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Understanding dynamics between initial trust and usage intentions of mobile banking

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Abstract. *Mobile banking is an emerging application of mobile commerce that could become an additional revenue source to both banks and telecom service providers. It is a form of service convergence enabled by innovative technologies. Despite the alleged benefits of mobile banking, its acceptance has been short of industry expectations. One plausible explanation may be consumers' initial lack of trust in available services. The objective of our research is to reveal the mechanisms associated with the initial formation of people's trust in mobile banking and intention to use the service. For this, we attempt to understand the effect of four antecedent variables (structural assurances, relative benefits, personal propensity to trust and firm reputation) on shaping a person's initial trust in mobile banking and its usage intention. They represent four types of trust-inducing forces: institutional offering (structural assurances), cognition (perceived benefits), personality (personal propensity) and firm characteristics (firm reputation). We examine individual significance of the selected antecedents and also their comparative reliability in explaining the two exogenous variables. The technical basis of our empirical research is the innovative mobile banking solution that uses cellphones with a built-in smart chipset. The survey data are analyzed using structural equation modelling. The analysis showed that three variables (relative benefits, propensity to trust and structural assurances) had a significant effect on initial trust in mobile banking. Also, the perception of initial trust and relative benefits was vital in promoting personal intention to make use of related services. However, contrary to our expectation, the reputation as a firm characteristics variable failed to attract people to mobile banking.*

Keywords: trust, mobile banking, business model, ubiquitous computing, m-commerce

INTRODUCTION

Service convergence driven by innovative technologies is an emerging industry paradigm. Because of the prevalence of portable devices (e.g. personal digital assistants and mobile phones), communication networks are increasingly being tied with financial services in the form of mobile banking. Unlike traditional phone-banking or tele-banking that offers very limited functions such as balance check and fund transfer, mobile banking is evolving into a rich platform for automated banking and other financial services. The service convergence makes sense to telecom service providers (or telcos) looking for new business opportunities to leverage their infrastructure, especially as the communication market approaches saturation. Lacking financial infrastructure and know-how, however, telcos cannot offer financial services alone. Banks are also embracing mobile banking to capitalize on the emerging opportunities and to supplement traditional off-line and phone banking. However, they lack the telecommunications infrastructure. Accordingly, value networks of mobile banking must involve banks, telcos and other financial institutions to complement each other's weaknesses (Shin & Lee, 2005). We therefore use the terms *mobile banking firms* or *service firms* to indicate both banks and mobile telcos offering financial services in partnership.

Prospective customers around the world seem slow in embracing mobile banking (Kleijnen *et al.*, 2004; Suoranta & Mattila, 2004), although there may be a geographical discrepancy in its acceptance level (Mallat *et al.*, 2004). Mobile banking is an application of mobile e-commerce; therefore, the literature associated with e-commerce may offer insights into its rather gradual adoption. Existing studies indicate that consumer reluctance about e-commerce has to do with the stability of commerce systems, reliability of service providers and confidence in mobile transactions (Paul, 1996; Ratnasingham, 1998; Min & Galle, 1999; Lee & Turban, 2001). Mobile channels in which banking transactions take place are inherently information-lean and more uncertain than traditional off-line or tele-banking channels. Because of the inherent risks, customers may not be willing to jump on the bandwagon without confidence in available services and their providers. Customer trust is naturally expected to be a critical factor in the success of mobile banking.

The objective of our research is to reveal mechanisms associated with the initial formation of people's trust in mobile banking and intention to use the service. For this, we attempt to understand the effect of four antecedent variables (structural assurances, relative benefits, personal propensity to trust and firm reputation) on shaping a person's initial trust in mobile banking and its usage intention. They represent four types of trust-inducing forces: institutional offering (structural assurances), cognition (perceived benefits), personality (personal propensity) and firm characteristics (firm reputation). We examine individual significance of the selected antecedents and also their comparative reliability in explaining the two exogenous variables.

The test bed of our research is the embedded mobile banking solution that has not been embraced by existing studies because it is relatively a recent development pioneered by major Korean telcos and, to the best of our knowledge, its international deployment is limited. Nonetheless, with increasing service convergence across industries, it is expected to become

an important platform for financial services in the global community. Our study contributes to the IS community by conducting the proposed theoretical and empirical research based on the emerging mobile banking paradigm.

To achieve the research goal, a research model is introduced to define relationships among the studied variables, and relevant hypotheses are proposed. The research model and accompanying hypotheses are empirically validated based on survey data gathered from cellphone users who had not signed up for mobile banking. The paper concludes with a discussion of findings and subsequent implications.

DEVELOPMENT OF MOBILE BANKING

The m-commerce paradigm

The term *m-commerce* represents business transactions conducted through mobile communication networks or the internet (Siau *et al*., 2001; Siau & Shen, 2003; Wang *et al*., 2006). It has the potential to transform the industry structure and competitive dynamics among telcos, internet service providers, financial institutions, online portals and others (Rask & Dholakia, 2001). M-commerce can offer unique values to consumers. It enables time and place independence and has effort-saving qualities (Lee & Benbasat, 2003; Mallat *et al*., 2004). It can also make people work better and increase their control over their affairs (Jarvenpaa *et al*., 2003). Convenience, ubiquity, flexibility and contextuality are other distinctive elements of m-commerce (Lee & Benbasat, 2003; Venkatesh *et al*., 2003; Looney *et al*., 2004). Anckar & D'Incau (2002) classified the benefits of m-commerce in terms of wireless values and mobile values. Wireless values such as cost savings, convenience and efficiency are benefits that mobile devices deliver better than stationary devices do. In addition, mobile values such as contextuality and ubiquity represent advantages unique to mobile commerce.

Many studies emphasize the potential value of context-driven m-commerce. Anckar & D'Incau (2002) suggest that m-commerce delivers special customer value when available services are grounded on five value contexts: time-sensitivity (e.g. urgency), spontaneity (as opposed to pre-planned), entertainment needs (e.g. time-filler), efficiency needs (e.g. productivity) and mobility related (e.g. location-based services). Among them, much emphasis has been placed on location-specific or localization services (Barnes, 2003; Looney *et al*., 2004). Technologies including cellular network and satellite-based positioning enable tracking and monitoring, content provision, controlling and a host of other services with unprecedented levels of customization (Barnes, 2003).

There are, however, challenges associated with m-commerce. Above all is the customer's experience of the user interface in terms of content design and functional ability (Venkatesh *et al*., 2003). M-commerce devices that rely on a small screen, offering limited screen resolution and an uncooperative keypad, may be too difficult for customers to use. M-commerce is also vulnerable to information and transaction eavesdropping, and is limited in bandwidth and processing power, connection stability, and functional predictability (Jarvenpaa *et al*., 2003;

Lee & Benbasat, 2003; Siau & Shen, 2003). Lee *et al*. (2003) also summarized the social and psychological risks of mobile banking: risks of exclusion, seclusion and intrusion. Recognizing the challenges, Lee & Benbasat (2003) proposed design guidelines to offset the weaknesses of mobile devices and improve m-commerce experience.

