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# THE IMPORTANCE OF TRUST AND RISK IN M-COMMERCE: A SOUTH AFRICAN PERSPECTIVE

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## Abstract

*Despite the hype associated with m-commerce and the massive revenue predictions by research companies, current adoption figures by consumers seem to demonstrate a lack of enthusiasm for more advanced services. A key reason cited in the literature is a lack of trust. M-commerce transactions are often characterised by complex technology, anonymous vendors, lack of transparency and convoluted interactions between stakeholders. Trust becomes more important in situations of increased uncertainty, such as m-commerce.*

*This research investigates a model that incorporates trust and risk factors to explore adoption of M-commerce. The model is based on the existing trust literature, but complemented with variables that relate to the benefits of mobile technologies, namely Innovation Diffusion characteristics.*

*A survey approach was used to investigate the statistical relevance and importance of trust and risk issues within a population of potential 'early adopters', using research models suggested in the academic literature. The study provides several interesting findings. The study determined that personal characteristics significantly influence the perceived trustworthiness of the vendor, technology and the institutional framework. It was further established that trust and risk influence intention to use M-commerce services. However, amongst early adopters, benefits were more important than both trust and perceived risks.*

**Keywords:** Mobile Commerce; Technology Adoption; Diffusion of Innovation; Trust; Risk; South Africa.

# 1. INTRODUCTION

M-commerce is perceived by many as the next technological innovation that will eventually replace Personal Computers (PC) with mobile phones as the preferred tool for conducting business. A lot of hype surrounds m-commerce; partly assisted by research companies that project massive revenue potential for MNOs and providers of these services. Furthermore, advanced mobile technologies and innovative mobile handsets make new types of m-commerce service possible. This is also true in South Africa where subscribers have seen the launch of exciting new services, such as mobile banking, video telephony, television services and location-based services. However, the adoption of these services has however been lethargic. The lack of trust in, and the perceived risk associated with, M-commerce may be an important causal factor for this slow take-up.

**Lack of trust** has been found to be a significant factor influencing the uptake of mobile commerce services (De Ruyter *et al*, 2002; Dahlberg *et al*, 2003, Siau *et al*, 2003a; Schmidt-Belz, 2003). Trust is important during situations that are perceived to be risky, and M-commerce exposes consumers to new vulnerabilities and risks. For instance, South African consumers are often not aware who the vendor is that is accountable for delivering the service and a party to trust is therefore absent. Additionally, some M-commerce service providers have been exposed in the media for their unethical conduct. Also, M-commerce technologies introduce additional complexity and expose consumers to Internet-type risks, such as cyber-crime, SPAM, viruses and illegal content. Although South Africa offers consumers legal protection against these risks, confidence in law enforcement remains at a low level.

From this, research issues emerge about the consumer perceptions of the trustworthiness of the **vendor** as well as the trust placed in the **technology** that delivers the M-commerce service and the **legislative** environment. The research objective was to investigate the *degree to which various trust and risk factors influence the adoption and usage of mobile commerce by consumers in South Africa*.

This research hopes to make a research contribution to the empirical study of trust and risk by studying these in the context of other adoption factors, since previous trust research has been criticised for either failing to effectively conceptualise trust or describing trust in too narrow a scope (Grabner-Kräuter *et al*, 2003; Ho *et al*, 1999; Chervany *et al*, 2001a; Grandison *et al*, 2000).

The next section gives an overview of key literature to substantiate our use of terminology and motivate our selection of research model. This is followed by a brief description of our research methodology, which combines a quantitative (questionnaire-based) approach to demonstrate the importance of trust, with a qualitative (focus group) approach to derive concrete interventions to reduce perceived risk and increase the trust invested in M-commerce by consumers.

## 2. DEFINITIONS AND RELATED PRIOR RESEARCH

This section explores how the key concepts used in this research, namely M-commerce, Trust and Risk, have been defined and operationalised in prior research studies. This is followed by a brief overview of the most popular models used by researchers in M-commerce. This serves to introduce the particular trust and risk research model used in this study.

### 2.1 M-commerce and the South African Context

The definition of M-commerce adopted for this study is “any information interaction where a mobile device and networks are used where the transaction leads to the transfer of real or perceived value” (Schwidorski-Groshe *et al*, 2002). Apart from the examples above, typical M-commerce transactions also include the purchase of digital premium-rated content, purchases of physical products or services to be delivered, and mobile banking. However, voice calls which lead to value transactions are excluded from the definition of M-commerce.

