

Factors Influencing the Adoption of Internet Banking in Tunisia

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Abstract

The purpose of this paper is to determine those factors that influence the adoption of internet banking services in Tunisia. A theoretical model is provided that conceptualizes and links different factors influencing the adoption of internet banking. A total of 253 respondents in Tunisia were sampled for responding: 95 were internet bank users, 158 were internet bank non users. Factor analyses and regression technique are employed to study the relationship. The results of the model tested clearly that use of internet banking in Tunisia is influenced most strongly by convenience, risk, security and prior internet knowledge. Only information on online banking did not affect intention to use internet banking service in Tunisia. The results also propose that demographic factors impact significantly internet banking behaviour, specifically, occupation and instruction. Finally, this paper suggests that an understanding the factors affecting intention to use internet banking is very important to the practitioners who plan and promote new forms of banking in the current competitive market.

Keywords: Adoption, Internet banking, Convenience, Security perception, Perceived risk, Tunisia

1. Introduction

Nowadays, the electronic technology is playing a major role for the world of business especially in banking activities. Electronic banking (e-banking) is the newest delivery channel for banking services. The definition of e-banking varies amongst researches partially because electronic banking refers to several types of services through which bank customers can request information and carry out most retail banking services via computer, television or mobile phone (Daniel, 1999; Mols, 1998; Sathye, 1999). In fact, it has effectively "opened" twenty-four hours a day, seven days a week. Customers can do their daily banking activities without having to wait in line or wait on hold for telephone banking services. E-banking offers electronic services that allow consumers to check the balances in their accounts, transfer funds among accounts, pay bills electronically as well as apply for loans, download information about accounts into their own computers, trade stocks or mutual funds, look at images of their cheques and deposit slips (Turban et al., 2004).

E-banking has become increasingly prevalent, employed by many financial institutions to reduce costs associated with having personnel serve customers physically, shorten processing periods, increase speed, improve the flexibility of business transactions and provide better service overall (Shih and Fang, 2004). Also, with the rapid progress of other types of electronic, largely Internet based services; there has been increased interest in e-banking services. With the rapid growth of Internet technology, online banking has played an important role in the e-payment area which provides an online transaction platform to support many e-commerce applications such as online shopping, online auction and Internet stock.

Banks have been using the Internet as one of their distribution channels because Internet Banking services benefit both the banks and their customers (Karjaluoto, 2002). It has become the most profitable distribution channel of the banks because it can help banks to save costs. It is convenient for the customers to execute their bank transactions or contact their banks faster, anytime and anywhere. Many companies in the financial services sector have been quick to implement Internet capabilities, and electronic service is becoming a viable option for interaction between financial service providers and their customers (Rotchanakitumnuai, S and Speece, M 2004). Clearly, in order to grow consumer internet banking adoption, banks must make key improvements that address consumer concerns. Thus, it would behoove financial institutions to gain an understanding of the key factors that influence consumer internet banking adoption.

This study tries to determine factors influencing the adoption of internet banking by the Tunisian consumer. More accurately, internet banking acceptance will be studied using the factors that are important from the success point of view, referring to the idea that consumers are using internet banking directly. Hence, more knowledge on the factors that affect internet banking adoption is needed in order to better understand and facilitate the adoption.

The remainder of the paper is set out in five sections. In first and second section we introduce and synthesize a literature review on online banking adoption. Third, we review the research methodology that was employed. Fourth, we discuss the main findings and draw implications for theory and practice. Fifth and finally, we conclude the paper, and a highlight major's managerial and further research implication. For the purposes of this paper, internet banking includes retrieving account balances and history of accounts, check-book request, opposition to check and credit card payments.

1.1 Basics of Electronic Banking

Electronic banking is a high-order construct, which consists of several distribution channels. It should be noted that electronic banking is a bigger platform than just banking via the Internet. The term electronic banking can be described in many ways. In a very simple form, it can mean the provision of information or services by a bank to its customers, via a computer, television, telephone, or mobile phone (Daniel, 1999). Burr (1996), for example, describes it as an electronic connection between bank and customer in order to prepare, manage and control financial transactions. Furthermore, electronic banking has three types of delivery channels: telephone, PC, and the Internet. Daniel (1999) introduces four different channels for electronic banking (Table 1): PC banking, Internet banking, managed network, and TV-based banking. Moreover, PC Home Banking allows customers to do their banking services only on PC that have been installed the assigned software package. Telephone banking, TV-based banking, and managed network do not play such a big role in banking today (Karjaluo, 2002). However, in the future the delivery platform is expected to shift from wired Internet connections to wireless mobile technologies. Electronic banking does not necessarily have to be on a computer screen. It can, for example, be on the tiny screen of a mobile phone or any other wireless device. With these wireless applications, customers can, for example, consult their bank account balances and transaction histories, view pie charts of their holdings in a portfolio, initiate payments or orders to buy and sell securities, and also send e-mail to their banks.

Several benefits of strong electronic service have also been identified as including satisfied and retained customers, attraction of new customers, development of customer relationships, increased sales and market shares, enhanced corporate image, reduced costs and increased profit margins and business performance (Parasuraman et al., 2005; Bauer et al., 2005). These benefits may explain the observed increase in the level of technology adoption in the delivery of banking services (Kalakota and Whinston, 1997; Bauer et al., 2005).

