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Demographic Differences and Internet Banking Acceptance

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ABSTRACT: *This research contributes to additional understanding of TAM's validity in Internet banking acceptance. Although some user profile variables have been examined in technology acceptance research, there has been little research investigating the new roles of these profile variables in the dynamic technology environment. The objective of this study is to profile adopters of Internet banking system and evaluate the impacts of these profiles on technology acceptance. We are interested in exploring how sex, age and IT competency influence Internet banking system use. TAM was applied to guide the evaluation of Internet banking acceptance behaviors.*

KEYWORDS: *Technology Acceptance Model, Internet Banking, Demographic Difference.*

1. Introduction

Information technology (IT) acceptance has been the subject of many research studies over the past two decades. Since the early 1990s, several theories have emerged offering potentially new insights into the relationship between actual IT acceptance and use, at both individual and organizational levels. Of these theories, the Technology Acceptance Model (TAM) has received more attention, perhaps because of its parsimony and the wealth of recent empirical support for them (Plouffe et al., 2001; Grandon and Pearson, 2004; Shih, 2004). However, the theoretical validity and empirical applicability of the TAM still need to be extended to incorporate different technologies. This is especially true when studying the acceptance of Internet banking systems, as their technology settings and transaction environments differ drastically compared to conventional IT and conventional business environments (Lai et al., 2010). Besides, Internet banking has also been widely accepted worldwide, with the number of households banking online increasing steadily every year (Byrne et al., 2009).

In addition to validating the TAM in different technology contexts, it is also important to validate the TAM in the context of different types of users. Research (Gefen and Straub, 1997; Karahanna et al., 1999; Gefen et al., 2003; Stoel and Lee, 2003; Kleijnen et al., 2004; Pagani, 2004; Spacey et al., 2004; Al-Somali et al., 2009) has suggested that user profile and characteristics may have a significant impact on the

TAM construct and the evaluation of TAM variables. Hence, it is important to evaluate the correlation between the TAM construct and user profile before determining the appropriateness of the TAM's application. These evaluations are critical, particularly for newer innovations like Internet banking, as the roles of gender, age, and IT competence in technology acceptance may have changed as a result of the popularity of IT education in school, the use of IT at work, and equal opportunities for females in employment and career development (Knight and Pearson, 2005). The evidence of a dramatic change in the demographic distribution of Internet users in recent years due to the rapid growth in the numbers of female and young Internet users also suggests that the roles of age and gender in computer usage are changing (Huang, 2005).

However, in using the TAM to identify the actual effects of demographic differences on Internet banking or other forms of IT acceptance, researchers must ensure the invariance or measurement equivalence of the TAM construct. In other words, all survey respondents must ascribe the same meaning to the surveyed items used in the TAM, particularly in a multi-group survey context (Cheung and Rensvold, 1999). Even in a mono-group research setting, age, gender, and experience may all affect an individual's response to a TAM's survey item (Drasgow and Kanfer, 1985; Cheung and Rensvold, 2000). Accordingly, the measurement equivalence (invariance) across the sample population is an important issue (Klenke, 1992, Doll, Hendrickson, and Deng, 1998). In this study, if our objective is to explore the changing role of user profiles on the TAM, we must eliminate the impact of variables generated through the TAM construct. If we cannot do this, we may not be able to evaluate the genuine impact of user profiles on the TAM variables. In other words, if our survey items are not adjusted to account for this invariance, it will be difficult to conclude whether the observed difference of new roles is constituted by the hypothesized user profile or is a result of non-invariance, thereby making direct comparison of the observed scores of different groups (such as gender groups, age groups, and IT competency groups) less valid (Drasgow and Kanfer, 1985).

The objective of this study is to profile people who have used Internet banking systems and evaluate the impact of these profiles on technology acceptance. We are interested in exploring whether the roles of gender, age, and IT competence have changed in Internet banking system use. The TAM will be applied as a guide to evaluating Internet banking acceptance behavior. This research contributes to additional understanding of the TAM's validity in Internet banking acceptance. Although some user profile variables, especially in gender (Gefen and Straub, 1997), age (Spacey et al., 2004), and IT competence (Kleijnen et al., 2004) have been examined in technology acceptance research, they did not examine these profiles with a role-change perspective and check the invariance of their constructs before their correlation analysis. These are problematic as many behavioural researchers (such as Rensvold and Cheung, 1998) have repeatedly

stressed the importance of invariance analysis, with particular focus on the construct's configural, factorial, and intercept invariance, and have urged the development of models that are operationalized in an unambiguous way so as to achieve measurement equivalence. Unfortunately, very few IS research studies check their survey instruments for measurement equivalence prior to the data collection. Most probably, IS researchers neglect invariance analysis because they control for the effects of demographic profiles by treating them as control variables. However, this approach is less effective, as control variables can only contain the effects of the controlled factors throughout an experiment to test the relative impact of independent variables on dependent variables. The control variables cannot eliminate the effect of the non-invariance of the construct or ensure the measurement equivalence of all survey respondents.

This study intends to fill a number of the research gaps in the existing TAM literature by evaluating the demographic profiles of Internet banking users. More specifically, our study has the following three research objectives:

1. To determine the validity of the TAM in the context of Internet banking. This evaluation could provide additional research insights to enrich the cumulative findings of the TAM.
2. To assess the non-invariance of the TAM construct, thus ensuring that the actual impact of user profiles on the TAM variables is identified.
3. To validate the changing roles of gender, age, and IT competence in the context of Internet banking.

2. Background

The emergence of Internet technologies has dramatically changed the landscape of IT access and applications. However, the use of Internet technologies has also intensified the "digital divide" -- the gap between individuals with effective access to information and communication technologies (ICT) and those with very limited or no access at all (Dewan and Riggins, 2005). Critics argue that the widespread adoption of Internet-based systems presents a new form of discrimination against older, female, less IT competence, poorer, less educated, and minority (ethnic) users (Yao and Okoli, 2006-2007). Although a comprehensive literature review is unlikely to ascertain the effects of all demographic characteristics on the use and adoption of ICT, it is important to note a few key studies that have identified important differences in certain key demographic characteristics. Accordingly, our literature review will focus on the research findings relating to gender, age, and IT competency, which are the primary demographic characteristics relating to Internet use and are the foci of our investigation.

2.1 Research on gender difference and technology acceptance

Current gender research on the TAM suggests that males and females look differently at technology use, meaning they use and apply technology differently (Ford et al., 1996; Venkatesh and Davis, 2000; Adamson and Shine, 2003; Faja and Trimi, 2008). Igbaria and Zinatelli (1998), for example, has investigated computer usage patterns in small firms and found that males more frequently use spreadsheets, data management packages, programming languages, and graphic packages, whereas their female counterparts use application packages more frequently. Teo and Lim (1996) also detected gender differences in the perception of ease of use, job fit, image, and voluntariness, but not in factors related to usefulness, trialability, and complexity. More recently, Floh and Treiblmaier (2006) found gender to have a moderating effect on website quality, service quality, and satisfaction in their study of Internet banking customer loyalty.

In a study of gender difference and e-mail use, Gefen and Straub (1997) suggested that gender differences would only cause a difference in the perceptions of, but not the actual use of, technology. For example, they found that females perceived the social value of e-mail to be higher than males did. Females also perceived e-mail to be more useful, but more difficult to use, than males did. Venkatesh and Morris (2000) pushed the boundaries of gender research further through their investigation of the short-term and long-term structural relationships between gender, social influence, and the role that they play in technology acceptance and usage. In their research, it was found that male technology decisions were more influenced by their perception of usefulness, whereas female decisions were more strongly influenced by subject norms and the perception of ease of use, although the effect of subjective norms diminished over time.