South Africa’s M-commerce industry is based on a three-tier model. The Mobile Network Operators (MNOs) provide the mobile telecommunications infrastructure. The market consists of two large operators who each own their own physical infrastructure (Vodacom and MTN) supporting all (European) standard digital mobile technologies up to 3G; as well as two smaller operators (Cell-C and

Virgin Mobile) that piggy-back onto the other MNOs' infrastructure. A second tier consists of the Service Providers (SPs) which are the retailers for the various telecommunication products. They manage the customer relationships for usually one but potentially several MNOs, including billing. Finally the actual M-commerce services are delivered by a third party, the Wireless Application Service Provider (WASP). Each WASP has a unique contract arrangement with the SP and their services are accessed and managed through the MNO network. The three-tier model is not always fully transparent especially since MNOs are actively pursuing their own M-commerce opportunities by providing their own services through their own information and entertainment portals, such as MTN Loaded and Vodafone Live Portal (Weideman *et al*, 2004).

## 2.2 Trust and Its Sub-Constructs

**Trust** is a “complex, multi-dimensional, context-dependent construct” (Gefen *et al*, 2003). Bailey *et al* (2002) define trust from the consumer's viewpoint as “the perception of the degree to which an exchange partner will fulfil their transactional obligations in situations characterised by risk or uncertainty.” This view emphasizes the role of the trustee, the vendor. However, vendor-based trust is just one of different trust types. Hence the more neutral definition of trust as “the objective quality governing the degree to which transactional obligations will be fulfilled in situations characterised by risk or uncertainty” is used.

**Disposition to trust** is a ‘belief’ that relates to the ‘propensity’ of the consumer to depend on the vendor (Gurviez *et al*, 2003). Each consumer, based on their personal characteristics, has a unique willingness to depend on others (Chervany *et al*, 2001a). An individual can be born with this personal characteristic or develop it later in life. ‘Disposition to trust’ is also described as, “a rational assessment of reliability” (Auroja *et al*, 2002) and a “generalised morality” (Granovetter, 1985). It therefore involves a decision-making process, influenced by ‘societal rules and norms’. ‘Disposition to trust’ is a “generalised tendency across situations” and influences the consumer's perception of all other trust variables (Chervany *et al*, 2001b). Urban *et al* (2002) identified four consumer characteristics that promote trust, namely: (1) internet savvy; (2) past behaviour; (3) previous shopping experience and (4) entertainment value. Siau *et al* (2003a) identified, (1) past experiences with product vendor and (2) word-of-mouth referral as consumer characteristics that could influence trust building in M-commerce. For the purposes of this study, ‘disposition to trust’ refers to those personal characteristics of a consumer which, in general, indicate a tendency to trust others.

**Institution-based trust** is the belief of the truster in the security of a specific situation, due to the fact that certain performance structures are in place. Many researchers feel that trust will not develop without “institutional infrastructures that establish and enforce rules and regulations” (Cheung *et al*, 2001). Institutional-based trust thus relates to laws, regulations and institutions. In South Africa, the Independent Communications Authority of South Africa (ICASA) is the primary regulator for the telecommunication industry. ICASA additionally fulfils the role of monitoring and dealing with customer complaints that were unsatisfactory resolved by MNOs. Another avenue of recourse available to consumers are the Wireless Applications Service Provider Association (WASPA), established in 2004 (Weideman, 2004). In terms of legislation, the Electronic Communications and Transactions (ECT) Act is the most relevant and important customer protection law. However, despite South Africa having some of the most advanced electronic commerce legislation, few South African websites appear to comply fully with the regulations of the ECT Act (Van der Merwe, 2004). It is thus not clear that legislation protects South African consumers effectively.

**Systems trust** refers to the trust in the underlying technology (Grabner-Kräuter *et al*, 2003; Lee *et al*, 2003; Kim *et al*, 2002). Our study focuses on the *customer* viewpoint of systems trust, not the view of the vendor or technical specialists. Systems trust can be improved through increased “network reliability, redundancy, improved security and the support of atomic transactions (transactions with no steps)” (Varshney, 2002).

**Vendor trust** is the degree to which the consumer perceives that the vendor will fulfil the transactional obligations in risky or uncertain situations (Bailey *et al*, 2002). Vendors can use ‘interventions’ to influence consumers to show trusting behaviours. An example of an intervention embedded in the

environment is third party certification or ‘trust promoting seals’, such as TRUSTe and VeriSign (Hu *et al*, 2002).