1.2 Conception of Internet Banking

The most general type of electronic banking in our times is banking via the Internet, in other words Internet banking. This type of banking allows consumers to check the balances in their accounts, transfer funds and order electronic bill payments. Internet banking systems allowing customers to apply for loans, trade stocks or mutual funds, and even view actual images of their checks or deposit slips. The services available for Internet banking vary from bank to bank. The terms Internet banking and online banking are often used in the literature to refer the same things. Nowadays the Internet is the main channel for electronic banking. Internet banking offers many benefits to banks and their customers (Karjaluo, 2002). The main benefits to banks are cost savings, reaching new segments of the population, efficiency, enhancement of the bank's reputation and better customer service and satisfaction (Jayawardhena and Foley, 2000). To customers Internet banking offers also new value. With the help of the Internet, banking is no longer bound to time or geography. Consumers all over the world have relatively easy access to their accounts 24 hours per day, seven days a week. It makes available to customers a full range of services including some services not offered at branches. Internet banking has the advantage that the customer avoids traveling to and from a bank branch. In this way, Internet banking saves time and money provides convenience and accessibility (Karjaluo, 2003). Customers can manage their banking affairs when they want, and they can enjoy more privacy while interacting with their bank. It has been claimed that Internet banking offers the customer more benefits at lower costs (Mols, 1998). Turban et al. (2000) indicated that Internet banking is extremely beneficial to customers because of the savings in costs, time and space it offers, its quick response to complaints, and its delivery of improved services, all of which benefits make for easier banking. To summarize, electronic banking in general and Internet banking especially offer many benefits to both service providers and their customers.

1.3 Internet banking in Tunisia

In Tunisia, the number of the users of Internet evolved to attain 2 millions user 68 miles at the end of June, 2008 against a million user 618 miles for the same period of the last year that is a 28 % evolution (the population total of Tunisia is approximately ten millions inhabitants). A study accomplished by New Arab Advisors on the Tunisian Internet users and the evolution of the new technologies and the e-commerce in Tunisia between May and July, 2008. In effect, this study showed that about 36,4 % of the users of Internet in Tunisia trade electronics, and even spent about 132,7 million dollars during one year on purchases through Web. The number of the Internet users having already purchased via Internet in Tunisia rises about 416 thousand persons according to the results (profits) of the aforementioned survey, which also deducted that the majority of the users of the e-commerce (64,8 %) make their electronic payments by bank cards, while 27,4 % of these users resort to the

on-line payment prepaid through the "e-dinar".

In Tunisia payments and account management products over mobile GSM phones as SMS service have been available over one decade, exactly since 1992, television-based banking since 1998 and banking via mobile Internet WAP since 1999. The evolution of electronic banking indicators in Tunisia for the first half of 2010 shows a steady increase (Appendix 2). This progression gives off the emergence of a new culture for modern means of payment. A issuing 2.946.146 new cards in the first ten months 2010 against 2.082.905 cards at the end of December 2009, an increase of 12.6% against 2.3%. The number of ATM stood at 1608 in the first ten months 2010 against 1409 in December 2009, an increase of 25.3% or 170 new plants. The number of operations made from ATM amounted to 36 million transactions during the first ten months of 2010, recording an increase of 5 million transactions or 19.2% over the same period 2009. The number of TPE installed in shops amounted to 11.843 units in 2010 against 10.450 in 2009.

In 2004, the number of Tunisian banks that were offering Internet Banking is limited to four. Nowadays, this number is doubled so that 80% of the commercial banks in Tunisia are offering now Internet Banking services (Appendix 2). In fact, Amen Bank was the pioneer in Tunisia to offer Internet Banking services since November 2000 following by STB (Société Tunisienne de Banque), BH (Banque de l'Habitat) and UBCI (Union Bancaire pour le Commerce et l'Industrie). In 2005, BIAT (Banque Internationale Arabe de Tunisie) was offered Internet Banking services and recently this supply is extended to Attijari bank, BT (Banque de Tunisie) and ATB (Arab Tunisian Bank). In addition to the extension of the number of Internet banks in Tunisia last years, also there is a development of Internet Banking services in quantity and quality. Actually, banking services offered via Internet are extended to other services more various and developed. So they are not limited to services of consultation but also other services more complicated like orders and payments of bills. Although, the development of the Internet Banking supply, the number of Internet Banking users is still very weak in comparison with the others e-banking services. Indeed, for example in BT the number of ATM users was 140 000, phone banking has 594.000 in 2008 (670.000 in 2007) users and users of SMS banking were 110.200 in 2008 (71.500 in 2007). Whereas, the number of Internet Banking users of BIAT was only 4900 in 2008 (2400 in 2007) in the same year. Additionally, although the long range of Internet Banking services offered, they are not frequently used by Tunisian consumers. Practically, the average frequency of using these services is so weak; it is between 1 to 2 times per month.

2. Literature review

Internet banking adoption has gained special attention in academic studies during the past years to investigate factors of adoption. Three of the most important theories used by researchers in the study of individual's adoption of Internet banking is Davis et al, (1989) Technology Acceptance Model (TAM) (Pikkarainen et al, 2004; Cheng et al, 2006), Theory of Reasoned Action (TRA) originally proposed by Fishbein and Ajzen (1975) (Gefen et al., 2003) and Theory of Planned Behaviour (TPB) (Shih and Fang, 2004) originally proposed by Ajzen (1991). The Theory of Reasoned Action (TRA), developed by Fishbein and Ajzen (1975), is probably one of the most influential theories used to explain human behaviour (Venkatesh et al., 2003). According to this theory, the behavioral intention can be explained by the attitude towards behavior and subjective norm. The attitude towards behavior is defined as an individual's positive or negative feelings (evaluative effect) about performing the target behavior (Fishbein and Ajzen, 1975). Subjective norm refers to perception that most people who really matter to the individual think that he either should or should not perform the behavior in question" (Fishbein and Ajzen, 1975). The Theory of Planned Behavior (TPB) was proposed by Ajzen (1991) as an extension of TRA (Fishbein and Ajzen, 1975) for situations where people have incomplete volitional control. This suggests that a central factor in human behavior is behavioral intention, which is affected by attitude toward behavior, subjective norm, and perceived behavioral control (Ajzen, 1991). This construct reflects how people perceive the internal and external limitations to their behavior. It refers to how easy or difficult people believe it would be to perform certain behaviors (Ajzen, 1985).