Mobile banking in Korea

As a type of m-commerce, mobile banking is spreading (Mallat *et al*., 2004). In fact, m-commerce itself is a subset of e-commerce, and therefore mobile banking can be considered an e-commerce application (Siau & Shen, 2003). Mobile banking is an innovation that could become one of m-commerce's value-added applications (Lee *et al*., 2003) and could have a huge economic impact (Varshney, 2004). Anckar & D'Incau (2002) reported that despite the overall low enthusiasm for m-commerce, people are more willing to embrace mobile banking. It is expected to transform and redefine business models associated with financial services (Rask & Dholakia, 2001), forcing firms to participate in this emerging value network one way or another.

Mobile banking enables customers to access their bank accounts through mobile devices to conduct conventional (e.g. balance checks and fund transfers) and more advanced (e.g. stock trading and smart card-based service payments) financial transactions. This service advancement and richness differentiate mobile banking from traditional tele-banking (or phone-banking), whose service is mostly limited to balance checking and fund transfer between savings and checking accounts. Currently, mobile banking is implemented through two different technological solutions: Wireless Access Protocol (WAP)-based internet access and cellphones with an embedded chip-set. For the former, digital devices are used to access banking portals on the internet. WAP is a protocol that enables content exchange between mobile devices and internet Web sites. WAP users have to login to the Web portal for account access and enter personal information such as the password and account identification in order to conduct intended transactions. WAP-based online banking has largely failed in the USA and Korea, but has been successful in Europe (Mallat *et al*., 2004).

Alternatively, mobile banking can be conducted using mobile phones with the necessary functions embedded in a built-in chipset, a small-scale electronic circuit board with its own processor and memory. By securely storing such private information as personal identification, passwords and bank account information, the chipset turns a mobile phone into an intelligent device with smart card capacity. Naturally, the embedded solution conducts financial functions quite efficiently, bypassing the process of manual authentication and information provision necessary under WAP. Although both WAP and the embedded solution offer functional similarities in mobile banking, they can be significantly differ in technical and non-technical aspects. Above all, the role of telcos in WAP is much weaker than the embedded solution. Also, the WAP-based solution, in general, lacks convenience and flexibility (e.g. user login) of the embedded solution. The latter also supports other online (e.g. prepaid e-cash) and off-line functions (e.g. point-of-sale transactions, public transportation payments).

Our study is based on the embedded chip solution that was pioneered by Korean telcos for the first time in the world in late 2003. Currently, the service is offered by three major mobile service providers (LG Telecom, SK Telecom and Korea Telecom) in partnership with large banks. This service is accessible from anywhere in Korea for 24/7. As of June 2006, 2.4 million people are said to have signed up for the service (National Information Society Agency, 2006a). This represents about 6% of cellular-phone users in Korea (National Information Society Agency, 2006b). Currently, its service fee for each financial transaction such as fund transfer runs between 40 and 60 cents, representing about 30% of ATM transaction fee in Korea.

To use the service, a person must buy a cell phone equipped with the built-in chipset and must activate it by signing up for the banking service. Many standard phones sold in Korea are not mobile-banking ready and they cannot be retrofitted for the service. Once the built-in device is activated and registered with a mobile carrier, a subscriber can conduct both basic (e.g. balance checks, withdrawals, transfers and deposits) and advanced (e.g. portfolio management, ATM transactions, stock trading and loan processing) financial functions (Suoranta & Mattila, 2004). Existing studies (e.g. Lee *et al*., 2003; Kleijnen *et al*., 2004; Mallat *et al*., 2004) of mobile banking have been mostly grounded on the WAP solution and, to the best of our knowledge, this research is the first one conducted based on the embedded solution of mobile banking. Because of differences between WAP and embedded solutions previously discussed, our study is expected to offer unique perspectives on initial trust in mobile banking. In the next section, we discuss the conceptual foundation of our empirical study.

INITIAL TRUST

Trust is a psychological expectation that a trusted party will not behave opportunistically (Bradach & Eccles, 1989; Rousseau *et al*., 1998; Bunduchi, 2005). It represents the willingness of a party to be vulnerable to the actions of other parties (Mayer *et al*., 1995). A trust relationship presumes that the trusted party will behave benevolently; a trusting party cannot control or force the trusted party to fulfil the expectation; and there is a certain level of dependency between a trustor and a trustee (Whitener *et al*., 1998). These definitions imply that risk and interdependency are the necessary conditions of trust and that trust is highly conducive to such psychological forces as expectations, attitudes, willingness and perceived probability.

Trust has been a recurring issue in interpersonal and business relationships. With the surge of e-commerce, more studies are being conducted on the conceptual structure and formation mechanisms of trust (Ba & Pavlou, 2002; Bhattacherjee, 2002; Gefen *et al*., 2003; Pauleen, 2003; Piccoli & Ives, 2003; Brown *et al*., 2004; Paul & McDaniel, 2004; Pavlou & Gefen, 2004). Activities in the network space are more anonymous and impersonal than those in the traditional off-line setting and therefore entail greater risk, uncertainty, and loss of control. Obviously, securing customer trust is critical for successful e-commerce (e.g. Ratnasingham, 1998; Jarvenpaa & Tractinsky, 1999; Lee & Turban, 2001).

Building customer trust, however, is a costly and time-consuming exercise because trust relationships are formed in the course of long-term interactions between implicated parties (McKnight *et al*., 1998). Trust of this type is based on prolonged and cumulative experience that gives clients a sense of familiarity, calculation and values (Coleman, 1990). Cumulative experience significantly influences the level of customer trust in a vendor's competence, predictability and goodwill (Siau & Shen, 2003). In addition, customer trust in a firm may affect his/her loyalty to its service and the choice of service continuation or repurchase (Jarvenpaa *et al*., 2000).

When a new innovative service such as mobile banking is introduced, there is no prior experience to fall back on. The experience or knowledge-based trust that normally develops through iterative interactions may not exist (McKnight *et al*., 1998; McKnight *et al*., 2002a; Koufaris & Hampton-Sosa, 2004). It is therefore expected that a person's initial trust, based on certain perceptive and possibly irrational forces such as cognitive cues, will play an important role in the decision to adopt mobile banking. Initial trust differs from experiential trust in the temporal stage (Koufaris & Hampton-Sosa, 2004). As a form of trust developed without prior experience, it presumes that actors do not yet have credible, meaningful information about, or affective bonds with each other (McKnight *et al*., 1998). People's initial trust reflects their willingness to take risks in order to fulfil their needs (Kim & Prabhakar, 2004). As a kind of first impression, initial trust can set the tone for a future relationship and may trigger the belief-maintaining mechanism described in McKnight *et al*. (2004). Their trust may be solidified or weakened as customers interact with a service provider, ultimately forming their experiential trust (McKnight *et al*., 1998).

Koufaris & Hampton-Sosa (2004) suggest that clients' initial trust in online stores is shaped when they experience the store for the first time. Their definition of initial trust differs from that of McKnight *et al*. (1998), to whom initial trust is not based on prior experience or first-hand knowledge, but on cognitive processes. People can shape their initial trust in mobile banking without registering for the service and using it for financial transactions. They may be more trusting initially if they see service firms (wireless telcos and banks) as reputable enterprises because of their off-line roots. From this perspective, the fact that these firms offer mobile banking might become an instant credit to the service. This is in contrast to many Web stores that are little known to visitors beforehand. After all, most people already have at least one bank account and use cellphones. Their non-mobile banking experience might help them solidify their impressions about mobile banking.