Since the vendor decides what type of technology to use, trust researchers such as Chervany *et al* (2001a), include ‘systems trust’ as part of vendor trust. We take the view that, although vendor interventions increase trust, this trust is not automatically extended to the underlying computer technology: “as computer systems become more integral to individual action, social interaction, and commerce, the study of trust must extend to understand how individuals extend trust to computers and computer systems” (Camp *et al*, 2000).

Since a key objective of this research is to look at how the vendor can promote trust in M-commerce, it is necessary to discuss the **sub-constructs of vendor trust**. These sub-constructs refer to the critical high-level attributes that the trustee must show to enable trust. For instance, Mayer *et al* (1995) see vendor ability, integrity and benevolence as key vendor trust characteristics.

### 2.3 Risk

Many researchers have ignored the role of risk perceptions, probably due to the complex nature of trust and risk (Gefen *et al*, 2003). E-commerce trust researchers show that increased trust reduces the trustee’s perception of risk and influences their attitudes towards the trustee, which, in turn, influences the willingness to purchase (Jarvenpaa *et al*, 2000). The risk management discipline views risk as related to the cost of outcomes, where trust and risk are ‘mirror images’ with an “approximate inverse relationship” (Grandison *et al*, 2000; Johnson *et al*, 2002).

No scholarly consensus has been reached on how to depict the relationship between trust and risk in models (Johnson *et al*, 2002). Gefen *et al* (2003) identified three types of risk and trust models.

In the **mediating relationship**, trust is hypothesized to influence perceived risk that, in turn, influences behaviour. If trust exists, the perception of risk is reduced, which, in turn, increases the willingness to take part in M-commerce. Olson and Olson (2000) take the view that trust is the *consequence* of risk, implying that trust mediates the relationship between risk and behaviour. Olson and Olson (2000, p43) state that “we trust more when the stakes are relatively low... or when the potential loss is miniscule”. This is the view and model adopted for our research since this is the model to which the majority of e-commerce researchers subscribe (Cheung *et al*, 2001; Lee *et al*, 2003; Jarvenpaa *et al*, 2000; Yousafzai, 2005).

Two other trust and risks models exist; namely the moderating relationship and the threshold model. In the **moderating relationship**, the influence of trust on behaviour is seen as varying depending on whether it is a low risk or a high risk condition. When trust is high, risk will have less of an impact on the formation of attitudes (Mayer *et al* 1995). In cases where high-risk conditions exist, for example mobile banking, trust between the truster and trustee will be higher than low-risk conditions. In the **threshold model** views trust and risk as two independent perceptions. If the perception of risk is higher than the trust relationship, the truster will not engage in M-commerce. The threshold model assumes that no relationship exists between trust and risk and that the consumer evaluates the relationship independently (Kim and Prabhakar, 2002).

In order to develop questionnaire test items for the construct of risk in a specific context such as M-commerce, Johnston *et al* (2002) suggest that one should consult ‘practitioner sources’ to find specific risks. Systems or technology related risks include viruses, blue-snarfing (theft of private details using BlueTooth), systems errors, security laps, fraud, health (brain tumour) and errors originating from the handset or network. Vendor-related risks included privacy issues, bill shock (excessive unexpected telephone expenditure), SPAM and access to harmful content such as porn or gambling. Institutional-based risks include the lack of transparency (due to multi-tier industry), lack of knowledge about consumer rights and interception of communications by government security institutions.

### 2.4 Theoretical Frameworks Used by Prior Trust in M-Commerce Studies

A number of theoretical models have been used in Information Systems research to explain or predict adoption. The **Technology Acceptance Model (TAM)** uses perceived usefulness and perceived ease of

use to explain information technology acceptance and usage (Davis, 1989). TAM was based on the Ajzen and Fishbein's (1975) **Theory of Reasoned Action (TRA)**, one of the most influential theories of human behaviour which was extended into the **Theory of Planned Behaviour (TPB)** (Ajzen, 1991). The **Decomposed Theory of Planned Behaviour** extends TAM and TPB by including additional variables, such as: attitude towards use, subjective norm and behavioural control. Finally, the **Innovation Diffusion Theory (IDT)** explains technology adoption through individual characteristics and external influences which make individuals adopt technologies at different rates (Rogers, 1995). Table 1 below summarizes how these models have been used and extended in the context of Trust research within the context of M-commerce.