More recently, Cyr and Bonanni (2005) have investigated the differences between genders regarding attitudes towards transaction security, preferred website design elements, website trust, website satisfaction and website loyalty. Their results indicated that the concern of e-business' transaction security of e-business did not differ between men and women. However, there are significant differences in perceptions of website design and website satisfaction between the genders, but not for e-loyalty. Chen, Fosh, and Foster (2008) have also investigated the extent of societally-derived values that differentiate male and female managers' in their perceptions of organizational cultures among different bank types. Their findings identified that each bank type was characterized by a distinct pattern of gender differences that was related to the ownership, history and type of business of that bank type.

2.2 Research on age and technology acceptance

Our literature review suggests that there is evidence that age does influence an individual's technology acceptance and use (Taylor and Todd, 1995a; Rosen and Weil, 1995; Morris and Venkatesh, 2000; Ford et al., 2001; Spacey et al., 2004). Specifically, these studies have found that older people are less comfortable, less competent, and less in control when using technology. Older people also perceived technology to be more dehumanizing (Czaja and Sharit, 1998; Adamson and Shine, 2003). In general, younger people often adopt new technology earlier, and their experience using new technology will have an important effect on subsequent adoption of further new technology (Czaja and Sharit, 1998).

For specific investigations, Lee (1986), for example, found that age has some correlation with users' computer usage pattern and sources of assistance. Igbaria, Pavri, and Huff (1989), however, pointed out that age has an impact on applications used, the duration of their use, and user's level of sophistication and computer anxiety. Kleijnen, Wetzels, and Ruyter (2004) also found that age has a moderation effect on perceived usefulness, perceived ease of use, and intention to use in wireless financial services acceptance. Morris and Venkatesh (2000) using the theory of planned behavior, investigated the behavior of young and old workers when using a new software system. Their findings concluded that age does have an effect on technology use. For example, younger workers' decisions on technology use were more influenced by their attitudes toward that technology, whereas older workers were more influenced by subjective norms and perceived behavior control. Because of these age differences regarding technology use, the authors argued that understanding specifically who the users of technology will be, can help an organization deliver effective support mechanisms for their workers.

Despite the general consensus of the effect of age on technology acceptance, research in age-technology has also produced some conflicting results. Rosen and Maguire (1990), for example, argued that not enough evidence has been accumulated to validate the assumption that younger people will have more positive attitudes and less anxiety toward technology use than older people. Bush (1995) also reported that age had no significant effect upon attitudes toward computers. Pope-Davis and Twing (1991) even found a significant positive relationship between age and attitudes toward computers, suggesting that older people hold a more favourable attitude toward computer use than younger people. Rosen and Weil (1995), in their age and entertainment technology use research, also pointed out that teenagers use fewer complex computer functions (other than playing games) than adults. In addition, adults were also found to have higher usage levels of personal computers, as they needed to, and were able to, use complex functions on their computers.

2.3 Research on IT competence and technology acceptance

IT competency, which is the set of IT-related explicit and tactic knowledge an individual possesses (Bassellier, Reich, and Benbasat, 2001), has a significant effect on how a computer is perceived and used (Rosen and Weil, 1995). In general, IT competence can be determined by the end-user's breadth and depth of knowledge of the technology, as well as their finesse in using it (Munro et al., 1997). However, some IS researchers (such as Bassellier, Reich, and Benbasat, 2001) preferred to use explicit technology knowledge and tacit technology knowledge as measures. Although these two proposed constructs measure IT competence from two different perspectives, breadth and depth of technology knowledge are in fact similar to explicit technology knowledge, while finesse levels, defined as the creativeness and innovation when using technology, are in fact a kind of tacit technology knowledge.

A number of studies have examined the effect of IT competence on technology use. In fact, several researchers (such as Igbaria et al., 1989; Taylor and Todd, 1995a; Harrison and Rainer, 1992; Hong et al., 2001-2002) have already confirmed that IT competence has a strong impact on the perceived ease of use, intention to use, and actual utilization of ITs. IT competence has such an influence on IT use because IT competent individuals are less dependent on their cognitive resources and require less attention in performing IT tasks which in turn leads them to perceive IT usage more positively (Kanfer, Ackerman, and Heggestad, 1996).

IT competency has also been investigated at the organizational level. In this case, IT competency relates to a firm's knowledge of IT and the extent to which a firm is able to effectively utilize IT for information management (Tippins and Sohi, 2003). According to Zhu and Kraemer (2005), the IT competence of an organization consists of the firm's technology infrastructure and IT human resources. Feeny and Willcocks (1998), however, summarize IT competency into nine categories: IS/IT governance, business systems thinking, relationship building, the design of technical architecture, making technology work, informed buying, contract facilitation, contract monitoring, and vendor development.

Given the increasing importance of information in today's business environment, achieving IT competence in managing global information is critical for organizations to create market leadership and competitive advantage (Itami, 1987). Accordingly, research on IT competence and technology acceptance at the organizational level has received much attention in the last two decades. For example, Cooper and Zmud (1990) suggested that IT diffusion and use require consideration of the IT competence and sophistication, and technological resources of an organization. Thong (1999) also confirmed that IT competence is a critical determinant of IS and electronic data interchange (EDI) diffusion.

Similarly, Kuan and Chau (2001) found that IT competence is a critical predictor of the implementation of EDI systems in organizations that have more internal IT expertise and better IT support. Zhu and Kraemer (2005) also reported that an organization's IT competence is related to the extent of its e-business use, as firms that have a higher degree of IT competence enjoy greater readiness to use e-business in their value chain processes.

2.4 Summary

In our literature review, most studies were found to use empirical data to confirm or disconfirm demographic inequalities in technology acceptance. The majority of these empirical studies develop their own research models and classify their data into categories of demographic differences for analysis and comparison. Hence, their research models are assessed using either MANOVA or ANOVA (such as Sumner and Niederman, 2003-2004; Cyr and Bonanni, 2005; Huang, 2005; Yao and Okoli, 2006-2007) or regression analysis (such as Ilie et al., 2005; Lamberton, Fedorowicz, and Roohani, 2005) to determine among-group difference. Overall, these studies support the idea that demographic characteristics can create differences in the levels of technology use and acceptance.

In addition to using the group-difference approach to assess the effect of demographic variables, we have identified a few empirical studies treat demographic variables as independent variables in their investigations. Gefen and Straub (1997), for example, extended the TAM model (Davis, 1989) and the SPIR addendum (Straub, 1994) by adding gender to their IT diffusion model to gain a better understanding of e-mail use. Ray et al. (2005) adopted individual's technical IT skills as an independent variable to explain customer service performance. Similarly, Larsen and Sorebo (2005) included the personal traits of age, gender, IT experience and education level as independent variables in their research model to explain the varying levels of Internet use among employees. Taylor (2004) also evaluated the direct impact of personal cognitive and gender differences and concluded that demographic differences significantly effect individuals' uses of knowledge management systems. Together, the findings from these studies indicate that demographic differences are directly related to differences in IT use and behavior. In general, the use of demographic variables as independent variables have improved the power of research models in explaining and predicting IT behaviors.

We also identified a number of studies that adopted demographic variables as moderating variables in investigating IT use. These researchers believe that the relationship strength of the independent and dependent variables under investigation will vary in relation to demographic characteristics. This implies that, in addition to having a direct effect on dependent variables, demographic variables also have a moderating effect on the relationships between certain variables designed into the research model. Ahuja and Thatcher (2005), for example, examined the moderating effect of gender on

the goal-based construct of trying to innovate with IT. They found that gender moderated the relationship between the work environment (in terms of autonomy and overload) and "trying to innovate with IT". Pearson et al. (2003) also investigated age and gender as moderators of the cultural and computer efficacy of organizations, but their moderating effects were not found to be significant. However, in a study of mobile chat service use, Nysveen et al. (2005) reported gender to be a moderator of the relationships between perceived expressiveness/enjoyment/usefulness and the intention to use. In general, most of the findings in this area demonstrate that the strength of various relationships can vary as a result of respondents' demographic differences.