The Technology Acceptance Model introduced by Davis (1985) is one of the most cited theoretical frameworks to predict the acceptance and use of new information technology within organizations. This model derives from the TRA. The Technology Acceptance Model hypothesizes that system use is directly determined by behavioral intention to use, which is in turn influenced by users' attitudes toward using the system and the perceived usefulness of the system. Attitudes and perceived usefulness are also affected by perceived ease of use. Perceived usefulness was defined as the degree to which individuals believe that using a particular system would enhance their job performance (Davis, 1989), whereas perceived ease of use relates to the degree to which individuals believe that using a particular system would require no effort (Davis, 1989). These two factors have been empirically justified as important factors determining the adoption and use of new information technology, including the adoption of Internet banking (Vijayasathy, 2004).

These different theories contribute an understanding of the factors influencing consumer adoption of internet banking. Figure 1 delineates the research model. It divides the factors which are hypothesised to influence the individual's decision to adopt internet banking into six main categories: convenience, security perception, prior internet knowledge, perceived risk, information on online banking and demographics characteristics. The

literature review which follows argues that many of these factors can be a priori regarded as pertinent to the process of online banking adoption. The model we developed proposed that online banking adoption can be modelled with the variables derived from literature and five variables referring to prior internet knowledge, convenience, security perception, perceived risk, information on online banking, and demographic characteristics.

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2.1 Demographic characteristics

Demographic factors have also been found to be associated with adoption of different banking channels, especially internet banking (Al-Ashban and Burney, 2001; Karjaluoto et al, 2002; Sathye, 1999). For instance, people with high educational attainment may have an aptitude for computers and possess good information processing skills. These qualities are crucial in the context of internet banking and therefore a relationship between formal education and adoption is propounded. The results reported in Flavia'n et al. (2006) indicated that women were also less likely to conduct their banking activities online. Akinçi et al.'s (2004) findings in Turkey show that mid-aged consumers are more likely than younger or older consumers to use internet banking. Other studies (Karjaluoto et al., 2002; Mattila et al., 2003; Sathye, 1999) shows that those who belong to upper middle class and have high-level occupations are more likely to use Internet banking. Consequently, the following hypothesis is proposed:

H₁: Demographic characteristics, such as gender, age, instruction, and occupation have a significant effect on consumer adoption of online banking.

2.2 Convenience

Convenience has been identified by several studies as an important adoption factor of innovation technologies (ACNielsen, 2005, Pew, 2003 and Ramsay and Smith, 1999). Copeland (1923) defined convenience goods as a class of consumer products that were intensively distributed and required minimal time and physical and mental effort to purchase.

Some later definitions of convenience also focused on resources such as time and effort required of the consumer in shopping for a product (Brown, 1990). Other researchers, however, expanded the concept of convenience to incorporate non-shopping activities. It is related to the visual view of the Internet compared to telephone banking (Black et al., 2002).

Furthermore, the 24-hour service availability (Gerrard and Cunningham, 2003; Liao and Cheung, 2002), home access (Gerrard and Cunningham, 2003), world wide access (Liao and Cheung, 2002), time savings (Gerrard and Cunningham, 2003), and wide variety of services accessible (Liao and Cheung, 2002) are seen as drivers of convenience in Internet banking.

Previous authors considered internet banking as competitive advantage of adopting of a new retailing channel in services capes (Polatoglu and Ekin, 2001; Gerrard and Cunningham, 2003). It is one of the dominating factors in transaction channel preferences (Ramsay and Smith, 1999) and a key determinant of consumer satisfaction (Yang et al., 2003). In his study Eastin (2002) found that perceived convenience was the strongest predictor of online banking usage. Finally, the same study also indicated that the perceived convenience was the most influential variable of overall adoption of all four e-commerce activities investigated.

Therefore, it is hypothesized that convenience has positive effect on consumer adoption of internet banking.

H₂: Convenience has a positive effect on consumer adoption of internet banking

2.3 Prior internet Knowledge

Another factor that influences the consumer adoption of internet banking is the prior experience of technologies, especially prior experience of computers. Thus, consumer's familiarity with technologies in general facilitates her appreciation of the potential added value which is inherent in a technology. The prior computer experience is associated with use of use of PC, the Internet and e-mail. Karjaluoto et al. (2002) showed that prior experience with computers and technologies and attitudes towards computers influence both attitudes towards online banking and actual behaviours.

Consequently, the following hypothesis is proposed:

H₃: The prior internet knowledge has a positive effect on consumer adoption of online banking.

2.4 Security perception

Security is one of the very important factors in determining the decision of consumers to use Internet banking. The Walls report (1997) also reported that unless security is improved, more households would be willing to conduct their transactions over the Internet.

According to Polatoglu and Ekin, (2001), security comprises of three dimensions: reliability, safety, and privacy. Consumers' concerns about security, which arise from the use of an open public network, have been emphasised as being the most important factor inhibiting the adoption and use of internet banking (Sathye, 1999; Daniel, 1999; Hamlet and Strube, 2000; Tan and Teo, 2000; Cox and Dale, 2001, Polatoglu and Ekin, 2001, Black et al., 2002, Giglio, 2002; Howcroft et al., 2002 Howcroft et al., 2002).

In USA, Thorton Consulting (1996) which conducted a survey focusing on banks concluded that 67 percent of US banks feel that "security concerns" is the major barriers for Internet banking. The same results obtained from the study of Booz et al. (1997), reveals that security concern among customers was the top-ranking obstacle for non-adoption of Internet banking in Latin America. Thereby we propose that:

H₄: Security perception has a positive effect on consumer adoption of internet banking.

2.5 Perceived risk

The third factor that influences the adoption of internet banking by customers is the perceived risk. Several recent studies (Bhatnagar et al. 2000; Featherman and Pavlou 2003; Jarvenpaa et al. 1999; Kolsaker et al. 2004; Liao and Cheung, 2001, Park et al. 2004, Pavlou 2003, and Ruyter et al. 2001) have deemed consumer risk perceptions to be a primary obstacle to the future growth of online commerce and e-services.

Bauer (1960) defined risk in terms of uncertainty and consequences associated with consumer's actions. Perceived risk increase with uncertainty and/or the magnitude of associated negative consequence (Hsi-Peng et al, 2005). The degrees of risk that consumers perceived and their own tolerance of risk tacking are factors that influence their purchase strategies (Chan and Te Lu, 2004). It should be stressed that consumers are influenced by risks that they perceive whether or not such risk.