Framework	Description	Major conclusions
Innovation Diffusion Theory (IDT)	Contexts specific variables were added which influence M-commerce consumer adoption.	De Ruyter et al (2002) studied consumer adoption of mobile gaming services and not specifically trust in m-commerce. The results confirmed that trust influences the adoption of m-commerce. Risk was identified as the most important factor, followed by ease-of-use and perceived usefulness as defined by Davis (1989).
	IDT expanded by introducing image and cost as further variables. Image introduced by Moore and Bensebat (1991); whereas Tornatzky and Klein (1982) introduced cost.	Gilham (2004) did a South African study investigating usage and adoption of mobile content services. The study identified gender as a key differentiator in usage and sought further investigation into IDT characteristics that could have a direct impact on the adoption of mobile content services.
Technology Acceptance Model (TAM) Davis (1989)	TAM was expanded to include trust and is called the Trust Enhanced Technology Acceptance Model (TOMI).	Dahlberg et al (2003) used focus group interviews which identified types of security risks for mobile consumers. It was concluded that the TAM model provides a good basis for exploring trust in mobile payment solutions. The disposition to trust and perceived trust were added to the model to better describe consumer acceptance.
Theory of Reasoned Action Ajzen and Fishbein (1975)	A model for consumer acceptance of mobile marketing was developed and includes perceptions of risks.	Bauer et al (2005) found social norms have a slight direct influence on behavioural intention, but are strong indirect determinant via personal attitude. Empirical evidence however could not be produced with regard to consumer-based determinants. Evidence of a positive relationship between 'innovativeness' and 'knowledge about mobile communications' was provided.
Observation	Observing mobile users using location-based technology.	Schmidt-Belz (2003) did not specifically investigate trust, but did manage to present evidence of distrust when users were observed using mobile services. The study essentially confirms that location-based services are regarded as risky by consumers.
Value-focused Thinking Approach (VFT)	The values that comprise trust were identified and converted into two objectives according to the outcome that consumers value and the methods used to achieve the result.	Siau et al (2003a) explored building consumer trust in m-commerce and proposed a framework to build sustainable trust relationships. In Siau et al (2003b), this framework was expanded upon or based on the Value-focused Thinking (VFT) approach advocated by Keeny (1992).
Both IDT and TAM	The model was based on both TAM and Innovations Diffusion and was augmented with specific features of mobile services adoption.	Mallet et al (2006) investigated the impact and use of situation and mobility on the acceptance of mobile ticketing services. The study introduced two new variables, mobility and use in a situation. These items suggest that the benefits of mobile ticketing are dependent on the situation in which they are used.
Developed Own Model		Lee (2005) studied consumer behaviour and a model based on literature was developed for both interactivity and the nature of the m-commerce environment.
The Decomposed Theory of	Expands TAM by including additional variables, such as: attitude towards use, subjective	Van Wyk (2004) studied of mobile gaming in South Africa and compared it to a similar Norwegian study. The study indicated 'subjective norm' to be a more important determinant of

Framework	Description	Major conclusions
Planned Behaviour	norm and behavioural control.	behavioural control in South Africa than the Norwegian study. The study also referred to the importance of the political environment.

Table 1. Selected Theoretical Models and Sample M-commerce Study.

Disposition to trust was excluded by many trust researchers. However, it was included as a trust variable in this study as it is seen as a significant predictor of trust in general (Lee and Turban, 2003). Chervany did not include risk in his model, although he referred to the possibility of ‘negative consequences’. Risk is therefore included as a separate variable. ‘Trusting belief’ is referred to as trust in this study, and ‘trusting intention’ relates to the same concept as ‘intention to participate’.

## 2.5 Proposed Trust Model

The preceding research was used to build an expanded model of trust for M-commerce as shown in Figure 1.

