyers in South Africa. **Product Description:** PayFast connects online buyers and sellers through a variety of payment methods through their PayFast interface, integrated with several shopping carts and e-commerce platforms. **Cost:** PayFast does not require a signup or monthly fee. **Payment channels:** PayFast processes MasterCard and Visa credit cards, Instant EFT (with SA's four biggest banks), debit cards (via PayD), Ukash, credit facility mobicred and digital payment method Bitcoin.

Table 12: Overview of the m-payment service providers in South Africa

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