Consequently the lower the perception of risks involved in using Internet banking the more likely an individual would be prepared to use it. Thus the hypothesis formulated was:

H₅: The lower the perceived risk of using Internet banking, the more likely that Internet banking will be adopted.

2.6 Information on online banking

The important factor that consumers consider before adopting is the amount of information they have about internet banking. In this context, Sathye (1999) has identified it as a major factor impacting the adoption. According to Sathye (1999), while the use of internet banking services is fairly new experience to many people, low awareness of internet banking is a major factor in causing people not to adopt internet banking.

In an empirical study of Australian consumers Sathye (1999), found that consumers were unaware about the possibilities, advantages/disadvantages involved with internet banking. Guiltinanand Donnelly (1983) identify "information about the benefits of using a product/service" as an essential service/product promotion strategy. Hence, for adoption of internet banking, it is necessary that the banks offering this service make the consumers aware about the availability of such a product and explain how it adds value relative to other products of its own or that of the competitors. For example, marketing effort, Radio and TV advertisements, Web site, branches and other promotional tools suggesting that marketing communications will have a positive effect on consumer adoption of online banking. Hence, we posit that:

H₆: The amount of information a consumer has about online banking has a positive effect on consumer adoption of online banking.

3. Research methodology

3.1 Survey design

The constructs in the model are operationalized from existing measures developed and employed in previous research. Five-point Likert scales with end points of "strongly disagree" and "strongly agree" were used to examine participant's responses, namely convenience, perceived security, perceived risk, information online banking and behavioral intention.

The prior internet knowledge were measured using six items that were almost identical to the item used by Walfried M. et al (2005). The measure of convenience and perception of security was almost identical to the measure applied by Cunningham et al (2005). The perceived risk construct using five items were adopted from Fang He et al (2007). The information online banking construct using three items were adopted from Tero et al (2004). The behavioral intention were measured using for items were adopted from Davis (1985). The demographics characteristics questions of the sample were measured in terms of usage frequency of internet banking, bank, gender, age, occupation and educational level.

3.2 Sample profile

The questionnaire was administered by meeting the respondents on a one-to-one. The respondents engaged in this study had at least one current bank account at the time of the interview. They were sampled by convenience and approached close to bank branches at several locations in capital of Tunisia. The questionnaires were distributed to 300 respondents and 253 usable data sets were entered into SPSS version 18.0.

4. Findings

This section provides the analysis and discussion of findings in order to satisfy the objectives of this study. More importantly, factor analysis was conducted prior to the regression analysis in order to identify the appropriate items for the analysis. Factor analysis is a data reduction technique that uses correlations between data variables. The underlying assumption of factor analysis is that a number of factors exist to explain the correlations or inter-relationships among observed variables (Chatfield and Collins, 1992).

The study performed factor analysis using a principal component analysis (PCA) alongside with Varimax with Kaiser Normalization rotation method until the Eigen value of each factor was equal to 1 or more. Loadings for items should be higher than 0.5 (ideally higher than 0.70) which indicates that significant variance is shared between each item and the construct. To check for convergent and discriminate validity of the constructs Cronbach's Alpha test was used to determine the internal consistency of each scale in this research. A Cronbach's Alpha coefficient close to 1.0 means that the questions are measuring similar dimensions of a factor. Although the general limit is > 0.7 , a score > 0.6 would be acceptable because of the exploratory nature of this research. By this standard, any factor with a Cronbach's Alpha coefficient less than 0.6 should be eliminated.

4.1 Demographics of the sample

To test the research model for this study, a cross-sectional survey was conducted. The data set consists of 95 online bank service users (37.5%) and 158 non-user (62.5%). Au total of, 75.1 percent of internet banking users was male. This represents a more balanced sample than that of Tan and Teo (2000) in which the number of male respondents was as high as 80%. The respondents were relatively young with 71.9% of respondents being between the ages of 25-45.

This is consistent with Tan and Teo's (2000) study in which 64.1% of respondents were between 20-29 and supported by Teo and Lim's (1999) findings that the majority of Internet users are youths and young adults. The majority of respondents were those with Bachelors degrees (29.3%) followed by those with secondary level of education (28.5%). As with Tan and Teo's (2000) study the indication is that respondents are generally of sound educational background. In terms of professions most respondents were executives (43.3%). The detailed information is depicted in Table 3.

To examine if demographic variables influence the usage of internet banking, the relationships between various demographic variables are tested with one-way analysis of variance (ANOVA). The results are presented in Table 3. On the basis of frequencies, percentages of the demographic profile, and significance of test Chi-square in SPSS (the corresponding probability is $P < 0.05$) more conclusion can be derived. Results show that instruction and occupation are having significant relationships with the usage of internet banking. Results show that instruction is significant factor to explain internet banking adoption. This finding is consistent with the studies done by Karjaluoto et al., (2002), Mattila et al., 2003, Al-Ashban and Burney (2001), Stavins (2001) and Sathye, (1999). Moreover, results show that occupation appears to be significant influential users which are consistent with the finding of earlier studies, for example, Karjaluoto et al., 2002; Mattila et al., 2003 and Sathye, 1999. The high education group consumers adopt Internet banking because generally they have a higher knowledge of new technology information and skills compared to consumers in the low education group. According to Stavins (2001), consumers with more years of education are more likely to use Internet banking.

4.2 Results of Factor Analysis

Convenience

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) was used to measure sampling adequacy and appropriateness of the factor analysis. The result was an MSA score of 0.860, which approaches the top of the scale at 1.0, indicating a high degree of sampling adequacy. The Bartlett's Test of Sphericity was used to determine whether the original correlation matrix is an identity matrix. If the correlation coefficient value is less than 0.001, then the R-matrix is an identity matrix and the factor analysis is appropriate. The result of the Bartlett Test showed a Chi-square value of 658,638 with a df value of 15 resulting in a significant value of 0.000, which is less than 0.001 and thus supporting the factor analysis. Principal component analysis revealed the presence of one component that explained 60,092%. Based on the criteria that loadings for items should be higher than 0.5, three items (CON1, CONV2 and CONV3) of this construct had to be dropped from the subsequent analysis. The Cronbach's alpha coefficients range from 0.886 that exceed recommended value of 0.7 (Hair et al, 1998). The factor loadings and communalities produced by the varimax rotation, as well as the percentage of explained variance and the reliability coefficients are shown in Table 4.