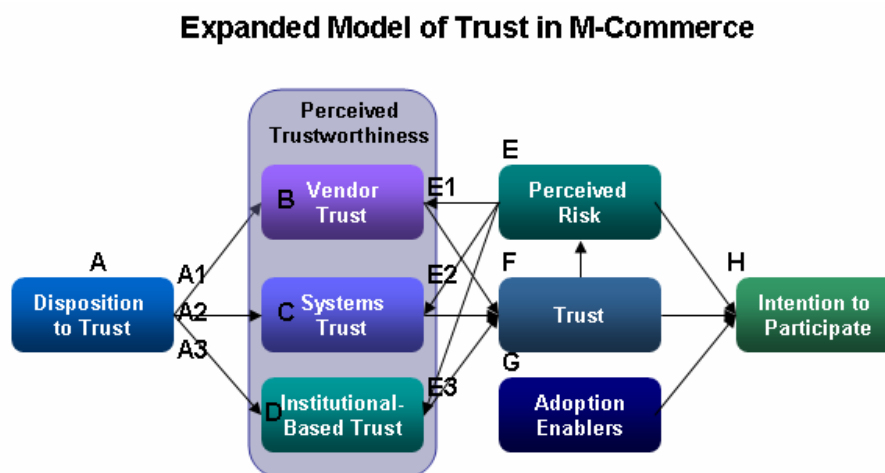


Figure 1. Expanded Model of Trust in M-commerce

The key research questions relating to the trust model above are summarized in Table 2 below:

Variable	Relevant Research Questions
A: Disposition to Trust	Do the personal characteristics of the South African consumer have a significant influence on the decision to use mobile commerce, via their influence on trust in the vendor (A1), systems (A2) or institutional (A3)-based trust?
B: Vendor Trust	Does the perceived trustworthiness of the vendor influence trust and the intention of the South African consumer to participate in M-commerce?
C: Systems Trust	Does the trustworthiness of the mobile technology, such as network coverage, influence trust and the intention to participate in M-commerce?
D: Institutional based Trust	Are South African consumers aware of consumer protection bodies and legislation? Does trust in the environment influence trust and the intention to participate?
E: Perceived Risk	Will perceived risks negatively influence adoption of M-commerce by reducing the amount of vendor (E1), systems (E2) or institution-based trust (E3)? Or will high trust in the vendor alleviate these concerns?
F: Trust in Mobile Commerce	Will overall trust, culminating from trust in the vendor, system or institutional environment, influence the intention of consumers to adopt M-commerce?
G: Adoption Enablers (Innovation Diffusion)	Do innovation diffusion characteristics have a significant influence on the intentions to participate and are the influences more significant than trust and risk factors? The IDT variables are relative advantage, complexity, compatibility, trialability, observability (Rogers, 1995), but have been expanded with two additional variables, namely cost and image (Gilham, 2005).
H: Intention to Participate	Do trust and risk factors have a significant influence on the intention to participate?

Table 2. Research Questions

### 3. RESEARCH DESIGN AND METHODOLOGY

The research model conceptualises relationships between variables and this model will be tested using a quantitative survey approach. This section explains the methodological issues survey relating to the questionnaire as part of the empirical quantitative model testing, and the research approach relating to the use of focus groups for the qualitative research component.

Based on the research model, seven main hypotheses were formulated to summarize the model and to allow for statistical analysis.

Hypotheses	Description
H <sub>0</sub> 1	Perceived trust influences the intention to use mobile commerce services.
H <sub>0</sub> 2	Disposition to trust influences perceived trustworthiness.
H <sub>0</sub> 3	Perceived risk negatively influences the intention to participate.
H <sub>0</sub> 4	Perceived trustworthiness of the vendor influences trust.
H <sub>0</sub> 5	Perceived trustworthiness of the system influences trust.
H <sub>0</sub> 6	Perceived trustworthiness of the institution influences trust.
H <sub>0</sub> 7	Adoption enablers influence the intention to participate.

Table 3. *Research Hypotheses for the Importance of Trust and Risk on Intention to Adopt*

The target population for the statistical analysis portion of the study were ‘early adopters’ of mobile services. The desired characteristics typical of early adopters of innovative technologies, are a relatively young age, high use of mobile phones, innovativeness, relative affluence and better educated than the general population. Two of the Cape Town-based call centres of one of the two largest mobile telecommunications company in Africa were used, yielding a sampling frame of approximately 500 call centre agents. These are representative of South Africa in terms of race, language and gender. However, most have an above-average university exemption qualification and are relatively young with an average age is 22.

The questionnaire drew its test items from a number of previous trust studies conducted in both electronic and mobile commerce. ‘Intention to use’ was tested using Moore *et al*’s (1991) test items. Trust in the vendor and ‘disposition to trust’ was based on the questions developed by Jarvenpaa *et al* (2000) and Koufaris *et al* (2002). The Innovation characteristic questions have been adapted from Moore and Benbasat’s (1991) model, to test for M-commerce services, as it was suggested by Gilham (2004) that the standard questions might not be best suited for the M-commerce environment.