As anticipated, our literature review did not identify many studies that discuss or validate the declining effects of demographic differences on IT behavior. This suggests that the idea that demographic characteristics can cause some differences in the levels of IT use is still the mainstream belief.

3. Research model and hypotheses

A research model, as depicted in Figure 1, is proposed to investigate the effect of demographic differences of Internet banking adopters. This model focuses on the investigation of the impact of gender, age, and IT competence on Internet banking acceptance, basing on the theoretical framework of TAM.

3.1 Gender differences

3.1.1 Perceived usefulness

Although males have traditionally tended to focus on hierarchy and independence and females have tended to focus on intimacy and solidarity (Gefen and Straub, 1997), this trend is progressively changing over time (Knight and Pearson, 2005). Females are becoming more task-oriented, which suggests that they are more inclined than ever to accept technology that enhances productivity. Even in regard to the females salient role in the family (Venkatesh and Morris, 2000), the proliferation of computers in the home has led to females using computers to fulfil their family role. In other words, the family role of the female is now more extended, as they are required to use and manage IT to enhance and complete their household tasks. Furthermore, with the increasing number of females in the workforce and the continued growth of computer usage in the workplace have influenced females' perception of the usefulness of computers.

The tasks associated with banking activities (such as depositing money, account transfers, bill payments, etc.) have long been perceived to be a female responsibility. In addition, a large percentage of females now work and are thus financially independent.

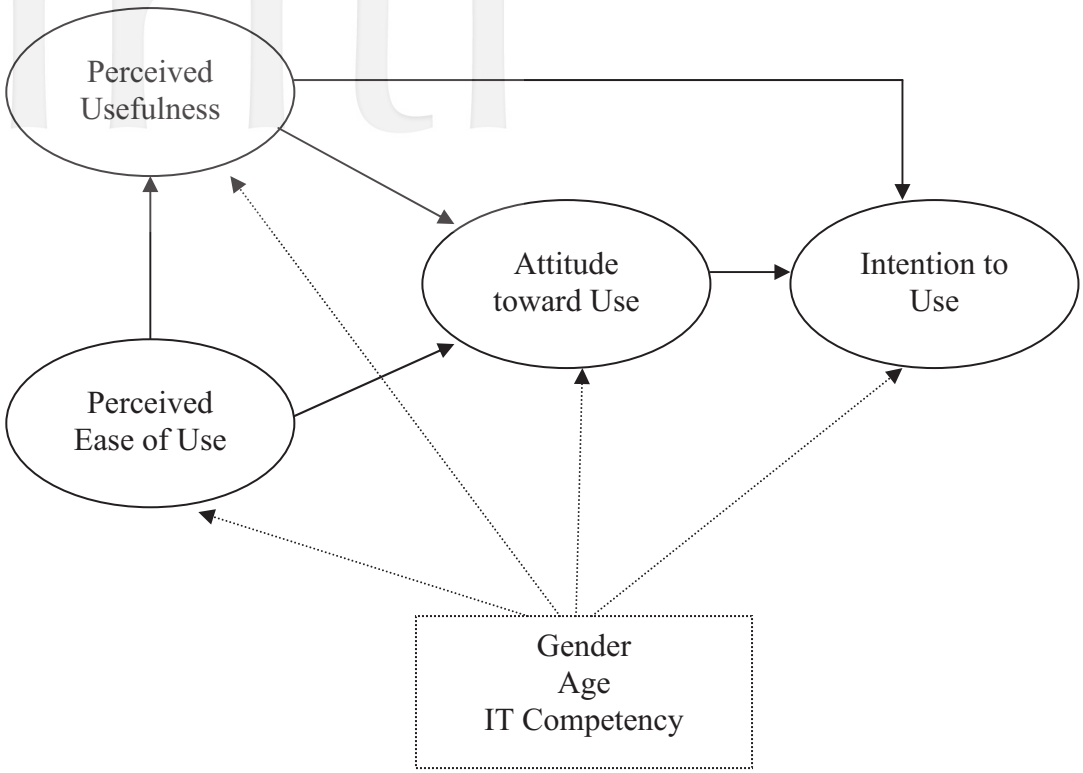

Figure 1 Research Model

Consequently, they need to manage their own banking activities, as well as their familys'. Internet banking has enhanced this task by enabling females to reduce the amount of time spent in, and travelling to, banks and ATM machines. We therefore postulate that:

H1: Internet banking will be perceived to be useful more by females than by their male counterparts.

3.1.2 Perceived ease of use

Females normally perceive IT to be more difficult to use than males do (Teo and Lim, 1996; Gefen and Straub, 1997; Igbaria and Zinatelli, 1998). Females are also reported to have higher levels of computer anxiety, less computer self-efficacy, and less favourable and less stereotypical attitudes towards computers (Jackson et al., 2001). In addition, the traditional social role of females in the family also affects the way IT is used and perceived by females (Venkatesh and Morris, 2000; Sin and Yau, 2001). The restriction role of females has adversely affected women in their career, education and orientation toward IT. This may have a subsequent negative effect on their perceived ease of use of IT-oriented applications. Hence, in the past, women tended to perceive technology as difficult to use more than men.

However, the relationship between gender and perceived ease of use may have changed in recent years. This is particularly the case in the context of Internet banking, which is a system designed for public use, without regard for the user's personal attributes or gender. It is expected that any Internet banking services launched today will be sociable and user-oriented to encourage the use of online banking applications on a large scale. Moreover, the fact IT education is now compulsory for all genders should have enabled females to overcome their computer anxiety and to break with their role stereotypes to become confident IT users at work and at home. In addition, the rapid growth of female Internet users has brought about a dramatic change in demographic distribution of Internet users. In the US, there is already a balanced user ratio of males and females and there are increasingly more countries where the numbers of female Internet users exceeds 40% of the total (Huang, 2005). These demographic changes in the workplace, education, and Internet use may explain why Internet banking is not perceived to be any more difficult to use by females than by males. A critical factor determining a system's ease of use is its frequency of use. In general, females are still responsible for performing the family's banking tasks. For this reason, females are more inclined to find Internet banking systems easy to use, owing to their familiarity with the embedded functions and features. In accordance with these arguments, the following hypothesis is thus postulated:

H2: Females will perceive Internet banking to be easier to use than their male counterparts.

3.1.3 Attitude toward use and intention to use

Although attitudes toward using technology are more salient in men than in women (Venkatesh and Morris, 2000), some research has recently found that this may not always be the case (Ray, Sormunen, and Harris, 1999; Schumacher and Martin, 2001). For example, Ray, Sormunen, and Harris (1999) found that female attitudes toward computer technology are more salient than male attitudes, particularly when a female uses a computer for leisure. This divergence in perspective can possibly be explained by the gender stereotype supposition, i.e., that if computer usage is regarded by females as a male characteristic, it follows that females will avoid learning and using computers to preserve gender constancy (Newman, Cooper, and Ruble, 1995). In our research context, banking tasks is frequently considered to be a female's role, thus causing them to accept this gender stereotype and use the technology. Research also suggests that in situation of fun and leisure, females are more salient regarding their attitude toward the technology than males. Using IT or computers in a relaxed environment for leisure activities could also contribute positively to females' attitude toward and intention to use the technology (Gefen and Straub, 1997; Schumacher and Martin, 2001). These two critical factors that favourably shaped females' attitude are in fact essential to the design of successful Internet

banking systems, thus suggesting that females would find Internet banking a good fit to their task needs and technology use. Some websites that support financial activities are even designed to be women-centric to fulfil the needs of the growing number of female Internet users (Huang, 2005). Based on these observations, in addition to the fact that Internet banking is a user-friendly system designed to support females for their banking and financial transactions, the following two hypotheses are proposed:

H3: Females will have a more favorable attitude towards Internet banking usage than their male counterparts.