The level of initial trust in a service is a function of diverse forces. McKnight *et al*. (1998) categorized them into institution-, personality- and cognition-based factors. Initial trust may be affected by structural or environmental conditions and situational normality, frequently termed as institution-based trust factors (McKnight *et al*., 2002a). Initial trust in a trustee or a service may also be affected by a trustor's personality, including his/her propensity to trust (Gefen, 2000). In addition, such firm characteristics as size, capability, integrity, role in the marketplace, benevolence, reputation and brand may affect a person's perception of a firm's services or products (Jarvenpaa *et al*., 2000; McKnight *et al*., 2002a; 2004). Finally, there are structural assurances that may be particularly relevant to e-commerce in enhancing service trustworthi-

ness. These include the availability of service guarantees, privacy policies, endorsement and third-party recognition (Siau & Shen, 2003; McKnight *et al*., 2004).

ANTECEDENTS OF INITIAL TRUST

Our theoretical discussion of initial trust and broad review of current studies on trust (see Appendix 1) imply that both personal and institutional attributes are influential in determining clients' initial trust in an innovative service. Individual attributes can be further divided into personality- and cognition-based factors (McKnight *et al*., 1998). Institutional attributes are composed of those innate to the firm (firm characteristics) and those offered by the firm (institutional offering). Our literature review indicates that *trust propensity*, *structural assurances* and *firm reputation* are particularly relevant antecedents of initial trust. They are the representative variables of personality (Gefen, 2000; Gefen & Straub, 2004), institutional offering (Gefen *et al*., 2003) and firm characteristics (McKnight *et al*., 2002b; Pennington *et al*., 2003–2004), respectively. In addition, usefulness perception has been frequently cited as a cognition variable (Gefen *et al*., 2003; Koufaris & Hampton-Sosa, 2004). Usefulness is a term conceptually similar to the relative benefits people perceive from a mobile banking service and, therefore, we adopted the perception of *relative benefits* as a cognition variable. As a result, four variables (*trust propensity*, *structural assurances*, *firm reputation* and *relative benefits*) were chosen as the key antecedents of initial trust.

Trust propensity

Trust propensity represents a person's disposition to rely on others in various situations (McKnight *et al*., 1998). It is deeply rooted in a person's personality and psychological development during the early stage of her/his life (Lee & Turban, 2001). According to the social learning theory, social interactions with people such as parents in early childhood play a vital role in shaping a person's trust propensity (Rotter, 1967). McKnight *et al*. (1998) divided trust disposition into two types: *faith in humanity*, in which a person believes in the reliability and dependability of people; and *trusting stance*, in which a person believes that he or she will be better off when he or she deals with people as if they are reliable. An individual's trust tendency thus formed plays a role in determining initial confidence in his/her business counterpart. For example, it has been shown that trust propensity affects investors' beliefs about the trustworthiness of brokerages and their services (Menon *et al*., 1999).

Structural assurances

Structural assurances in the form of agreements, contracts, regulations, policies, laws, feedback forums, guarantees, escrow services and others enhance initial trust between involved parties in a relationship (Zucker, 1986; McKnight *et al*., 2004; Pavlou & Gefen, 2004). People understand that there are uncertainties and risks associated with online business channels

because the information asymmetry between buyers and sellers can result in opportunistic behaviours. The availability of formalized structural assurances that discourage such opportunistic behaviours is vital to build confidence in m-commerce services such as mobile banking (Kim & Prabhakar, 2004). Institutional formalities are necessary for the successful formation of client trust in online businesses, particularly in the initial stage of business engagements (McKnight *et al*., 1998); Pennington *et al*., 2003–2004). In this study, therefore, we examine the effects of various structural assurances offered by mobile banking firms, which include compensation for financial losses because of service faults and the protection of customer information and privacy.

Firm reputation

It is difficult to determine the quality of a service without prior experience. However, channels such as referrals and word of mouth can influence a person's perception of a service when it is complex or difficult to assess (Granovetter, 1973). People's perceptions of a service may also be affected by institutional cues and ideas about its reputation conveyed formally and informally (Kim & Prabhakar, 2004). A good reputation provides assurance of a firm's ability, integrity and goodwill, thus helping to increase trust even when consumers do not have first-hand knowledge of the service company (Lohse & Spiller, 1998). Likewise, Anderson & Weitz *et al*. (1989) show that a service provider's reputation critically affects people's confidence in the firm. In addition, the reputation of a firm's Web site is positively associated with the firm's perceived capability and increases a person's confidence in the firm even without prior business engagements (McKnight *et al*., 1998). Jarvenpaa & Tractinsky (1999) also indicated that the reputation of an internet shopping mall boosted consumers' confidence, which in turn positively influenced their attitude towards online service.

Relative benefits

Relative benefits are realized when a new service offers greater value to customers than existing ones in such ways as improvements in economic benefits, personal image, convenience and satisfaction (Rogers, 1995; Taylor & Todd, 1995). The term *relative benefits* bears a conceptual resemblance to the term *perceived usefulness* that has been utilized often in extant studies, including Davis's (1989) Technology Acceptance Model. The resemblance lies in the fact that both presume performance improvement of a new service over existing ones. Clients compare available services and choose the one with better value.

Mobile banking offers benefits in mobility and convenience that traditional off-line processes or non-mobile internet banking cannot match (Anckar & D'Incau, 2002; Lee & Benbasat, 2003; Looney *et al*., 2004). However, off-line and traditional internet channels have their own advantages. Off-line banking relies on information-rich person-to-person contacts, avoids impersonality and anonymity, and offers better security than wireless channels. Non-mobile internet banking can offer a richer interface and better security than mobile banking running on WAP

or embedded solutions. Nonetheless, when people find that mobile banking delivers values that more than offset other trade-offs, they may develop a positive attitude towards the service even without prior experience.

RESEARCH MODEL

Existing theoretical and empirical studies (see Appendix 1) imply that people's initial trust in mobile banking is vital for its individual and social acceptance. A research model (Figure 1) is proposed to examine how selected antecedents affect the formation of an individual's initial trust in mobile banking and how these antecedents and initial trust lead to his/her intention to make use of the service. The initial trust variable therefore mediates the antecedents and usage intention. All antecedents are presumed to influence usage intention indirectly via the initial trust variable (McKnight *et al*., 2002a). Relative benefits and perceived reputation are also expected to influence usage intention directly (Davis, 1989; Jarvenpaa *et al*., 2000). It is possible to argue that structural assurances directly influence usage intention. However, because firms introduce them to relieve clients' apprehension and gain their trust in a service, the role of structural assurances is deemed indirect.