A number of new questions relating to **risk** were included in the study because trust researchers, such as Yousafzai (2005), remark that, “the examination of more detailed facets of risk would be a promising area for future research.” Also, no prior South African study has been conducted to assess the risk perception of South African consumers in terms of M-commerce. Risk perceptions raised in the popular literature are however seldom included in trust studies and only limited examples could be found in research such as Bauer *et al* (2005). Since many of these questions were new, extra test items were incorporated to check validity but this increased the length of the questionnaire. Although thought to be relevant by the researchers, no socio-demographic characteristics could be collected because the University’s Ethics Committee, in its wisdom, deemed these not relevant to the study. The full instrument is available on simple request from the authors. After an initial pilot, only two questions were re-phrased.

### 4. DATA ANALYSIS AND FINDINGS

This section discusses the findings relating to the importance of the trust and perceived risk constructs in the adoption of M-commerce using the research model. It is based on the early adopter survey. Although only a relatively small number of responses is available, the significance of most findings was not close to the 5% significance level and so appear not to be overly dependent on a large sample size. It must be realized that the nascent character of M-commerce in South Africa made obtaining a sufficiently homogenous larger sample size almost impossible.

Overall, 110 responses to the ‘early adopter survey’ were received, of which 8 cases were rejected due to incomplete information. Additionally, three influential outliers were identified and removed. It



appeared as if these 3 questionnaires were completed mindlessly by the respondents by mechanically choosing all the extreme response options (i.e. all 1s or 7s).

#### 4.1 Reliability

Item reliability was evaluated using the Cronbach alpha scores (Table 4). The relatively large number of IDT constructs were not evaluated for internal validity due to the fact that only two questions per IDT variable were asked in order to reduce the length of the questionnaire. However, all IDT test items were taken from existing instruments which have been validated extensively in previous research.

Construct	# of items	Reliability
Disposition to Trust	4	0.790562
Vendor Trust	5	0.772977
Systems Trust	5	0.939170
Institutional Trust	5	0.887567
Perceived Risk: Vendor	7	0.868767
Perceived Risk: Systems	13	0.935339
Perceived Risk: Institution	3	0.853945
Trust	4	0.867562
Intention to Participate	3	0.962804

Table 4. Reliability Analysis

Since the scores for all constructs showed Cronbach alpha scores exceeding 0.77, the internal reliability can be regarded as acceptable. It is especially comforting to see the relatively high reliability (>85%) of the “new” test items which the researchers created for the Perceived Risk constructs.

#### 4.2 Construct Validity

Exploratory factor analysis (EFA) was conducted to explore the relationship between the variables. The sixty-four (64) test items loaded onto fifteen (15) factors. Factor one (1) and factor two (2) account for a significant percentage of the variance in the data and revealed a commonality between IDT characteristics and trust in the system and vendor.

Principle Components Analysis (PCA) was subsequently conducted to reduce the variables into a set of eight (8) weighted combinations. The rotation method used was Varimax with Kaiser Normalisation. Because of the large number of test items (64), the factor analysis tables have been omitted but are available from the authors.

Overall trust and participation in M-commerce load together, which indicates a strong causal link between the two. Respondents were unlikely to trust M-commerce, yet not participate in it, and vice versa. Personal characteristics; trust in the system and vendor trust loaded together. Detailed examination of the questions revealed that the respondents could not potentially view these as identical, and that it was not exclusively trust researchers who would be able to conceptually distinguish between the variables. The IDT questions, which had all been adapted from previous research, also tended to load together. Moore and Bensabat (1991) found that relative advantage and compatibility are predisposed to load together, which could mean that these two are viewed as being similar.

Although the loading of different variables onto the same factor initially appeared to raise an issue, it must be remembered that factor analysis will only produce meaningful results if the data is, “truly continuous and multivariate normal,” and, furthermore, “item-level data in psychological research (e.g. disposition to trust) almost never meets these requirements” since “the correlation between any two items is affected by both their substantive (content-based) similarity and by the similarities of their statistical distribution.” (O’Connor, 2005). This therefore implies that items that show similar distribution may be loaded into similar factors. This was investigated by examining the means and standard deviation of the items on each factor and our analysis appeared to confirm the suggestion by Bernstein *et al* (1989) that, if this is the case, “there are strong reasons to attribute the factors to statistical rather than to substantive bases”.