H4: Females will have a greater intention to use Internet banking than their male counterparts.

3.2 Age difference

3.2.1 Perceived usefulness

Research has shown that age is related to an individual's working style and attitude (Morris and Venkatesh, 2000; Adamson and Shine, 2003). Due to these value differences in job selection, older workers are more likely to focus on relationship building with their co-workers and give less emphasis to using technology in their work. In contrast, younger workers will look to useful technology for help in enhancing their work performance (Adamson and Shine, 2003). To these younger workers, IT is perceived as a competitive tool that can offer not only automation, but also un-rivalled ability to improve job efficiency and effectiveness. However, this age-related supposition may be challenged by today's Internet development and use. The recent rise in popularity of web-blogging among youngsters demonstrates that teenagers are no longer using IT solely to enhance their job performance, but also to enrich their social activities and personal relationships. Consequently, the use of Internet banking is not an age-related matter, but a consequence of a need-related activity. Although older bank customers are more accustomed to seeking and applying traditional non-technological solutions to their banking tasks than younger customers, they tend to accumulate more wealth in their lifetime and thus conduct more financial transactions. Consequently, the older customers should perceive Internet banking to be more useful because they have a greater need to use the technology to manage their banking accounts. Accordingly, we postulate that:

H5: Older users will perceive Internet banking to be more useful than will their younger counterparts.

3.2.2 Perceived ease of use

A common belief about older people is that they are often not familiar with new technology, learn slower than younger people, and their memory also decreases with age

(Morris and Venkatesh, 2000; Ford, Miller, and Moss, 2001). This belief may be due to computer experience and accessibility. Older people believe that learning new technology is difficult more than younger people do, due to their lack of prior computer exposure and experience of use (Rosen and Weil, 1995; Adamson and Shine, 2003). Older people's ability to use technology is also restricted by the availability and accessibility of the technology. Although Internet banking was designed to be easy to use, with a good match of tasks performed through Internet banking and through the existing banking system, the problems older people encounter in using Internet banking still prevail. This digital divide problem can probably be alleviated in the future, but its effect will continue to exist and challenge older people in their use of innovative technologies. Hence, we propose our hypothesis on age and ease of use to be:

H6: Younger users will perceive Internet banking to be easier to use than their older counterparts.

3.2.3 Attitude toward adoption and intention to use

The role of attitude and intention to use a technology is the subject of many studies (Szajna, 1996; Czaja and Sharit, 1998; Liao and Cheung, 2002; Adamson and Shine, 2003). The role of age on attitude toward technology adoption has also been the subject of many research (Czaja and Sharit, 1998; Mead and Fisk, 1998; Shaw and Giacouinta, 2000). The consensus is that age is negatively related to the attitude and intention of adopting technology, both in the long and short term (Morris and Venkatesh, 2000; Shaw and Giacouinta, 2000). In general, older people are less comfortable and less experienced with computers, especially regarding newer technologies such as the Internet (Czaja and Sharit, 1998). Even in graduate students where there was no great age difference, attitude and the intention to use a computer is still obviously different in different age groups. Despite the fact that Internet banking is a breakthrough banking system, older people still have many reservations with the value of this technology, particularly the security of this online system in conducting financial transactions. With such perceptions, older people may hold more negative attitudes when considering the use of this service. This was evidenced by the Morris and Venkatesh (2000) study that found that subjective norms may have a significant influence on intention. According to this theory and the above discussions, even if Internet banking is widely accepted, older people will continue to lag behind in their use of it and continue to use traditional banking services.

H7: Younger Internet banking users will have a more favourable attitude towards Internet banking than their older counterparts.

H8: Younger Internet banking users will have a greater intention to use Internet banking than their older counterparts.

3.3 IT competence

3.3.1 Perceived usefulness

In general, more IT competent users will perceive usefulness to be a more important determinant of IT usage than inexperienced users (Taylor and Todd, 1995a). Research findings also suggest that competence level in IT can alter individuals' focus on technology use (Morris and Venkatesh, 2000). More competent IT users will have overcome any IT anxiety and will focus on the usefulness of technology (Taylor and Todd, 1995b), whereas less IT competent individuals will still be concerned about the technology's ease of use. In the context of Internet banking, more IT competent users will have probably overcome any concerns about ease of use and may focus their attention instead on the effectiveness and efficiency of Internet banking in supporting their banking needs. Consequently, the more IT competent users are able to appreciate the relative advantages of Internet banking in terms of its accuracy, security, network speed, user-friendliness, user-involvement and convenience, which are critical factors in regard to their perception of the system's usefulness (Lai, Chau, and Cui, 2010). Hence, we propose that:

H9: More IT competent users will perceive Internet banking to be more useful than will less IT competence users.

3.3.2 Perceived ease of use

Research findings have already confirmed that the IT competency, either through training (Chiasson and Lovato, 2001) or experience accumulation (Seeley and Targett, 1999; Gefen, Karahanna, and Straub, 2003; Hackbarth, Grover, and Yi, 2003), of an individual has a strong impact on the perception of a system's ease of use. With higher levels of IT competency, IT users build up their skills and confidence, which can favorably shape their perception of a system's ease of use. Based on the theoretical model of experience and ease of use perception, an individual's knowledge of a system can affect their cognitive and motor process when completing tasks (Kanfer, Ackerman, and Heggestad, 1996). This means that the more experienced and competent an individual is in using a system, the less dependent an individual is upon cognitive resources to accomplish their tasks, making the individual perceive the system in a more positive light as compared to when they first started.

Accordingly, there is no doubt that IT competent users perceive Internet banking systems to be easy to use and have the ability to learn in novel situations. Hence:

H10: The more IT competent users will perceive Internet banking to be easier to use than will the less IT competent users.

3.3.3 Attitude toward adoption and intention to use

The relationship between IT competency and attitudes toward technology has received the attention of many IS researchers in the past two decades (Levin and Gordon, 1989). The general consensus is that IT competency has a positive impact on the attitudes towards, and intention to use IT (Martin, 1988; Taylor and Todd, 1995b). This could be explained by the level of IT knowledge an individual possesses. An individual with more IT competence will possess either a greater depth or breadth of technological knowledge, or a higher level of finesse when using technology. As this will make them more confident in their ability to use technology, it is very unlikely IT competent individuals will have negative attitudes toward technology adoption. Therefore, they will have a more positive attitude toward IT, generally believing the technology to be efficient, humanizing, and enjoyable. People with low IT competence, however, will either not have had enough IT experience or have had bad experiences with IT, so they normally perceive IT to be dehumanizing and feel that organizations use IT to exert greater control over them. Consequently, these individuals have been found to have negative attitudes toward IT and the intention to use IT in organizations (Kerber, 1983). Although Internet banking has a user-friendly interface and is designed to be easy to use, less IT competent users will still have to go through the anxiety and process of using new technology, which can negatively influence their attitude toward that technology. Hence:

H11: More IT competent users will have more positive attitudes toward Internet banking than will less IT competent users.

H12: More IT competent users will be more willing to use Internet banking than will less IT competent users.