HYPOTHESES

Relative benefits, initial trust and usage intention

According to the theory of innovation, the characteristics of an innovative technology influence the degree of its adoption and diffusion (Rogers, 1995). Relative benefits include the value an

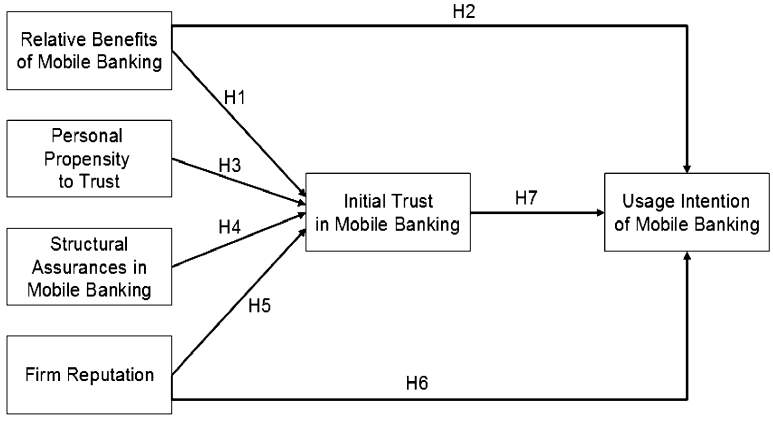

Figure 1. Research model.

innovation brings to its adopters in the form of economic gains, improved public image and greater convenience or satisfaction. Despite the noted weaknesses of handsets (e.g. small screen size and keypad), mobile banking offers benefits unmatched by traditional off-line or non-mobile internet banking (Clarke, 2001; Anckar & D'Incau, 2002). To use off-line banking services, customers have to travel to a bank and wait in line. Off-line services are also available only during a bank's operating hours. Non-mobile internet banking has a spatial limitation in that service users have to be at certain locations (e.g. hot spots) with internet access. Mobile banking frees clients from such spatial and temporal restrictions.

Convenience, flexibility and other perceived benefits may contribute to the formation of trust even before a customer actually uses a service (Koufaris & Hampton-Sosa, 2004). Lee *et al*. (2003) found out that the innovative attributes or advantages of a service could reduce consumers' perception of its social or psychological risks. Relative benefits are conceptually synonymous with perceived value (Anckar & D'Incau, 2002), in which a service with more value factors gains increased acceptance. From a slightly different angle, perceived benefits are also analogous to perceived usefulness (Taylor & Todd, 1995). Many studies, including those grounded on the Technology Acceptance Model (Davis, 1989), have shown that the perceived usefulness of a technology changes user attitudes towards it, subsequently affecting adoption and usage behaviour. Extending the discussion to the context of m-commerce, we expect that the perceived benefits of mobile banking influence a person's trust in the service and subsequent intention to use it. Therefore, we posit that:

H1: Perceived benefits of mobile banking positively affect a person's initial trust in it.

H2: Perceived benefits of mobile banking positively affect a person's intention to use it.

Trust propensity and initial trust

Individual disposition to trust is an attribute formed by a person's cultural background, psychological characteristics and experience (Lee & Turban, 2001). When people make a judgement of a service without prior knowledge, those with a higher propensity to trust are more likely to assume that the service is dependable. A person's initial trust in mobile banking is therefore expected to be a function of his/her propensity to trust when there are no experiential elements to factor in (McKnight *et al*., 1998). Gefen's (2000) study based on Amazon.com, McKnight *et al*.'s (2002a; 2002b) research on internet retail stores, and Kim & Prabhakar's (2004) work on internet banking imply that individual inclination to trust could play a significant role in shaping initial confidence in mobile banking. Extending the results of extant studies to the context of mobile banking, we hypothesize that:

H3: A person's propensity to trust positively affects the formation of his/her initial trust in mobile banking.

Structural assurances and initial trust

Providing structural assurance is an effective mechanism to increase institution-based trust (McKnight *et al*., 1998). Institution-based trust among transaction parties may be fortified by

such formal provisions as contract terms and conditions, agreements, regulations and third-party guarantees. The role of such measures is critical in shaping one party's initial trust when information about the counterpart is incomplete. In the mobile banking context, structural assurances promise the reliability of financial transactions, the protection of individual privacy and transactional confidentiality. They improve customers' initial confidence in a service because clients want to be protected from informational, financial, and other forms of risk and uncertainty (McKnight *et al*., 2002a; 2002b). Kim & Prabhakar (2004) suggested that structural assurances are especially important when the parties in question are involved in financial transactions through electronic channels. Therefore, the following hypothesis is proposed:

H4: Structural assurances provided by service firms contribute positively to the formation of a person's initial trust in mobile banking.

Firm reputation, initial trust and usage intention

Building a good reputation for a firm demands the long-term investment of resources and sustained efforts to manage relationships with customers and the community successfully. McKnight *et al*. (1998) explain that when customers do not have prior experience with a firm, they rely on its reputation to decide its trustworthiness. The success of reputation-feedback systems or feedback forums (Ba & Pavlou, 2002) in online auctions demonstrates the importance of business partners' reputation in forming clients' initial trust in their services. Koufaris & Hampton-Sosa's (2004) study also showed a close link between the reputation of a Web store and the formation of clients' initial trust. Similarly, McKnight *et al*. (2002a) conducted a study on business relationships and found a positive association between the perceived reputation of a law firm and clients' initial trust in the firm and service.

A firm's reputation reflects its reliability in business engagements. It increases customers' recognition, plays a role in forming their initial confidence and helps to maintain their confidence in future transactions (Kim & Prabhakar, 2004). The reputation of a service provider is therefore one of the key factors that influence customers' choice of technology-enabled services (Mols, 1999; Aladwani, 2001). It was also shown that increases in online transactions or intention to use a service were strongly affected by the reputation factor (Jarvenpaa *et al*., 2000; Tan & Thoen, 2001; Pavlou, 2003). We therefore posit a direct influence of reputation on potential customers' inclination to trust mobile banking and subsequently adopt it.

H5: A service firm's reputation is positively associated with a person's initial trust in mobile banking.

H6: A service firm's reputation is positively associated with a person's intention to adopt mobile banking.

Initial trust and usage intentions

Studies have pointed out that the level of trust in a firm affects customers' intention to make use of its services or products (Gefen *et al*., 2003; Gefen & Straub, 2004; Pavlou & Gefen, 2004).

Jarvenpaa & Tractinsky (1999) showed that customers' confidence in an internet shopping mall affected their intention to purchase. McKnight *et al*. (2002a; 2002b) depicted a close association between trusting beliefs and trusting intentions. Kim & Prabhakar (2004) demonstrated that a consumer's willingness to take part in online banking is contingent on his/her level of trust. According to Suh & Han (2003), trust mediates the relationship between a person's perception of security control and his/her acceptance of online banking. In their qualitative study, Rotchanakitumnuai & Speece (2003) found that the limited success of internet banking in Thailand was because of the lack of trust people had in service providers. Additionally, several studies that examined internet shopping services demonstrated a link between trust in Web stores and customers' usage or usage intentions (Anderson & Weitz, 1989). It is therefore hypothesized that:

H7: The level of initial trust a person has in mobile banking is positively associated with his/her intent to adopt it.

RESEARCH METHOD

Survey development

To validate the research hypotheses, a survey was developed in Korean. Question items from extant studies were adequately adapted to the context of mobile banking. Their sources are summarized in Table 1. All study variables and their measurement items were designed to gather perceptions at the individual level, making each individual the unit of analysis. Responses are measured on the 7-point Likert scale (1–7). The question items are listed in Appendix 2.