Overall, most constructs displayed satisfactory validity although the test items for closely associated constructs seem to load on the same factors. This is perhaps not surprising given the large number of constructs (in relation to the sample size). Overall, the construct reliability is high and, while the factor analysis matrix is not a text-book example, the concerns about construct validity can be explained. Thus it was decided to proceed with the testing of the hypotheses.

#### **4.3 The Importance of Trust and Some of its Antecedents**

The data shows a very strong correlation between Overall Trust and Intention to Participate in M-commerce. In fact, on its own, Overall Trust accounts for 42 percent of the variance in Intention to Participate ( $p < 0.00001$ ), strongly supportive of  $H_01$ .

Looking at the antecedents of Trust, it was found that Disposition to Trust explains a substantial part of the various individual types of trust with a respective adjusted  $R^2$  of 54% for Vendor Trust, 29% for Systems Trust and 20% for Institution-based Trust (with  $p < 0.00001$  for all three correlations). This strongly supports  $H2$ . Each of the individual trust types is, in turn, very strongly correlated with Overall Trust, with highly significant ( $p < 0.00001$  for all correlations) adjusted  $R^2$  values between Overall Trust and its assumed antecedents: Vendor Trust (35%), Systems Trust (49%) and Institutional Trust (40%). This strongly supports  $H4$  to  $H6$ .

#### **4.4 The Marginal Role of Perceived Risk**

Interestingly, a multiple regression analysis of the three perceived risk factors finds that only one of them, namely Vendor Risk, exerts a significant (negative) influence on Intention to Participate in M-commerce (Beta -0.25;  $p = 0.0420$ ). Institution-based Risk shows no influence whatsoever (Beta = 0.01) and Systems-based Risk a slightly negative but non-significant influence (Beta = -0.14;  $p = 0.2258$ ).

This lack of influence was corroborated in the focus group where most participants agreed that they could see nothing that was a big enough inhibitor to prevent them from using M-commerce (mean ranking 3.9), though the possibility of receiving spam (mean ranking of 2.2), the services not fulfilling their needs (2.2) and bad vendor reputation (2.0) were ranked as the next three highest potential inhibitors.

Similarly, the assumed strong correlation between Trust and Perceived Risk was not supported statistically. Institution Risk does not correlate significantly with any Trust concept nor with Intention to Participate. Although Systems Risk shows a significant but rather low correlation of 34% with Overall Trust, it does not correlate significantly with any other constructs in the model. Only Vendor Risk emerges as a significant variable with the rest of the model constructs, with a significant 45% correlation with (i.e. assumed influence on) Vendor Trust, in addition to a 34% correlation with Overall Trust and a 36% correlation with Institution-based Trust. Thus, apart from explaining 9% of the variance of Intention to Participate directly, it also exerts an indirect influence via its influences on Trust quite strongly. Thus there is only partial support for  $H3$ .

#### **4.5 Innovation Diffusion Factors Influencing M-commerce Adoption**

Apart from Trust and Risk, some traditional adoption variables were also investigated. Of the seven IDT constructs, only three emerged as significant factors: Compatibility ( $p < 0.00001$ ), Image ( $p = 0.0014$ ) and Cost ( $p = 0.0447$ ). Although Trialability ( $p = 0.0634$ ) might have emerged also as significant factor using a larger sample, Complexity, Relative Advantage and Observability showed (statistically non-significant) negative correlations which, in fact, runs counter to the theory for the last two factors.

Nevertheless, a multiple regression of the IDT factors accounts for 57% of the total variance in Intention to Participate in M-commerce. This strongly supports  $H7$  although not all of the IDT constructs were found to be significant.

#### 4.6 Summary of the Expanded Trust Model

Although the traditional IDT model explains the major portion of Intention to Participate in M-commerce, the addition of Trust, and to a lesser extent Perceived Vendor Risk, significantly enhances the understanding of M-commerce Adoption. Figure 2 below shows the additional significant variables and relationships uncovered in our survey. The causal directions were imputed from underlying theoretical models as explained in the literature review above.