Prior internet Knowledge

Bartlett's sphericity test was significant at 1 percent (Chi-Square: 395,245, df = 3 and $p=0.00$) and the

Kaiser-Meyer-Olkin test, an assessment of the partial correlations between variables, was 0.711, above the 0.7 lower limit suggested by Hair et al. (1998). Construct reliability was evaluated on internal consistency, by calculating Cronbach's Alpha coefficient (Devellis, 2003). The resulting coefficients were higher than 0.7 (Nunnally, 1978). Since this scale with three items is reliable. The factor loadings and communalities produced by the varimax rotation, as well as the percentage of explained variance and the reliability coefficients are shown in Table 5.

Security

The KMO measure of sampling adequacy reflects score of (0.735), which is well above the recommended 0.50 level (Malhotra, 2004) and the Bartlett's test of sphericity is significant at ($p < 0.001$) levels. PCA revealed the presence of one component that explained 57,409%. Based on the criteria that loadings for items should be higher than 0.5, three items (SECU5, SECU6, SECU7, SECU8 and SECU9) of this construct had to be dropped from the subsequent analysis. The Cronbach's alpha coefficients range from 0.744 that exceed recommended value of 0.7 (Hair et al, 1998). The factor loadings and communalities produced by the varimax rotation, as well as the percentage of explained variance and the reliability coefficients are shown in Table 6.

Perceived risk

Bartlett's sphericity test was significant at 1 percent (Chi-Square: 212,295, $df = 3$ and $p=0.00$) and the Kaiser-Meyer-Olkin test, an assessment of the partial correlations between variables, was 0.684, above the 0.7 lower limit suggested by Hair et al. (1998). PCA revealed the presence of one component that explained 69,216%. Based on the criteria that loadings for items should be higher than 0.5, three items (RISK1 and RISK2) of this construct had to be dropped from the subsequent analysis. The Cronbach's alpha coefficients range from 0.744 that exceed recommended value of 0.7 (Hair et al, 1998). The factor loadings and communalities produced by the varimax rotation, as well as the percentage of explained variance and the reliability coefficients are shown in Table 7.

Information online banking

The KMO measure of sampling adequacy reflects score of (0.735), which is well above the recommended 0.50 level (Malhotra, 2004) and the Bartlett's test of sphericity is significant at ($p < 0.001$) levels. PCA revealed the presence of one component that explained 91,849%. Based on the criteria that loadings for items should be higher than 0.5, one item (INFO3) of this construct had to be dropped from the subsequent analysis. The Cronbach's alpha coefficients range from 0.911 that exceed recommended value of 0.7 (Hair et al, 1998). The factor loadings and communalities produced by the varimax rotation, as well as the percentage of explained variance and the reliability coefficients are shown in Table 8.

Intention

The KMO measure of sampling adequacy reflects score of (0.840), which is well above the recommended 0.50 level (Malhotra, 2004) and the Bartlett's test of sphericity is significant at ($p < 0.001$) levels. Principal component analysis revealed the presence of one component that explained 79,272%. The Cronbach's alpha coefficients range from 0.912 that exceed recommended value of 0.7 (Hair et al, 1998). The factor loadings and communalities produced by the varimax rotation, as well as the percentage of explained variance and the reliability coefficients are shown in Table 9.

4.3 Results of Regression Analysis

Considering the outcome from the factor analysis, the items for independent variables and the dependent variable were aggregated in which factor loadings exceeded 0.50 were selected. Once the data were aggregated, the multiple regression was conducted to reveal how different factors affect intention to use internet banking. This approach has been widely employed in the survey - based studies (Guriting and Ndubisi, 2006; Luarn and Lin, 2005; Wang et al., 2003 and Ramayah et al., 2003). Aggregation of the research results allows combining of all items under one particular heading or label, which thus is easy to analyze using regression analyses, as noted earlier (Table 10).

The results of regression equation based on five independent variables (convenience, security, risk, prior internet knowledge and information online banking) indicate positive and statistically significant relationship ($F = 28.767$, $p < .001$) with dependent variable of internet banking services adoption. The independent variables accounted for 60.8% ($R^2 = 0.370$) of variance in dependent variable of internet banking services adoption. The convenience, with largest beta coefficient of (0.264) is the most significant independent variable followed by security (Beta = 0.205), risk (Beta = 0.188), prior internet knowledge (Beta = 0.125) and information online banking (Beta = 0.071) respectively. The results also show that all for independent variables are significant at 1% level. The effect of convenience ($B=0.264$, $p < 0.01$), security ($B=0.205$, $p < 0.01$), perceived risk ($B=0.188$, $p < 0.01$) and prior internet knowledge ($B=0.241$, $p < 0.01$) on intention to use Internet banking was significant, thus validating the proposed model. Hypothesis H_1 , H_2 , H_3 and H_4 , were supported in that prior internet knowledge, convenience, security perception, and perceived risk all had a significant effect on behavioral intention.

Table 11 illustrates that hypotheses were significantly supported. However, the remaining two hypotheses,

including of H5 are not supported in this study.