Relative benefits of mobile banking were listed as transactional mobility, perceived convenience and efficiency, and effectiveness in account management. *Trust propensity* of a person was reflected by cautiousness in adopting new Information Technologies (IT), avoidance of IT-based financial transactions and discreetness in a new business engagement. Here, the first two items are conceptually different because although a person may be receptive to new ITs, he or she may still avoid using them for financial transactions because of perceived risks or personal preferences. *Structural assurances* included the capacity of mobile banking firms to prevent clients' financial losses, protecting personal as well as transactional information and safeguarding clients from other unexpected accidents. *Firm reputation* was manifested by a person's recognition of mobile banking firms and their service quality. As the mobile banking under consideration was offered in industry partnerships, survey items for banks and mobile carriers were separately included. *Initial trust* was measured in terms of the accuracy, safety and reliability of mobile banking as a financial service.

We measured the dependent variable, *usage intention*, with one question item rather than multiple items. The incorporation of multiple indicators improves the reliability of a variable when it is a second- or higher-order latent variable (e.g. service quality) that represents several first-order variables (e.g. reliability, tangibility, customer service). Here, we used one question

Table 1. Summary of survey items

Variables	Definition	Manifestation	Items	Sources
Relative benefits	Personal perception of the benefits of mobile banking	Transaction mobility Transaction convenience Transaction efficiency Effectiveness in account management	4	Moore & Benbasat (1991) Kim *et al*. (2003)
Trust propensity	Individual disposition to trust	Avoidance of using new ITs Avoidance of using new ITs for financial transactions Caution in transactions	3	McKnight *et al*. (1998) Kim & Prabhaker (2004) Lee & Turban (2001)
Perceived structural assurances	Individual perception of safety measures in mobile banking	Protection against financial loss Protection of personal info Client protection policy Transaction dependability	4	Kim & Prabhaker (2004) Yoon (2000)
Firm reputation	Perceived reputation of mobile banking firms	Firm reputation (bank and telco) Firm recognition (bank and telco) Service quality (bank and telco)	6	Yoon (2000)
Initial trust	A person's initial trust in mobile banking	Service accuracy Service safety Service reliability	3	Schneider (1998) Kim & Prabhaker (2004)
Usage intention	Intention to use mobile banking	Usage intention	1	Venkatesh & Davis (2000)

Telco, telecom service provider.

item on the grounds that usage intention was not a latent concept but more of a monolithic judgement variable with measurement reliability. In fact, for the same reason, several studies limited the number of question items in capturing usage intention (e.g. Venkatesh & Davis, 2000; Gefen *et al*., 2003; Pavlou, 2003).

Data gathering

A pretest of the survey was conducted with college students to validate the reliability of question items. Those with semantic ambiguities were adequately modified. Then, the survey was administered to people (not college students) who owned a mobile phone and maintained a regular bank account but did not sign up for mobile banking. Signing up for mobile banking requires the activation and registration of the smart chip embedded within a mobile phone.

For the data gathering, directors of three large mobile telcos in Korea were contacted and their collaboration was solicited for the identification of survey respondents. Each company came up with 200 randomly chosen cellular-phone users who did not register for mobile banking. In total, 600 (200×3) surveys were sent to the selected people via online and off-line channels. Of these, 206 responses were returned, making the response rate slightly higher than 33%. Fourteen responses were dropped from further consideration because of their incompleteness. Remaining 192 samples satisfied (or closely satisfied) the recommended sample size necessary to achieve the reliability in structural equation modelling (Hair *et al*., 1995; Hoogland & Boomsma, 1998).

SPSS 11.0 was used to obtain descriptive statistics and to undertake the factor analysis. For the hypothesis testing, structural equation modelling was conducted on LISREL. Statistics indicate that most respondents were in their 20s and 30s (Table 2). The distribution (51, 35 and 14%) of survey respondents closely reflected the market share of the three mobile service carriers.

Table 2. Distribution of survey respondents

Distribution		Frequency total: 192	%
Gender	Male	125	65.1
	Female	67	34.9
Age	19~24	30	15.6
	25~29	111	57.8
	30~34	27	14.1
	35~39	21	10.9
	40~	3	1.6
Mobile service provider	SKT	98	51.0
	KTF	68	35.4
	LGT	26	13.5

KTF, KTF Co., Ltd.; LGT, LG Telecom; SKT, SK Telecon.

ANALYSIS RESULTS

Validity testing

Survey data were examined for reliability and validity. Discriminant and convergent validities were tested using factor analysis with VARIMAX rotation. Table 3 summarizes the test results. All indicators of each factor had high loading values, confirming convergent and discriminant validities. Cronbach's alpha was used to measure the reliability of each factor, for which 0.6 was the threshold value (Nunnally, 1978). All Cronbach's alphas were higher than 0.7 except for *trust propensity* (0.63), indicating compelling reliability in the factor structure. Although the Cronbach's alpha for trust propensity was relatively lower than the others, it surpassed the generally accepted threshold value (Nunnally, 1978).

Descriptive statistics

Descriptive statistics of the studied variables on the 7-point Likert scale are summarized in Table 4. The results indicate that survey respondents had a relatively low level of initial trust in mobile banking (2.55/7) and were uncertain about service firms' institutional assurances to

Table 3. Validity testing and reliability analysis

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	
Items	Firm reputation (RP)	Structural assurance (SA)	Relative benefits (RA)	Initial trust (IT)	Trust propensity (TP)	Cronbach's alpha
RP1	0.784					
RP2	0.815					
RP3	0.737					
RP4	0.717					0.8628
RP5	0.801					
RP6	0.655					
RA1			0.660			
RA2			0.743			
RA3			0.811			0.7735
RA4			0.733			
SA1		0.767				
SA2		0.704				
SA3		0.720				0.7857
SA4		0.710				
IT1				0.790		
IT2				0.765		0.8182
IT3				0.655		
TP1					0.771	
TP2					0.663	0.6331
TP3					0.770	

Table 4. Descriptive statistics

Variable	Mean	Standard deviation
Initial trust in mobile banking	2.55	0.77
Intention of service usage	3.26	0.79
Relative benefits	3.46	0.70
Trust propensity	4.32	0.70
Structural assurances	2.52	0.70
Firm reputation	3.83	0.59

Table 5. Summary of fitness statistics

Type	Adjusted Chi-square ratio	GFI	AGFI	NFI	TLI	CFI	RMR
Threshold	≤5	≥0.90	≥0.80	≥0.90	≥0.90	≥0.90	≤0.05
Value	3.81	0.99	0.87	0.97	0.81	0.97	0.02

Adjusted goodness of fit Index (AGFI), Comparative fit Index (CFI), Goodness of fit Index (GFI), Normed fit Index (NFI), Root mean square residual (RMR), Turker-Lewis Index (TLI).

protect them from potential risks innate to mobile banking (2.52/7). Not surprisingly, their intention for service subscription was lukewarm (3.26/7).