4. Research methodology

4.1 Instrument development and pre-test

This study used a survey to capture data from our respondents. The questionnaire adopted for this study was checked in terms of validity and reliability in three different stages. In the first stage, we tried to identify and adopt items and questions for our survey that have previously been validated. We also followed generally accepted instrument construction guidelines (such as Straub, 1989; Boudreau, Gefen, and Straub, 2000) as closely as possible when we developed the questionnaire. In the second stage, three business professors and fourteen Internet banking users were asked to review the questionnaire so that we could improve its quality and content validity. In the last stage, a pilot test was administered to thirty-two MBA students taking a graduate-level class in electronic commerce. The reliability of the question items was then evaluated

by calculating their Cronbach's alpha. No items were found to have values lower than the level of 0.80 suggested for exploratory study (Nunnally and Bernstein, 1994), thus suggesting it was adequate in terms of reliability and was suitable for use.

4.2 Subjects

A total of three hundred and twelve part-time post-graduate (mostly MBA and MSc) students at a major university in Hong Kong were recruited for this study. These students were surveyed in class, whereby they were informed of the voluntary nature of the study, and were assured that their individual responses would be treated with strict confidence. The profile of these students was very similar to the profile of targeted Internet banking users, i.e., around the 25-45 age group, possibly more educated and more computer literate. This information was solicited from local bankers before our sample selection. Hence, we believed that our student subjects would have well-formed perceptions and attitudes toward this information technology and would not differ systematically from the target Internet banking population in terms of their perceptions of the technology being studied.

4.3 Variable operationalizations

Studies on perceived ease of use, perceived usefulness, and attitudes toward use have been well researched, especially in the context of the TAM application (Davis, 1989; Davis, Pearce II, and Randolph, 1989; Teo, Lim, and Lai, 1999; Moon and Kim, 2001). Their measurements have also been developed, validated, and adopted in much IT adoption and diffusion research. The items used to measure PEOU, PU, attitude toward use, intention to use, and actual system use in this study were adapted from Davis (1989), Moon and Kim (2001), and Teo, Lim, and Lai, (1999). Gender was measured by asking the respondents to indicate their sex and their responses were subsequently coded as 0 for male and 1 for female. The respondents were also asked to report their age, which was categorized into two groups, younger (below 35) and older (above 35). IT competency was measured by asking respondents' about their internet usage experience and their responses were then categorized according to more competent and less competent IT users by the codes of 1 and 2, respectively.

5. Data analysis and results

5.1 Respondents' profile

Three hundred and twelve questionnaires were distributed and two hundred and forty-seven were returned. Of these returned questionnaires, six were partially completed and were excluded from the data analysis. This gave an effective response rate of 77.24 percent. The final 241 respondents were all college graduates, and ninety-one of them

already held a master's degree. They ranged in age from 21 to above 45, but a majority of them (78.4%) were aged between 25 and 40. Distribution of gender was balanced, 122 respondents (50.6%) were female.

Their occupations (although varying extensively from medical doctors to business owners) could generally be classified into either middle management, or professionals from marketing, finance, banking, and consulting. They had an average of 7.6 years working experience and had an average deposit balance of US$12,000 in their principal bank. All of them had Internet experience, with almost half of them (46.5%) spending more than ten hours surfing the net per week. Not surprisingly, one hundred thirty-nine of them (57.7%) were already Internet banking users, leaving the remaining 102 respondents as non-adopters. Of these 139 adopters, 116 (83.5%) of them used Internet banking services for less than fives times per week and 97 of them (69.8%) spent an average of 3-10 minutes per use. Only fifteen (10.8%) users indicated they had spent more than 10 minutes per use.

5.2 Measurement model analysis

A confirmatory factor analysis using LISREL 8.70 was conducted to test the measurement model. The overall model fit was assessed using six goodness-of-fit indices, which are normalized fit index (NFI), non-normalized fit index (NNFI), comparative fit index (CFI), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), and root mean square residual (RMSR). The chi-square statistic was not used because of its sensitivity to sample size (Hartwick and Barki, 1994). Table 1 shows the results of the indices, along with the recommended values of common model fit suggested by Hartwick and Barki (1994), Segars and Grover (1993), and Hu and Bentler (1998). Although the

Table 1 Fit Indices for Measurement and Structural Model

Fit Indices	Recommended Value	Measurement Model	Structural Model
Chi Square/Degree of Freedom	≤ 3.00	2.17	2.21
Normalized Fit Index (NFI)	≥ 0.90	0.96	0.96
Non-normalized Fit Index (NNFI)	≥ 0.90	0.97	0.97
Comparative Fit Index (CFI)	≥ 0.90	0.98	0.98
Goodness of Fit Index (GFI)	≥ 0.90	0.81	0.80
Adjusted Goodness of Fit (AGFI)	≥ 0.80	0.73	0.73
Root Mean Square Residual (RMSR)	≤ 0.10	0.08	0.08
Root Mean Square Error of Approximation (RMSEA)	≤ 0.10	0.11	0.11

AGFI and the RMSEA index in our study failed to meet the recommended minimum values, the small value discrepancies of 0.07 for AGFI and 0.01 for RMSEA led us to believe that the model fit was reasonable and adequate for assessing the results of the structural model.

The measurement model was further assessed for its construct reliability and validity. Construct reliability was initially evaluated using Cronbach's alpha reliability test and further evaluated by the item reliability and composite reliability. The purpose of item reliability is to determine the amount of variance in an item due to the underlying construct rather than to error. The coefficient of item reliability, which is the square of factor loading, of at least 0.5 is considered to be evidence of reliability (Long, 1983). The purpose of composite reliability is similar to that of Cronbach's alpha, but it takes into account the factor loadings rather than assuming that each item has an equal loading on the construct and has a recommend value of 0.70, as suggested by Fornell and Larcker (1981). As indicated in Table 2, the Cronbach's alpha values of all our variables are in the range of 0.90, significantly above the 0.8 level suggested for confirmatory research by Nunnally

Table 2 Summary of Measurement Scales

Construct	Mean	S.D.	Cronbach's Alpha	Factor Loading	Item Reliability	Composite Reliability	Average Variance Extracted
Perceived Usefulness							
PU1	5.02	1.27		0.95	0.90		
PU2	5.01	1.22		0.96	0.92		
PU3	5.05	1.19	0.95	0.97	0.95	0.94	0.74
PU4	5.04	1.22		0.96	0.93		
PU5	4.71	1.29		0.71	0.51		
PU6	5.13	1.29		0.93	0.86		
Perceived Ease of Use							
EOU1	5.50	1.15		0.93	0.86		
EOU2	5.30	1.18	0.90	0.96	0.93	0.90	0.76
EOU3	5.36	1.22		0.91	0.82		
Attitude towards Use							
ATT1	5.00	1.26		0.95	0.91		
ATT2	5.04	1.27	0.95	0.95	0.91	0.95	0.85
ATT3	4.99	1.31		0.97	0.94		
Intention to Use							
ITO1	4.82	1.34		0.98	0.97		
ITO2	4.78	1.35	0.94	0.98	0.97	0.94	0.86
ITO3	4.61	1.37		0.89	0.80		

and Bernstein (1994). The coefficients of all items also exceed the recommend minimum value of 0.5. Furthermore, the composite reliability of all four constructs is well above the recommended 0.70, thus confirming the reliability of our measurements for model testing.

As far as the instrument's convergent validity is concerned, our measurement model was assessed with average variance extracted for each item. The rule of thumb for this assessment is that a construct has to have a minimum of 0.5 average variance extract as evidence of convergent validity (Fornell and Larcker, 1981). Our test results, which are also depicted in Table 2, show that all items surpassed the minimum recommended value. The tests for average variances extract do not show any significant problems, thereby demonstrating adequate convergence validity in our model.