4.4 Discussion

The result concurs with the findings of Black et al. (2002), Gerrard and Cunningham, (2003) and Liao and Cheung, (2002) where convenience was affecting the utilization of internet banking. In his study Eastin (2002) found that perceived convenience was the strongest predictor of online banking usage. This study reveals that perceived security is an important factor influencing customers' adoption of Internet banking. Several researchers indicate that perceived security plays an important role when bank customers decide to adopt Internet banking services (Kaynak and Harcar, 2005; Liao and Wong, 2007; Altintas and Gürsakal, 2007; and Laforet and Li, 2005). Liao and Cheung (2002) and Sathye (1999) show that the more secure the customer perceive Internet banking to be, the more likely it is that customer will use Internet banking. This results show that perceived risk is one of the major influencing factors around the establishment and use of Internet banking before perceived security. According to Liu and Arnett [1999] the need for secure transactions are critical to the success of not only Internet banking but that of any e-commerce related website. This research reveals that prior internet knowledge also has strong influence on customers' decision to adopt Internet banking. This result is consistent with a number of researchers that regard prior internet knowledge as the main factor that affects consumers' adoption of Internet banking (Igbaria and Iivari, 1995; Howcroft and Durking, 2000). Thus, familiarity with the Internet environment encourages acceptance of Internet banking by individuals who have used the World Wide Web for a long period.

5. Conclusion

The objective of this study is to analyze the factors affecting bank customers' decisions to adopt Internet banking. This study identifies some factors that are more influential than others in Internet banking adoption in the Tunisia banking market. The empirical results show that the perceived convenience, perceived risk, perceived security and prior internet knowledge all have significant effects on behavioral intention to use online banking. An important finding of this study is that, among 'early adopters', convenience was a more important indicator of intentions to adopt internet banking. Risk, security and prior internet knowledge is also an important factor influencing customers adopting internet banking after convenience. Among demographic variables, further significant influences have been found for instruction and occupation. An understanding of the factors identified in this study allows bank managers to direct efforts and resources in the most effective and efficient way to increase bank business in the long run and encourage their bank customers' to adopt Internet banking. Bank managers can make use of such information to develop appropriate strategies to attract new customers to use Internet banking services. In general, if the bank management has greater knowledge about the factors affecting their customers' adoption of Internet banking, then they have greater ability to develop appropriate strategies and hence increase the Internet banking adoption rate. Among demographic variables, further significant influences have been found for instruction and occupation.

5.1 Managerial implications

The present study has many implications. First, security it might be important for banks to develop a marketing strategy for internet banking, however, banks need to visibly demonstrate concern for security, reliability, with concrete solutions to improve trustworthy secure e-banking systems, and specifically protect personal information or security for payment transaction. There is a need to upgrade the banks' security system. To overcome such risk issues, bank management should take steps to manage and minimize perceived security and risks. Banks should implement new security policies, improve the internal communication coordination, evaluate and upgrade their services according to customers' expectations, and develop service recovery programmes. Banks should also increase their ability to control and manage the various risks inherent in Internet banking. Banks can use encryption, firewall, intrusion detection, and other related security devices to properly safeguard the Internet banking security systems.

Second, perceived risk appears to be an important inhibitor to the adoption of internet banking. This underscores the fact that concerns about fraud and identity thefts are foremost in the minds of internet banking users. Thus, providing encryption and strong authentication to prevent fraud and identity theft should be a priority in banks management. In this context, banks should consider focusing on the prevention of intrusion, fraud and identity theft. For example, building secure firewalls to avoid intrusion, developing methods for strengthening encryption, and authenticating websites in order to prevent fraud and identity theft are all measures that should be undertaken.

Third, for prior internet knowledge, the government should provide some free basic computer training projects which can educate people about the computer and the Internet. The government should also improve support to the public access to the Internet. As people have more accessibility and knowledge about the Internet, they will use the services that the Internet can provide, such as online shopping, and paying bills. These incentives should increase the number of probability that bank customers adopt Internet banking services. Banks should provide free demonstration computer courses about using Internet banking to bank customers. As the education level increases, people who have attended the courses should have more knowledge and skills and therefore perceived

Internet banking as more user-friendly. Therefore, the adoption rate of Internet banking should also increase.

5.2 Limitations and Avenues for Future Research

This study has several limitations. First, this study identified four factors that may influence consumers' adoption of Internet banking. However, there may be some additional factors that can impact on customers' adoption of Internet banking but are not examined in this study. Additional empirical research is required to identify and examine other factors that can impact on customers' adoption of Internet banking services, such as type of Internet connection used, perceived ease of use, self-efficiency, culture, and trust. The second limitation concerns the sample. The sample size is not large enough quite large compared to sample sizes of other studies, and representative, it consisted of Tunisian consumers only. This has an effect on the generalization of the findings. These limitations pave the way to future studies. Furthermore, another interesting avenue for further research could be a detailed study on online banking usage in Tunisian firms such as other variables (e.g. market, environmental, regulatory etc.) which may have an effect on the decision of the banks to adopt internet banking.

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Table 1. Delivery platforms for electronic banking

Type of service	Description
PC banking	Proprietary software, distributed by the bank, is installed by the customer on their PC. They then access the bank via a modem linked directly to the bank.
Internet banking	Customers can access their bank account when they use the internet
Managed network	The bank makes use of an online service provided by another party, such as AOL
TV-based	The use of satellite or cable to deliver account information to the TV screens of customers

Source: Adapted from Daniel (1999)

Table 2. Potential influences on consumer adoption of internet banking

Theory	Factors	Autors
Communication theory : uses and gratification	Relaxation, ompanionship, habit, passing time, entertainment, social interaction, information/surveillance, arousal, and escape	Cunningham and Finn, 1996; Korgaonkar and Wolin, 1999; Lin, 1999; Ruggiero, 2000.
Communication theory : prospective and gratification	Habit strength, deficient self-regulation, self-efficacity	Bandura, 1997; LaRose et al. 2001; Limayem and Hurt, 2003.
Diffusion of innovation	Relative advantage, compatibility, complexity, trialability, observability	Rogers, 1995
Technology acceptance	Perceived usefulness, perceived ease of use	Davis (1989)
Online consumer behaviour and online service adoption	Channel knowledge, convenience, experience, perceived accessibility and perceived utility, time savings, site waiting time, security, privacy and trust, cost, service quality	Li et al., 1999; Bellman et al., 1999; Dellaert and Kahn, 1999; Huang, 2002; Miyazaki and Fernandez, 2001; Nissenbaum, 2004; Pew, 2005; Gefen et al., 2003; Meuter et al., 2000.
Service switching costs	Procedural, financial and relational	Burnham et al., 2003
Adoption of internet banking	Convenience, service quality, perceived relative advantage, compatibility, trialability, complexity (after Rogers, 1995), demographics, consumer attitudes and beliefs, Security, privacy, trust, risk, needs already satisfied, familiarity, habit, lack of awareness, consumer, product, organisation, channel characteristics, convenience, adaptability, computer and technology, confidence, knowledge, High levels of internet use at work, gender	ACNielsen, 2005; Tan and Teo, 2000; Chung and Paynter, 2002; Gartner Group, 2003b; Pew, 2003; Kolodinsky et al., 2000; Sathye, 1999; Black et al., 2002; Ramsay and Smith, 1999; Thornton and White, 2001; Durkin (2004); Suh and Han, 2002; Zhu et al., 2002; Shergill and Li, 2005; Ilett, 2005; Perumal and Shanmugam, 2005; Siu and Mou, 2005; Wan et al., 2005; Waite and Harrison, 2004