Structural equation modelling

We adopted a two-step analysis approach, in which measurement models and the structural model are separately validated. In general, the two-stage analysis is considered better than the single-stage analysis in accurately representing indicator reliability and in compensating for a model's theoretical weaknesses (Hair *et al*., 1995). As a single-question item was used for the dependent variable on the grounds that it was not a latent construct, we wanted to avoid the interaction of measurement and structural models, which could sacrifice the reliability of the usage intention variable. Also, as an application of m-commerce, mobile banking is an emerging paradigm. Many issues therefore await a more theoretical investigation, which further justifies the use of two-step analysis. The goodness-of-fit statistics (Table 5), in general, support the integrity of the overall model.

Figure 2 shows standardized path coefficients and corresponding *t*-values (within parentheses). *T*-statistics confirmed that all paths except two were highly significant. The paths that connect firm reputation and initial trust, and firm reputation and usage intention, were not significant. The link between relative benefits and usage intention was significant at $p = 0.05$ and all the other paths achieved their significance at the $p = 0.01$ level.

Mobile banking is offered through the partnership between banks and mobile telcos (Shin & Lee, 2005). Our analysis is therefore based on the perceived reputation of both banks and mobile telcos. However, people may feel that they differ in their trustworthiness. Because of the possible perception gap, we conducted two additional tests in which the effect of the reputation variable was separately assessed for banks and mobile telcos (see Appendix 3). The

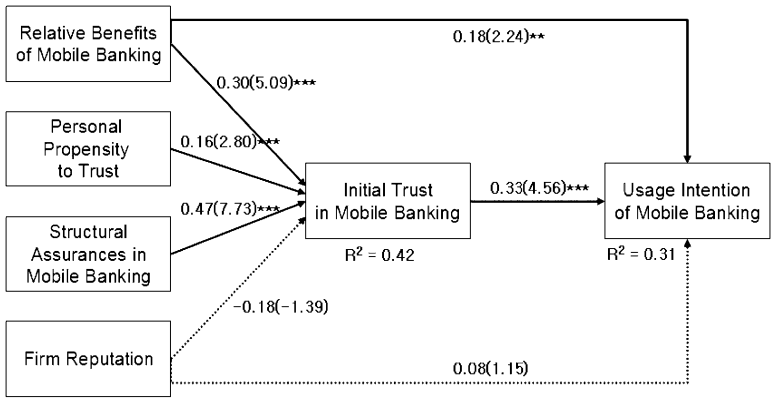

Figure 2. The results of path analysis (**$p < 0.05$, ***$p < 0.01$).

Table 6. Summary of hypothesis testing

Items	Research hypotheses	Result
H1	Perceived benefits of mobile banking positively affect a person's initial trust in it.	Accepted
H2	Perceived benefits of mobile banking positively affect a person's intention to use it.	Accepted
H3	A person's propensity to trust positively affects the formation of his/her initial trust in mobile banking.	Accepted
H4	Structural assurances provided by service firms contribute positively to the formation of a person's initial trust in mobile banking.	Accepted
H5	A service firm's reputation is positively associated with a person's initial trust in mobile banking.	Not accepted
H6	A service firm's reputation is positively associated with a person's intention to adopt mobile banking.	Not accepted
H7	The level of initial trust a person has in mobile banking is positively associated with his/her intent to adopt it.	Accepted

parameters of both SEMs showed close resemblance, indicating reputational proximity between banks and mobile telcos.

Based on the standardized path coefficients in Figure 2, we can compare antecedent variables in terms of their explanatory power. First of all, the provision of structural assurances (0.47) had the highest impact on the formation of initial trust, followed by perceived benefits of mobile banking (0.30) and personal propensity to trust (0.16). Relative benefits influenced usage intention both directly and indirectly (through the enhancement of initial trust). The overall effect of relative benefits on usage intention ($0.18 + 0.30 \times 0.33 = 0.28$) closely matched that of initial trust on usage intention (0.33). R-square values indicated that the antecedent variables explained 42% of variations in initial trust. Also, the selected antecedents and initial trust variables explained 31% of variations in usage intention. Table 6 summarizes the result of hypothesis testing.

DISCUSSION

Analysis results

This study examined dynamics among selected antecedents of initial trust, initial trust in mobile banking and intent for its adoption. Overall, the people surveyed had a relatively low degree of trust in mobile banking and did not have much confidence in structural assurances provided by service firms. Understandably, their perceptions on relative benefits of mobile banking and their intention to use the service were also tepid. The results are in line with other studies (Kleijnen *et al*., 2004; Suoranta & Mattila, 2004) that reported low enthusiasm for WAP-based mobile banking. Our study re-confirms the link between the innovative nature of a service and the social and psychological risks that people perceive in embracing it (Lee *et al*., 2003).

The close association between perceived benefits and initial trust was recognized. The benefits perception of a service conceptually resembles to its value and usefulness. Mobile commerce's usefulness is largely attributed to its wireless value (e.g. convenience and efficiency) and mobile value (e.g. contextuality and ubiquity) (Anckar & D'Incau, 2002). Currently, the emphasis of mobile banking is on delivering wireless values rather than mobile values. The survey items of perceived benefits therefore included such value factors as location independence, convenience, efficiency and effectiveness. The research confirmed that improved sense of wireless values (Anckar & D'Incau, 2002) in mobile banking results in higher initial trust in it. This agrees with studies that examined the role of service usefulness in shaping trusting beliefs (Lee *et al*., 2003; Koufaris & Hampton-Sosa, 2004). Also, as theorized by Davis's (1989) Technology Acceptance Model and as implied by Rogers' (1995) innovation adoption, the usefulness (or benefits) perception of mobile banking significantly boosted a person's intention to adopt it. The path coefficients revealed that perceived benefits of mobile banking had a stronger effect on its initial trust than on its usage intention.

Personal disposition to trust played a positive role in developing initial trust in mobile banking. Given that mobile banking of this modality is a new concept to most people, personal characteristics may play a major role in a person's adoption decision if other conditions (e.g. affordability and accessibility) remain equal. In particular, the result leads to the conjecture that those who have a greater propensity to trust and willingness to accept higher risks of wireless financial transactions will embrace mobile banking early. This may imply that target (rather than generalized) marketing of mobile banking to those who fit the trust profile may be a more cost-effective approach in broadening customer-base. Overall, benefits perception of mobile banking had a larger effect on its initial trust than personality had. This seems to indicate that among individual-level attributes, cognition-based factors (McKnight *et al*., 1998) outweigh personality-based ones (McKnight *et al*., 1998; Gefen, 2000) in influencing potential customers' initial trust in mobile banking.

The most powerful antecedent of initial trust was structural assurances outweighing both value perceptions and personal inclination. Structural assurances are representative antecedents of trust offered by institutes (McKnight *et al*., 1998; Gefen *et al*., 2003). The finding

underscores the importance of measures taken to safeguard customers from both financial and information losses to earn their faith in mobile banking. The assurance measures (e.g. compensation for losses and protection of personal information) surveyed here are typically offered by service firms; we did not include external protections (e.g. regulations, laws and escrow services) available from the community (Zucker, 1986). Although they may not be as powerful as firm-level provisions, external measures should also have a significant bearing on people's initial trust. Understanding their role remains a subject for future research.