We also performed a discriminant validity test by comparing the shared variance among the constructs with the average variance extracted. Our test results, which are depicted in Table 3, show that the squared correlations of all entries, representing the shared variance among variables, were found to be consistently lower than the square root of the diagonal average variance extracted. Although the value of one shared variance exceeds the average variance extracted, the violation is minimal. These findings suggest that the measures are distinct and unidimensional, thereby ensuring discriminate validity at the construct level. We also reviewed the loading coefficients and found that all of the items intended to measure the same construct converged as originally envisaged, thus suggesting the adequacy of the discriminant validity of our measurement model.

Table 3 Average Variance Extracted

	PU	ITO	ATT	EOU
PU	**0.74**			
ITO	0.67	**0.76**		
ATT	0.79	0.75	**0.85**	
EOU	0.52	0.61	0.72	**0.86**

Note: Values on the diagonal represent the average variance extracted. Values off the diagonal represent the shared variances.

5.3 Invariance analysis

Upon the validation of our model's applicability, invariance analyses were then performed to determine the effect of gender, age and IT competency on the construct of our model. Of all invariance analyses, the configural invariance test, which is the prerequisite for comparing groups, was conducted to determine if different gender, age and IT competence subgroups would use the same items to measure the same construct. Using

gender as an example, if different genders use different items for the same construct, configural non-invariance exists and further invariance analyses becomes redundant. The results of our configural analysis for gender, which is shown in Table 4, suggest that the χ^2 and fit statistics of the constrained models (either male or female respondents alone) did not differ significantly from the unconstrained (females and males together) model, thus providing evidence of form invariance of the construct. Similar results were obtained when conducting configural invariance analysis on age and IT competence. Table 4 also shows results supporting the notion that configural invariance exists in the age and IT competency groups.

Table 4 Results of Configural Invariance Analysis for Gender, Age and IT Competence

		χ^2	df	IFI	CFI	NNFI	RMSEA
Gender	Male	114.07	84	0.97	0.97	0.96	0.062
	Female	109.89	84	0.98	0.98	0.97	0.058
	Stacked Model	223.96	168	0.97	0.97	0.97	0.060
Age	Old	127.32	84	0.96	0.96	0.95	0.074
	Young	120.98	84	0.97	0.97	0.96	0.056
	Stacked Model	248.30	168	0.96	0.96	0.95	0.065
IT Competence	Expert	107.09	84	0.98	0.98	0.97	0.060
	Novice	142.93	84	0.95	0.95	0.93	0.084
	Stacked Model	250.85	168	0.96	0.96	0.95	0.073

In the second step, factorial analysis was performed to determine whether males and females, older and younger people and people with high IT competency and low IT competency conceptualized our Internet banking constructs in the same way. For example, if gender has an effect on the measurement equivalence of the construct, observed scores from the male and female groups would be of a different scale and not be directly comparable. In such a scenario, we would then need to identify the observed items that caused such non-invariance. The situation is similar in terms of age and IT competency. When measurement non-invariance exists between two groups, direct comparison of the scores of the constructs is inappropriate. When performing factorial invariance analysis, an unconstrained model was initially set up, followed by a fully constrained model. The $\Delta\chi^2$ and Δdf and fit statistics (in our case, NNFI, CFI, and RMSEA) of the two models were then calculated for comparison. According to the results depicted in Table 6 (for males and females, older and younger people, and people with higher and lower IT competence), the changes in $\Delta\chi^2$ and Δdf are not significant and the fit statistics of the two models are also

quite comparable, thereby justifying the invariance of the unconstrained and constrained models. Following this comparison, partially constrained models that constrained individual construct (PEOU, PU, attitude, and intention) were set up for further factorial invariance analysis. The results, which are also depicted in Table 5, suggest that all $\Delta\chi^2$, Δdf, and fit statistics are not significantly different between the models compared. Through these factorial invariance tests, it can be concluded that our model fits the construct very well, and the factor loadings for both males and females, older and younger people, and people with higher and lower IT competence, do not have any non-invariance, thus justifying the factorial invariance of our construct.

Table 5 Results of Factorial Invariance Analysis for Gender, Age and IT Competence

	Test	Model	χ^2	df	$\Delta\chi^2$	Δdf	NNFI	CFI	RMSEA
Gender	1	Unconstrained baseline model	223.96	168			0.97	0.97	0.060
	2	Fully constrained model	236.94	179	12.98	11	0.97	0.97	0.059
	2.1	Loadings on PEOU	227.73	170	3.77	2	0.97	0.97	0.061
	2.2	Loadings on PU	229.67	173	5.71	5	0.97	0.97	0.060
	2.3	Loadings on ATT	224.81	170	0.85	2	0.97	0.97	0.059
	2.4	Loadings on ITO	226.62	170	2.66	2	0.97	0.97	0.060
Age	1	Unconstrained baseline model	248.30	168			0.95	0.96	0.065
	2	Fully constrained model	256.81	179	8.51	11	0.96	0.97	0.060
	2.1	Loadings on PEOU	248.52	170	0.21	2	0.96	0.96	0.063
	2.2	Loadings on PU	249.13	173	0.83	5	0.96	0.97	0.060
	2.3	Loadings on ATT	250.16	170	1.86	2	0.96	0.96	0.064
	2.4	Loadings on ITO	253.91	170	5.61	2	0.95	0.96	0.066
IT Competence	1	Unconstrained baseline model	250.85	168			0.95	0.96	0.073
	2	Fully constrained model	263.82	179	12.97	11	0.96	0.96	0.071
	2.1	Loadings on PEOU	251.94	170	1.09	2	0.96	0.96	0.072
	2.2	Loadings on PU	255.43	173	4.58	5	0.96	0.96	0.072
	2.3	Loadings on ATT	255.56	170	4.71	2	0.95	0.96	0.073
	2.4	Loadings on ITO	253.44	170	2.59	2	0.95	0.96	0.073

5.4 Research model results

LISREL 8.70 was used to test our research model with the sample covariance matrix depicted in Appendix 2. The results, as depicted in Table 1, show that all eight fit indices for our testing model (χ^2/df = 2.17, NFI = 0.96, NNFI = 0.97, CFI = 0.98, GFI = 0.81, AGFI = 0.73, RMSR = 0.06, and RMSEA = 0.11) exceeded the minimum recommended values, except AGFI and RMSEA, which were slightly below the recommended value, thus indicating the reasonably adequacy of our model for further statistical analysis, including causal link evaluation. Subsequently, the Internet banking TAM was run separately for adopters, non-adopters, and a combination of both adopters and non-adopters. The results of these three runs are depicted in Table 6. Of the three runs, the adopters group provided the best support for the TAM, with all variables significant at $p < 0.01$. Interestingly, though all TAM variables of non-adopters group were significant from the $p < 0.05$ to $p < 0.001$ levels, *PU* is found to have an adverse effect on *intention to use*. Because of this counteracting effect of the non-adopters group, the overall effect of *PU* on *intention to use* is found to be insignificant.

Table 6 Results Classified by Adoption Types

Research Paths	Adopters (t-value)	Non-adopters (t-value)	Overall (t-value)
PEOU → PU	7.23***	5.54***	11.02***
PEOU → attitude	2.96***	3.51***	4.30***
PU → attitude	5.86***	2.03*	6.67***
PU → intention	3.09**	-2.29*	0.88
Attitude → intention	7.47***	8.45***	11.89***

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

LISREL was again used to validate our postulated hypotheses. In this study, gender, age, and IT competency are modelled as dummy variables. Table 7 shows the result of each demographic variable on the TAM. As depicted, there were six significant findings in our investigation. The same results were also used to validate the hypotheses postulated in this study. However, as depicted in Table 8, only five hypotheses were supported -- three related to gender, one related to age, and one related to IT competence.