Source: Lichtenstein and Williamson (p. 52, 2006)

Table 3. Demographics profile of respondents

	<i>Online banking users (%) (n=95)</i>	<i>Non users of online banking (%) (n=158)</i>	<i>Total percentage (%)</i>	<i>Chi-square</i>
Gender				N.S. (*)
Male	36.3	63.7	75.1	
Female	41.3	58.7	24.9	
Age				N.S. (*)
Under 25	25.0	75.0	4.8	
25-45	36.3	63.7	71.9	
45-65	43.9	56.1	22.5	
Over 65	50.0	50.0	0.8	
Instruction				10.2 (**)
High School	26.7	73.3	24.4	
College	40.9	59.1	17.8	
Graduate	47.2	52.8	29.3	
P-graduate	65.7	34.3	28.5	
Occupation				20.8(**)
Executives	66.1	33.9	43.5	
Middle-staff employes	23.1	76.9	19.1	
Blue-collar workers	31.3	68.8	19.1	
Independents	62.5	37.5	6.5	
Students	23.5	76.5	11.8	

Note: (*) Non Significant relationship

(**) Significant at 5% significance level

Table 4. Factor analysis and reliability for prior internet knowledge

Item	Labelle	Communalities (>0.5)	Reliability (Cronbach's alpha) (>0.7)	Percentage of total variance explained
PIK1	How comfortable do you feel using computers in general?	0,819	0,868	79,287%
PIK2	How comfortable do you feel using the Internet?	0,845		
PIK3	How satisfied are you current skills for using the internet?	0,715		

Table 5. Factor analysis and reliability for security perception

Item	Labelle	Communalities (>0.5)	Reliability (Cronbach's alpha) (>0.7)	Percentage of total variance explained
SECU1	The authorized username and password are important	0,729	0,744	57,409%
SECU2	I do not save my login number and password on the computer	0,673		
SECU3	I do not leave my computer unattended, while connected to the e-banking services	0,850		
SECU4	Trust affects the demand for e-banking services	0,768		

Table 6. Factor analysis and reliability for perceived risk

Item	Labelle	Communalities (>0.5)	Reliability (Cronbach's alpha) (>0.7)	Percentage of total variance explained
RISK1	Existing government policies are sufficient to keep online transactions and payments safe and secure	0,751	0,777	69,216%
RISK2	Existing legal regulations for online transactions and payment can effectively protect my information privacy	0,701		
RISK3	I have confidence in the security of the existing online transaction network	0,625		

Table 7. Factor analysis and reliability for information online banking

Item	Labelle	Communalities (>0.5)	Reliability (Cronbach's alpha) (>0.7)	Percentage of total variance explained
INFO1	I have generally received enough information about online banks	0,918	0,911	91,849%
INFO2	I have received enough information about the benefits of using on online bank	0,918		

Table 8. Factor analysis and reliability for intention

Item	Labelle	Communalities (>0.5)	Reliability (Cronbach's alpha) (>0.7)	Percentage of total variance explained
INT1	Assuming Web technology is available to me, I predict i will use it on a regular basis in the future	0,743	0,912	79,272%
INT2	For future task, I would use internet banking	0,822		
INT3	In the future, I plan to use the internet banking often	0,847		
INT4	I intend to increase my use internet banking in the future	0,760		

Table 9. Regression results

MODEL SUMMARY	R		R ²	Adjusted R ²	Std error of the estimate	
Model	0.608		0.370	0.357	0.804	
ANOVA MODEL ^a	Sum of squares	df	Mean square	F	Sig.	
Regression	93.136	5	18.627	28.767	0.000	
Residual	158.640	245	0.648			
Total	251.776	250				
COEFFICIENTS ^b	Unstandardized coefficients		Standardized coefficients	t	Sig.	
	B	Std. error	Beta			
(Constant)	-0.002	0.051		-0.036	0.971	
Convenience	0.265	0.067	0.264	3.979	0.000	
Security	0.206	0.064	0.205	3.197	0.002	
Risk	0.188	0.056	0.188	3.362	0.001	
Prior Internet Knowledge	0.125	0.057	0.125	2.206	0.028	
Information on online banking	0.071	0.053	0.071	1.347	0.179	

Notes: ^a Dependent variable: Internet banking adoption. ^b Predictors: (constant), Convenience, Security, Risk, Prior Internet Knowledge, Information on online banking.