The reputation of service providers as a representative variable of firm characteristics (Pennington *et al*., 2003–2004) did not affect respondents' initial trust in mobile banking or intention for its usage. This result does not agree with that of other studies conducted on internet shopping malls, in which their reputation was a vital element in building clients' initial trust in and subsequent usage of online shopping (Gefen *et al*., 2003; Pavlou, 2003; Pennington *et al*., 2003–2004). Many online stores are relatively young and therefore not as well recognized as mobile banking firms. This situation could make the formation of initial trust in online retailers much more challenging. On the other hand, mobile banking firms are relatively large and widely recognized as they have been in business for many years (Shin & Lee, 2005). This leads us to believe that if the reputation of a mobile banking firm reaches a certain level, it is no longer significant in influencing trust or in attracting more people to the service.

It has also been found that a person's initial confidence in mobile banking to offer accurate, stable and safe financial services is vital to his/her intention to embrace it (Bhattacherjee, 2002; Gefen *et al*., 2003). This re-confirms that as in traditional off-line or online businesses, building early trust in a service is crucial for the successful marketing of mobile banking. Given that mobile banking is perceived riskier than non-mobile banking, our result underscores the importance of securing user confidence in service safety and reliability. Overall, among four antecedents of initial trust in mobile banking, institutional offering (structural assurances) seems to be most effective in shaping the trust sense of mobile banking among prospective users. It was followed by cognition (relative benefits), personality (personal propensity) and firm characteristics (firm reputation). Also, among three predictors of usage intention for mobile banking, initial trust shows the biggest influence followed by relative benefits and firm reputation whose effect was statistically insignificant.

This study focused on mobile banking, a popular m-commerce application (Lee *et al*., 2003; Varshney, 2004; Shin & Lee, 2005) that fuses banking and telecommunications infrastructures. The results of our study have practical implications for identifying competitive strategies in this emerging service field. First of all, service firms should offer various assurance programmes designed to relieve uncertainties associated with mobile banking usage, to counter its perceived risks and to earn people's trust early in the process. Second, given the leading-edge nature of mobile banking, marketing efforts based on the profiling of target customers according to personal trust model may be particularly effective. Third, service firms should emphasize functional benefits and advantages of mobile banking to expand customer-base. Highlighting value factors of mobile banking against off-line banking, tele-banking or non-mobile internet banking may be effective. Because the embedded solution is in its early stage of evolution,

existing services aim to enhance *wireless values* (Anckar & D'Incau, 2002) in user experience. Service firms, however, can further the sense of user benefits by enhancing *mobile values* (Anckar & D'Incau, 2002). In particular, financial services that utilize contextuality and ubiquity aspects (Venkatesh *et al*., 2003; Looney *et al*., 2004) are expected to positively affect the sense of trust in mobile banking and their adoption.

Limitations and future research

For several reasons, caution is necessary in interpreting the results of our study. First, although the Cronbach's alpha for the *trust propensity* variable satisfies a general threshold value suggested by Nunnally (1978), it is relatively lower than the other variables. Concerned that the variable might have affected the estimation of other links in the structural model, we conducted an additional SEM test without the trust propensity variable. Estimated statistics (e.g. path coefficients) were almost identical to the original model, confirming little effect of the trust propensity variable on overall results. This also seems to support the validity of having 0.6 as the threshold value suggested by Nunnally (1978).

Second, our empirical study of mobile banking is grounded on the embedded chip solution. For two reasons, people might have reacted differently if it were based on WAP. Above all, the embedded chip technology and WAP differ significantly in terms of service convenience and efficiency, flexibility and accessibility (Shin & Lee, 2005). Also, unlike WAP which has been around for some years, the embedded chip solution is in the very early stage of the adoption curve.

Third, the reports of people's initial trust in our study could significantly differ from those of other studies because the respondents already had experience with a bank and a mobile telco. Their familiarity with service firms might have affected their impressions of mobile banking. In the meantime, the low level of initial trust in mobile banking (refer to Table 4) indicates that respondents are not necessarily tying it with the market reputation of service firms.

Our study paves the way for future research. First of all, the empirical data were gathered from a single country, with its own unique cultural characteristics (Hofstede, 1980). Accordingly, cross-cultural studies will not only improve the generalizability of study results, but will also extend our understanding of cultural implications on the prospect of embedded mobile banking. The influence of cultural and other socio-economic factors seem to be especially evident when research deals with the adoption and diffusion of an innovation (Scott, 2002). For instance, Koreans may spend more time in public transportation, during which they use cellphones as a productivity and media centre tool. The usage includes not just telephone calls, but also entertainment (e.g. music, online games and video on demand), short messaging service, management of community Web sites and other routines (e.g. financial transactions). However, the usage of cellphones at this level may not be feasible when people drive much on the road (except possibly sales people or professionals who are constantly travelling), and this difference may explain why mobile banking is not popular in some countries, including the USA (Mallat *et al*., 2004).

Unlike our study, which relied on usage *intention* as the dependent variable, future work may be based on the actual *adoption behaviour* of mobile banking. When actual behaviour is used

as the dependent variable, measurement reliability improves substantially (Arnold & Feldman, 1981; Brookhouse *et al*., 1986). On the other hand, there is a potential risk of response bias because survey respondents may answer other question items (e.g. relative benefits, structural assurances and initial trust) in such a way as to justify their service adoption. Comparing adopters and non-adopters of mobile banking to understand what divides them is another promising research topic. However, we believe that such a comparison is meaningful when mobile banking itself is widely accepted and, therefore, it may be somewhat premature to conduct this comparative research based on the embedded chip solution.

Finally, the adoption behaviour (or adoption intention) of mobile banking among prospective users is influenced by both system and non-system factors. Non-system factors may be further divided into individual and organizational factors. Naturally, besides the antecedent variables studied here, there are many other system (e.g. system quality, speed, multimedia capability) and non-system factors (e.g. social influences, age, computer skills, mobile technology readiness) that may affect (initial) trust in mobile banking and its adoption (Kleijnen *et al*., 2004). Their incorporation remains as future research.

CONCLUSIONS

With the emerging paradigm of service convergence across industries, we expect increasing popularity of advanced mobile banking. Its growth represents the value of synergistic partnerships between two seemingly unrelated telecommunications and finance industries. Mobile banking is expected to create pervasive value networks in which many telcos, banks and other financial firms actively participate to take advantage of looming opportunities, to survive competition and to sustain long-term growth. Despite the industry push for the obvious reasons, ultimate success of mobile banking largely rests on user reactions to available services and their value propositions. There has been paucity of research efforts in empirically examining the implications that initial trust and its antecedents have on innovative mobile banking, let alone in the context of embedded solution.

Through the research, we examined the mechanisms associated with the initial formation of people's trust in embedded mobile banking and intention to use its service. With the high-level research goal, we assessed the contribution of studied antecedents (personal propensity to trust, perceived benefits, structural assurances and firm reputation) to both initial trust in mobile banking and its usage intention. The antecedents represent individual and organizational dimensions of personality, cognition, institutional offering and firm-characteristics. To the best of our knowledge, this is the first empirical research undertaken based on the embedded mobile banking solution that was launched by Korean telcos for the first time in the world in late 2003. With technological progress, the innovation is expected to embrace ingredients of ubiquitous computing to deliver unprecedented-level of value propositions to clients. The results of our empirical study and related introduction of Korea's experience therefore enrich understanding on the issues of initial trust, bring to light important future research issues and also offer practical insights to other potential adopters of the embedded solution.