Of all the three profile variables, gender had the strongest impact on the TAM. Females, as compared to males, were found to perceive Internet banking significantly differently in all four of the TAM's variables. As depicted in Table 7, females were found to perceive Internet banking to be more useful, easier to use, and had a more positive

Table 7 Demographic Effect on TAM Variables

Variable	Gender	Age	IT Competence
PU	-0.10**	0.11**	-0.02
PEOU	-0.14***	0.06	0.15***
Attitude towards Use	-0.08*	-0.04	0.01
Intention to Use	0.09**	-0.01	-0.05

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

Table 8 Results of Hypotheses Testing

Hypotheses	Coefficient		Supported?
H1: Female will perceive Internet banking more useful.	-0.10	**	Yes
H2: Females will perceive Internet banking easier to use.	-0.14	***	Yes
H3: Female will have a more favourable attitude on Internet banking usage.	-0.08	*	Yes
H4: Female will have a greater intention to use Internet banking.	0.09	**	No
H5: Older users will perceive Internet banking more useful.	0.11	**	Yes
H6: Younger users will perceive Internet banking easier to use.	0.06		No
H7: Younger Internet banking users will have a more favourable attitude towards Internet banking.	-0.04		No
H8: Younger Internet banking users will have a greater intention to use Internet banking.	-0.01		No
H9: More IT competent users will perceive Internet banking more useful.	-0.02		No
H10: More IT competent users will perceive Internet banking easier to use.	0.15	***	Yes
H11: More IT competent users will have more positive attitude toward Internet banking.	0.01		No
H12: More IT competent users will have greater intention to use Internet banking.	-0.05		No

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

attitude toward its use. In contrast, males were found to have a higher intention to use Internet banking. Through these findings, only hypotheses H1, H2 and H3 postulated for gender were supported.

The effect of age and IT competence on the TAM was less significant as compared to gender. Only perceived usefulness was there a difference found related to age -- older users perceived Internet banking to be more useful than younger users, thus supporting hypothesis H5. IT competence was also found to have a very significant relationship with perceived ease of use, thus supporting H10 that more IT competent users will find Internet banking easier to use. All other hypotheses postulated for age and IT competence were not found to be significant.

6. Discussion

All of the gender variables used in our study were found to have a significant effect on the intention to use Internet banking. Females were confirmed to have a more favourable attitude towards Internet banking than males and to perceive it as more useful and easier to use. These findings confirm the new trend, that the disparity in computer knowledge between males and females has been significantly reduced due to the changing workplace and educational demographics, thus reducing the difference in levels of IT competence and usage between genders. Females are now offered the same opportunities as their male counterparts at work, in education, and in IT use.

While females were found to perceive Internet banking as more useful, easier to use, and more favourable, males were found to have a greater intention to use the technology. There are two possible reasons for this unanticipated finding. First, the traditional social role of males in society may still have an effect on technology acceptance. Females may be unwilling to break the norms of social role in accepting Internet banking, even though they have more favourable attitudes toward Internet banking and its usefulness. Second, males are less frequent users of counter services at banks due to their work restriction. Therefore, they need to rely on a tool that can provide them with the flexibility to complete their banking needs during their working hours. Internet banking is thus a good candidate to choose as it offers around the clock service.

This study has also identified some interesting findings of the effect of age on Internet banking. First, older Internet banking users were confirmed to perceive Internet banking more useful than their younger counterparts (H5), as explained by their career and financial stability, which led them to use this more convenient technology to manage their financial transactions and investments. Second, younger users did not find Internet banking any easier to use. Although we had been advised by bankers before our study that

their Internet banking users were mostly younger individuals, our findings did not support such pre-supposition. Most probably the reason is that the age spread of our subjects is not wide enough to include many older individuals. After all our subjects are only MBA and MSc students who are normally in similar, but narrow age range. Third, age was found to have no discriminating power in both attitude toward and intention to use Internet banking. Again, these insignificant findings can be attributed to our subjects' age range of 20-45, which may not be wide enough to show the effect of age on technology adoption. Such effects should be explored further in future studies.

Our study confirms that Internet banking users with higher IT competence will find the system easier to use (H10). This finding contributes further evidence to the claim that one's competence with computers can accurately predict one's computer use. However, our research does not have any evidence to support the hypotheses that competent-usefulness (H9), competent-attitude (H11), and competent-intention (H12) are positively related. There are two reasons to explain these insignificant findings. First, the profiles of our respondents are too homogeneous. They are all graduate business students with similar educational background, thus causing a small deviation in their differentiation of IT competency. Second, we have not evaluated our respondents' financial need, which is critical to fostering their exploration of the usefulness features and functions designed into the system. If an individual has no need for any online financial transaction or service, that individual will not spare any time exploring the system for its usefulness. Hence, "need" is a catalyst or a pre-existing condition to explore Internet banking for its usefulness. Without financial needs, the corresponding motive, attitude, and intention to use Internet banking could not be established.

7. Conclusions and implications

This study has successfully validated our measurement model to be invariant across gender, age, and IT competence. Our results suggested that our measures for perceived usefulness, perceived ease of use, attitude toward use, and intention to use have achieved measurement equivalence across the sample population, regardless of their gender, age, and IT competence level. Consequently, the findings from our analysis on gender, age, and IT competence are genuine results of user differences in Internet banking acceptance, and not the result of non-invariance of measures.

7.1 Implications for researchers

Our study confirmed that the role of gender has changed in relation to the acceptance of Internet banking. In contrast to the past, females are now more receptive to IT than their male counterparts, and perceive it to be more useful and easier to use. These findings

challenge the traditional concept of 'user-oriented' system design, which accounts for the needs of users who are predominately male. In this regard, Oudshoorn et al. (2004) argued that the identification of the gender of users is an important, but yet unexplored process for configuring the needs of users. Thus, researchers need to focus on gender differences in system design and investigate how technological innovations can better fulfil the needs of specific groups of users, particularly women, in the design of 'universal' systems. However, including gender issues in designing systems for 'everybody' is a complex task. It may include transforming the 'for-the-male' cultural image of technology, changing the practices of current system design communities, and renegotiating gender identity in relation to technology (Sorensen, 1992; Rommes, 2002; Oudshoorn et al., 2004). Researchers can definitely play a role in proposing solutions to some of these restrictions.

Our study showed that females had a significantly more favourable attitude toward Internet banking, but a significantly lower intention to use the system than males. We are unsure of the causes of such incongruent findings in attitude and intention. However, we wonder if there are any factors that restrict females from the intention of using Internet banking? Are these factors time, opportunity to access the Internet, the social roles of different genders, or normative influences? Further research in this area is important as the findings will not only further explain IT use, but will also guide the development and marketing of IT applications and products among females and males separately. As a first step, researchers could perhaps evaluate the features and services offered by Internet banking and evaluate whether or not they are female- or male- oriented. In achieving this objective, researchers will be able to tabulate the frequency of the tasks performed by different genders in their Internet banking transactions to derive usage patterns for males and females. This finding could provide better insight into how Internet banking systems are used and why females have less intention to use this system than males.

Interestingly, while most prior research has suggested that younger and more IT competent individuals are more inclined to accept an innovative IT, our finding did not support these suppositions. Does age really matter in the acceptance and use of Internet banking? If younger individuals are more inclined to accept an innovation, how come they do not use this innovation to support their banking tasks? If older individuals have career and financial stability, how come they are not using Internet banking systems to manage their banking needs? Are the causes of insignificant age-attitude and age-intention correlations due to a mismatch of IT and task? Most probably researchers could employ the 'task-technology fit' theory to explain why age is not correlated to attitude and intention to use Internet banking system. When there is a task-technology fit, individuals using Internet banking systems will have less adjustments, fewer changes, more added values, and less rejection of Internet banking. Consequently, this fit will favorably improve users' perceived usefulness of Internet banking. A logical suggestion might then

be that the TAM be extended to incorporate a task-technology fit construct in the context of Internet banking research.