Table 10. Hypotheses 2 to 6 Test results

Hypotheses	Supported	No supported
H ₂ : Convenience has a positive effect on consumer adoption of online banking	✓	
H ₃ : The prior internet knowledge has a positive effect on consumer adoption of online banking.	✓	
H ₄ : Security perception has a positive effect on consumer adoption of online banking.	✓	
H ₅ : The lower the perceived risk of using Internet banking, the more likely that Internet banking will be adopted.	✓	
H ₆ : The amount of information a consumer has about online banking has a positive effect on consumer adoption of online banking.		✓

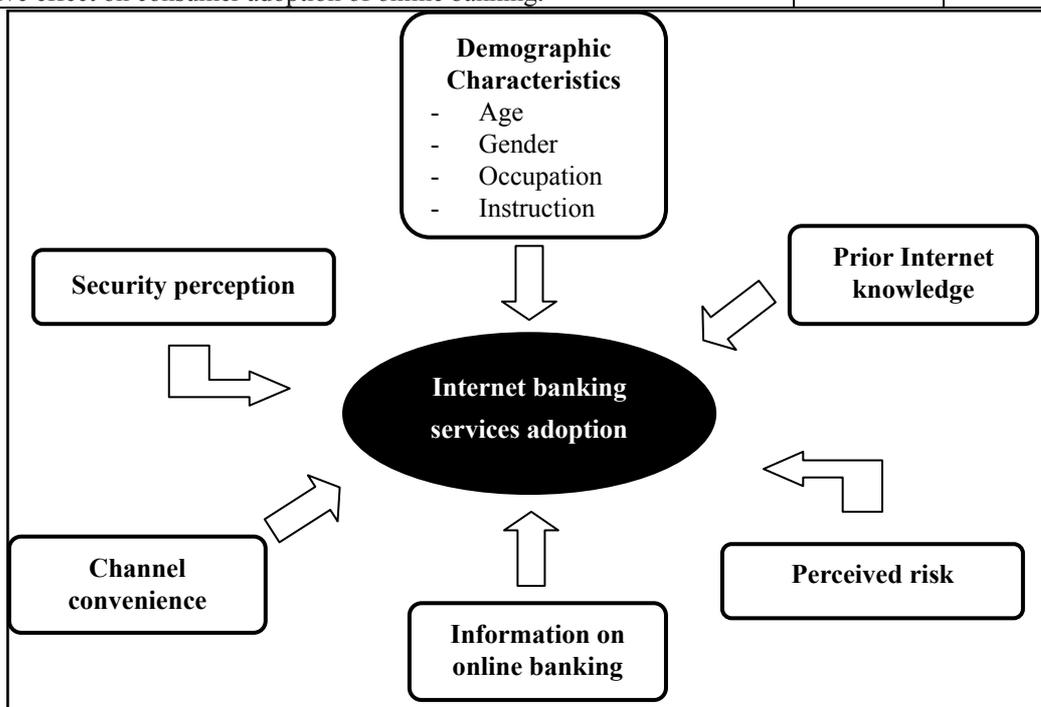


Figure 1. Research model

Appendix 1: The questionnaire

Questionnaire items: please respond to questions below by circling your choice (1 = strongly disagree, 5 = strongly agree)

Constructs	Source
<p><i>Convenience</i> I can access anytime and anywhere No queue Save time as compared to conventional banking E-banks transaction is easy to use User friendly Easy login Account access when abroad I check my transaction details and statement regularly I think computer literate keeps me using e-banking services</p>	<p>Poon W. C. (2008)</p>
<p><i>Security</i> The authorized username and password are important I do not save my login number and password on the computer I do not leave my computer unattended, while connected to the e-banking services Trust affects the demand for e-banking services I do not leave my computer unattended, while connected to the e-banking services I don't mind registering before supplying information Banks' reliability in correcting erroneous transactions Trust the bank will compensate for losses due to security reasons I am satisfied with the security system</p>	<p>Poon W. C. (2008)</p>
<p><i>Risk</i> The risk of credit card fraud for online transactions and payments is low for me I Would feel free to submit my personal information online Existing government policies are sufficient to keep online transactions and payments safe and secure Existing legal regulations for online transactions and payment can effectively protect my information privacy I have confidence in the security of the existing online transaction network</p>	<p>Fang He et al, (2007)</p>
<p><i>Prior internet knowledge</i> How comfortable do you feel using computers in general? How comfortable do you feel using the Internet? How satisfied are you current skills for using the internet?</p>	<p>Walfried M. et al, (2005)</p>
<p><i>Information online banking</i> I have generally received enough information about online banks I have received enough information about the benefits of using on online bank I have received information about using on online bank from</p>	<p>Tero et al, (2004)</p>
<p><i>Intention</i> Assuming Web technology is available to me, I predict I will use it on a regular basis in the future For future task, I would use internet banking In the future, I plan to use the internet banking often I intend to increase my use internet banking in the future</p>	<p>Davis (1985)</p>

Appendix 2: Evolution of automated vehicles in Tunisia

	2009	2010	Variation en %	Variation in number and volume
Number of TPE (units)	10.450	11843	13.3%	1393
Number of ATM (units)	1409	1608	14.4%	199
Credit cards	2 082 905	2 346 165	12.6%	263 260
Number of transactions (thousands), of which	30 268 907	36 086 048	19.2%	5 817 141
Volume of transactions (in millions dinars) of which	3056,816	3776,872	24%	720,056

Source: (APTBEF (Association Professionnelle Tunisienne des Banques et des Etablissements Financiers) report October 2010)

Appendix 3: List of the Bank and their web addresses

Banks	Web addresses
UBCI (Union bancaire pour le Commerce et l'Industrie)	http://www.ubcinet.net/
STB (Société Tunisienne des Banques)	http://www.stbnet.stb.com.tn/
ATTIJARIBANK	http://www.attijarinet.com.tn/
BH (Banque de l'Habitat)	http://www.bh.com.tn/
BTK (Banque Tuniso Koweitienne)	http://www.btknet.com/
BIAT (Banque Internationale Arabe de Tunisie)	https://www.biatnet.com.tn/
BT (Banque de Tunisie)	http://www.bt.com.tn/
UIB (Union International des Banques)	http://www.uibnet.com.tn/
AB (Amen Bank)	https://www.amennet.com.tn/
BNA (Banque Nationale Agricole)	www.bnnet.com.tn
BFT (Banque Franco Tunisienne)	No site
BZ (Banque Zitouna)	No site
BTE (Banque de Tunisie et des Emarates)	No site
BTS (Banques Tunisiennes de Solidarité)	No site
TQB (Tunisian Qatari Bank)	No site
ATB (Arab Tunisian Bank)	No site
City Bank	No site