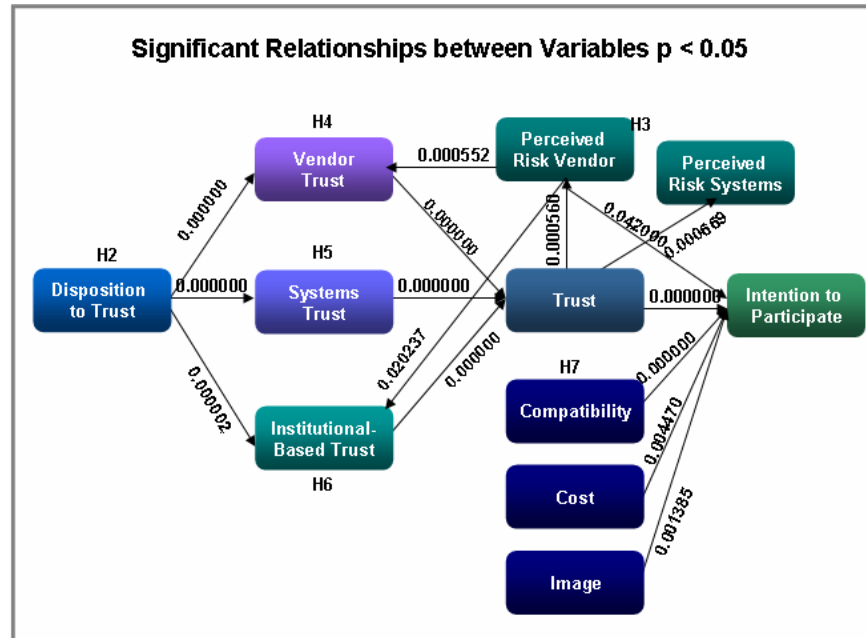


Figure 2. Significant Relationships in Trust Model (p-values shown)

Trust and its various antecedents are found to greatly enhance the explanatory power of Intention to Participate in M-commerce (on its own, it accounts for 42% of variance). In addition, although a number of Risk factors were analyzed, only Perceived Vendor Risk assumed a significant but less powerful role. Overall, the above model raises the explained variance of Intention to Participate from 57% (the original seven IDT factors) to 64%. Thus all hypotheses are supported strongly except that the only type of Risk which seems to be playing an important role is Vendor risk (H3). Also, not all IDT factors were shown to influence Intention to Participate (H7).

## 5. CONCLUSION AND IMPLICATIONS

South Africans in general have a positive attitude to mobile devices and services as evidenced by the extremely high mobile phone penetration. The popularity of SMS and mobile content points to a great potential demand for M-commerce services. The institutional framework and consumer protection authorities are in place to encourage future adoption of M-commerce. Finally, South Africa has low fixed-line Internet penetration rates, which leaves a huge untapped market potential for mobile Internet. However, many barriers to adoption exist. One of these barriers is believed to be a lack of trust. This research is the first South African study to develop a model and investigate whether trust and risk factors are important factors that will influence the adoption of M-commerce. The research explored the relative importance of trust and risk factors for the South African consumer and whether other significant enablers exist that are considered more important indicators of future M-commerce adoption.

### 5.1 Summary of Findings

The development of the trust model was based on previous trust research, but included additional variables that relate to the benefits of mobile technologies; namely the Innovation Diffusion Characteristics. Quantitative analysis explored the relative importance of the various factors for early

adopters and the role that they play in inhibiting M-commerce. The study confirmed that consumer perceptions about trust and risk influenced the adoption of M-commerce.

An important finding of this study is that, among 'early adopters', convenience was a more important indicator of intentions to adopt M-commerce than trust. Although they are aware of security and privacy issues, they do not consider trust and risk to be significant issues that influence their uptake of M-commerce services. As early adopters already had multiple M-commerce interactions, it was not particularly surprising that convenience were found to be more dominant than trust and risk in determining intention to use M-commerce. This might, however, not be the case for new users of M-commerce services.

## 5.2 Limitations and Further Research

The quantitative analysis focused on early adopters and the researcher's observation of focus group participants. It cannot therefore be generalised to the whole population, as the research was not based on a random sample. However, the views of active subscribers provided important insights into how trust and risk influence the adoption of M-commerce.

Since the model was tested on early adopters, future research might determine whether the findings of the study could also be considered applicable to late adopters. It is a conjecture of this research that the model potentially pertains more to the general population, who have a lower risk tolerance compared to early adopters. It is further suggested that future studies should focus on specific M-commerce services that are regarded as more risky, for example mobile banking.

## 5.3 Conclusion

The study established that, amongst South African early adopters, the benefits of M-commerce were seen to be more important than trust and perceived risk. Trust however, was still identified as a significantly contributing factor to intention to participate in M-commerce.

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