In the context of Internet banking, personal financial needs and personal financial background may impact its acceptance. Hence, 'personal need' as a determinant of technology acceptance should be systematically explored. In the social psychology domain, a theory of personal need for structure (PNS) has been developed to investigate individual differences in the desire for a simple structure that influences the way an individual understands, experiences, and interacts with the world (Neuberg and Newsom, 1993). Perhaps PNS concepts could be integrated into the TAM to enrich the social psychological aspect of the TAM construct. In fact, the relationships between need, motive, attitude, and satisfaction are intertwined in many traditional theories of human behaviour (Salancik and Pfeffer, 1977), which suggest that 'need' is a critical component capable of enriching our understanding of the effects of IT competence and other demographic variables on Internet banking adoption.

7.2 Implications for practitioners

From a managerial standpoint, our study presented an opportunity to investigate the responses of users, dissected by demographic differences, to Internet banking. This is important as the roles of individuals -- males and females, young and old, IT literate and illiterate -- are changing in today's knowledge-oriented society. Hence, the findings provide additional insights into gender, age, and IT competence difference in Internet banking acceptance and use. They also provide valuable insights into the promotion and marketing of Internet banking services among individuals from different demographic groups. For example, marketing professionals may find our study particularly useful when Internet banking is being promoted to a specific target group, such as older females, within the population. In this context, emphasizing the usefulness of Internet banking might foster greater acceptance and use from the target group of older females, both in the short and long-term.

The influence of IT competence on PEOU, which consequently could shape a favorable attitude toward use and intention to use, has implications for the introduction of Internet banking. One way to close the competence-PEOU gap would be to offer fundamental Internet and Internet banking training to less IT competent users. Potential users could be invited for free training as a marketing strategy within their customer relationship management program. Essentially, training enhances users' acceptance of IT by breaking through the acceptance barriers such as ease of use and usefulness of the IT. Pragmatically, training provides a means of communicating to bank customers not only the use and benefits of Internet banking, but also provides an opportunity to promote other products and build the customer relationship.

Demographic variables were found to have an impact on Internet banking. These suggest that Internet banking is likely to affect various groups of bank customers differently. Hence, IT professionals involved in Internet banking should conduct a thorough user analysis to build a portrait of the ways that different groups of users need and use the system. A feasible and effective strategy may be to involve these user groups in the Internet banking development process in its early stages, thereby allowing developers to recognize the design needs of each demographic subgroup to fit their preferred styles and usage preferences. Internet banking developers must recognize that technology is rarely implemented and accepted uniformly across all demographic subgroups. Failure to understand this will make it likely that they will design technology that is unfit for and incompatible with their users' needs.

The significance of older users perceiving Internet banking to be more useful makes sense in an Internet banking context. Older individuals, in general, will be further along their career path and perhaps have accumulated more wealth than younger individuals. This may subsequently motivate them to use more diversified and efficient financial management services. To meet the needs of these older users, banks must enhance the 'usefulness' of Internet banking services. In an earlier investigation by Chau and Lai (2003), it was found that personalization and alliance services were significant determinants of Internet banking usefulness. Accordingly, banks should focus on exploring strategies that can take advantage of these services. For example, personalization services could provided that include customized presentation, customized content, personal message delivery, tracking of individual access patterns, inference on individual banking preferences as well as tailor-made offerings on products and services. In terms of alliance services, banks should consider offering different levels of cross-organizational services to bank customers via alliances with various other organizations using the bank's web site as the single point of access. Potential organizations that could be allied to the provision of Internet banking services include finance institutions, insurance companies, stock and mutual fund companies and service-oriented businesses.

7.3 Limitations

The major limitation of this study was the use of graduate students as our subjects. The benefit of using student subjects is that we can get a higher response rate using less resources and effort. Furthermore, we could also manipulate our student subjects to be aligned with the profile of actual Internet banking users, who are highly educated and aged from 21 to 45. Unfortunately, all these benefits may be offset by the homogeneity, particularly in terms of IT competency, of the student subjects. For example, many of our hypotheses on age and IT competency (but not gender) were found to be insignificant. This was mainly due to the use of student subjects.

Our research may also suffer from self-report bias, which could lead to response bias and inflate our inferences on correlational and causal relationships. In this study, our respondents had already been reminded of the confidentiality and anonymity of the survey, however, they might still have under-reported behaviours deemed inappropriate and over-reported behaviours viewed as appropriate. Therefore, future Internet banking studies may consider using different research methods (such as behavioural measure) or different source of data (such as objective data) in their data collection. If these approaches are infeasible, future studies may consider using more open-ended questions in their survey or performing concurrent validity assessment by comparing their self-report results with another self-report study on the same topic.

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Appendix 1: Survey Questionnaire

Perceived usefulness

PU1	I can accomplish my banking tasks more quickly using Internet Banking.
PU2	I can accomplish my banking tasks more easily using Internet Banking.
PU3	Internet Banking enhances my effectiveness in utilizing banking services.
PU4	Internet Banking enhances my efficiency in utilizing banking services.
PU5	Internet Banking enables me to make better decisions in utilizing banking services.
PU6	Overall, I find Internet Banking useful.

Perceived ease of use

PEOU1	Learning to use Internet Banking is easy for me.
PEOU2	It is easy to use Internet Banking to accomplish my banking tasks.
PEOU3	Overall, I believe Internet Banking is easy to use.

Attitude

ATT1	In my opinion, it is desirable to use Internet Banking.
ATT2	I think it is good for me to use Internet Banking.
ATT3	Overall, my attitude towards Internet Banking is favourable.

Intention to use

ITO1	I will use Internet Banking on a regular basis in the future.
ITO2	I will frequently use Internet Banking in the future.
ITO3	I will strongly recommend others to use Internet Banking.

Appendix 2: Covariance Matrix

	EOU1	EOU2	EOU3	PU1	PU2	PU3	PU4	PU5	PU6	ATT1	ATT2	ATT3	ITO1	ITO2	ITO3
EOU1	1.328														
EOU2	0.960	1.384													
EOU3	1.057	1.089	1.489												
PU1	0.778	0.863	0.921	1.611											
PU2	0.697	0.834	0.911	1.362	1.475										
PU3	0.688	0.833	0.875	1.244	1.203	1.410									
PU4	0.685	0.884	0.872	1.253	1.244	1.315	1.478								
PU5	0.567	0.678	0.711	1.019	1.039	1.085	1.134	1.654							
PU6	0.798	0.916	0.898	1.260	1.207	1.220	1.293	1.070	1.662						
ATT1	0.821	0.836	0.849	0.950	0.887	0.959	0.973	0.766	1.076	1.579					
ATT2	0.789	0.834	0.809	0.954	0.900	0.926	0.917	0.740	1.049	1.384	1.578				
ATT3	0.848	0.818	0.874	1.050	1.014	0.996	1.041	0.765	1.133	1.367	1.412	1.715			
ITO1	0.811	0.854	0.862	0.931	0.929	0.904	0.953	0.713	0.974	1.218	1.220	1.391	1.804		
ITO2	0.757	0.851	0.802	0.873	0.902	0.928	0.955	0.702	0.974	1.232	1.231	1.377	1.667	1.826	
ITO3	0.825	0.870	0.823	0.885	0.881	0.918	0.961	0.824	0.974	1.210	1.215	1.334	1.446	1.477	1.867