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APPENDIX 1. SUMMARY OF TRUST LITERATURE

	Context	Trust type		
Author	Research Method	Trustor/Trustee	Trust antecedents	Trust consequences
Liu *et al.* (2004)	Internet Retailing	general trust	■ Privacy - notice - access - choice - security	■ behavioral intention
	laboratory experiment	consumer trust in online bookstores		
Pavlou & Gefen (2004)	online auction	general trust	■ institution-based trust - feedback mechanism - third-party escrow services – credit card guarantees	■ perceived risk ■ transaction intentions
	field survey	buyer trust in the community of online auction sellers		
Walczuch & Lundgren (2004)	Internet Retailing	general trust	■ institution-based trust - personality-based - perception-based - experience-based - knowledge-based	N/A
	field survey	consumer trust in e-retailers		
Koufaris & Hampton-Sosa (2004)	Internet Retailing	initial trust	■ perceptions about the company - perceived willingness to customize - perceived reputation - perceived size ■ perceptions about the web site - perceived usefulness - perceived ease of use - perceived security control ■ trust propensity	N/A
	experimental survey	consumers' initial trust in online companies		
Gefen & Straub (2004)	Internet Retailing	general trust	■ social presence ■ familiarity ■ disposition to trust	■ purchase intentions
	simulation experiment	consumer trust in e-products and e-services		
Kim & Prabhakar (2004)	Internet Banking	initial trust	■ trustor's propensity-to-trust ■ word-of-mouth referrals ■ structural assurances	■ adoption of Internet banking
	field survey	consumers' initial trust in e-Channel as a banking medium		

APPENDIX 1. cont.

Author	Context / Research Method	Trust type / Trustor/Trustee	Trust antecedents	Trust consequences
Pennington *et al.* (2003–4)	Internet Retailing / experimental survey	general trust / consumers' perceived trust in vendors	■ system trust ■ perceived vendor reputation	■ attitude toward vendor ■ purchase intent
Gefen *et al.* (2003)	Internet Retailing / field survey	general trust / consumer trust in online vendors	■ calculative-based trust ■ institution-based structural assurances ■ institution-based situational normality ■ knowledge-based familiarity ■ perceived ease of use	■ perceived usefulness ■ intended use
Suh & Han (2003)	Internet Banking / field survey	general trust / consumer trust in e-commerce	■ security control - authentication - nonrepudiation - confidentiality - privacy protection - data integrity	■ attitude toward using ■ behavioral intention to use
Pavlou (2003)	Internet Retailing / experiential exploratory survey & confirmatory survey	general trust / consumer trust in e-commerce	■ reputation ■ satisfaction with past transactions ■ frequency	■ perceived risk ■ perceived usefulness ■ perceived ease of use ■ intention to transact
McKnight *et al.* (2002b)	legal advice web site / experiment	initial trust / consumer trust in web vendors	■ perceived vendor reputation ■ perceived site quality ■ structural assurance of the Web	■ behavioral intentions intention to follow vendor advice - intention to share personal info. with web vendor - intention to purchase from site
Ba & Pavlou (2002)	online auction / experimental survey	general trust / buyer trust in e-sellers	■ feedback profile (online feedback mechanisms)	■ price premiums
McKnight *et al.* (2002a)	Internet retailing / experimental survey	initial trust / consumer trust in Web vendors	■ disposition to trust ■ institution-based trust - structural assurance - situational normality ■ perceived site quality	■ trusting intentions – willingness to depend - subjective probability of depending
Bhattac-herjee (2002)	e-commerce (retail, bank) / field survey	general trust / individual trust in online firms	■ familiarity	■ willingness to transact

APPENDIX 1. cont.

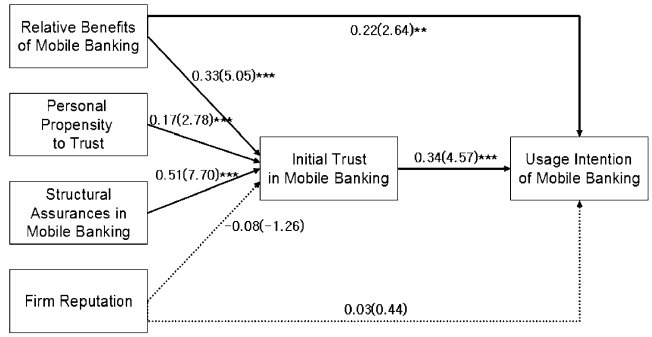
Author	Context / Research Method	Trust type / Trustor/Trustee	Trust antecedents	Trust consequences
Lee & Turban (2001)	Internet retailing / field survey	general trust / consumer trust in Internet shopping	■ trustworthiness of Internet merchant - ability - integrity - benevolence trustworthiness of Internet shopping medium - technical competence - reliability - medium understanding ■ contextual factor - effectiveness of third party certification - effectiveness of security infrastructure	N/A
Jarvenpaa *et al.* (2000)	Internet retailing / experiential survey	general trust / consumer trust in online stores	■ perceived size ■ perceived reputation	■ attitude ■ risk perception ■ willingness to buy
Gefen (2000)	Internet retailing / field survey	general trust / consumer trust in online bookstore	■ familiarity ■ disposition to trust	■ inquire ■ purchase
Jarvenpaa & Tractinsky (1999)	Internet retailing / experiential survey & cross-cultural study	general trust / consumer trust in Web merchant	■ perceived size ■ perceived reputation	■ attitude ■ risk perception ■ willingness to buy

APPENDIX 2. SURVEY ITEMS

Variables	Question items
Relative benefits	Mobile banking has more advantages than Internet or off-line banking because services are not limited by location.
	Mobile banking is more convenient than Internet or off-line banking.
	Mobile banking is more efficient than Internet or off-line banking.
	Mobile banking is more effective than Internet or off-line banking in managing a bank account.
Propensity to trust	I am cautious in using new technologies to do my work.
	If possible, it is better to avoid using new technologies for financial transactions.
	In a new business relationship, I have to be careful until I see the evidence of a firm's trustworthiness.
Perceived structural assurance	Mobile banking firms guarantee compensation for monetary losses that might occur during service usage.
	Mobile banking firms guarantee the protection of customers' personal information.
	Mobile banking firms publish a policy on the protection of transactional data.
	Mobile banking firms publish a policy on customer protection from accidents.
Firm reputation	My cellular service provider has a good reputation.
	My cellular service provider is recognized widely.
	My cellular service provider offers good services.
	My bank has a good reputation.
	My bank is recognized widely.
	My bank offers good services.
Initial trust	Mobile banking always provides accurate financial services.
	Mobile banking always provides reliable financial services.
	Mobile banking always provides safe financial services.
Usage intention	I intend to use mobile banking.

APPENDIX 3. PATH ANALYSIS (**$P < 0.05$, ***$P < 0.01$)

1. With mobile telco's reputation only



2. With bank's reputation only