# Determining the Factors Influencing Internet Banking Adoption: An Empirical Study in Morocco

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**Abstract:** *This study investigates customer's perception and adoption of Internet banking IB in Morocco. We developed a theoretical model based on the Technology Acceptance Model (TAM) with Perceived Risk construct. A questionnaire was designed to collect data from a randomly selected sample of Moroccan banking customers and obtained 280 usable responses. Structural equation modeling (SEM) was used for data analysis. The results indicate that PU, PEOU and ATT have a significant effect on customer's acceptance of Internet Banking (IB), while Perceived Risk has no significant impact on adoption and attitude. The findings of this study provide important implications for bank management in formulating sound IB marketing strategies and enhancing banking adoption in Morocco.*

**Keywords:** Internet Banking, Technology Acceptance Model (TAM), Perceived Risk Theory (PR), Structural Equation Modeling (SEM)

## 1. Introduction

Since the beginning of the new millennium, the breakthroughs in IT have revolutionized the banking industry as a whole and have opened up new opportunities to be more creative and competitive. These technologies have transformed the way communication is achieved and the way services are delivered. Thanks to Internet banking, banks are offering better and fast access to many bank facilities 24 hours a day 7 days a week, through which customers can access their accounts, conduct transactions and get useful information on financial products and services anywhere and anytime with just the push of a button (Baldock, 1997 and Laukkanen, 2007). As a result, a lot of research has been conducted to investigate and predict the factors that influence the acceptance and use of these technologies. A number of models and frameworks have been developed to explain users' adoption or rejection of Internet banking and these models have introduced factors and offered new insights that can affect users' adoption. The most well-known theoretical models which have attempted to explain and predict the relationship between users' beliefs, attitudes and intentions include *Theory of Reasoned Action* (TRA- Fishbein and Ajzan, 1975), *Theory of Planned Behavior* (TPB- Ajzen, 1991), and *Technology Acceptance Model* (TAM- Davis, 1989). All technology acceptance theories have been designed to measure the degree of individual acceptance and satisfaction toward the use of an IT but from different angles and perspectives.

Morocco has a well-developed diversified banking sector in Africa, where penetration is rising rapidly since 2007. Despite being a developing country, the Moroccan banking sector has several large homegrown institutions such as Attijariwafa Bank (AwB), Bank of Africa (BOA, ex. BMCE), and *Banque Centrale Populaire* (BCP) with international footprint, as well as several subsidiaries of foreign banks with a network comprised of 19 banks, 6388 branches and 7235 ATMs. It stands as one of the most structured and developed banking systems in North Africa and the MENA region (oxfordbusinessgroup, 2019). Therefore, the goal of this article is to investigate the main factors that influence online banking adoption in Morocco, in the light of the Technology Acceptance Model TAM (Davis et al., 1989; Mathieson, 1991; Davis and Venkatesh, 1996) with Perceived Risk Theory (PR) (Featherman and Pavlou, 2003).

### 1.1 Research problem

We are now living in a digital world where Information and Communication Technologies ICT are prerequisites in almost if not all sectors. Customers' expectations have changed with the technological advancements in Internet and communication and the global innovation of information technology has reshaped the financial industry. These advances have made a significant impact on the flow of information in banking organizations, reconstructing their "analogue nature into digital one" (Tumbas et al., 2011).

In fact, banking is an information-intensive business that has traditionally been strongly dependent on information and communication technologies to be efficient and more competitive (Shih and Fang, 2004). Since it is a high-volume industry, and it provides an increasingly wide innovative range of services and products, the benefits for financial institutions are monumental. Besides, the nature of the Internet as a channel for banking service delivery has more advantages than other channels thanks to its interactive power and borderless source of information (Shah and Siddiqui, 2006).

Moreover, because Internet banking has become one of the most profitable e-commerce applications over the last decade, there was a need to empirically validate the Technology Acceptance Model (TAM) and an added construct Perceived Risk (PR) for understanding and predicting the key factors that influence Moroccan banking customers' intention to adopt Internet banking. Therefore, the objective of this study is to enrich our knowledge and understand the various factors that influence Internet banking usage in Morocco. A theoretical model is proposed to explain Moroccan customers' intention to use Internet banking with a focus on users' perceptions of ease of use,

usefulness, and attitude towards Internet banking, as well as the perceived risk of using this new technology to meet individual's banking needs. The objective of exploring this issue in the Moroccan context is to contribute to the knowledge about retail banking communication services and allow banks to better formulate their marketing strategies to increase Internet banking adoption in the future and consequently, expand their market share.

Although the implementation of Internet banking has been widely adopted in various developed countries, customers' adoption in developing countries namely Morocco has been slower and very shy. That is why there is a dire need to investigate the factors that impact on customers' decision to adopt these services in conducting their banking transactions and also to allow banks to understand users' concerns so as to enhance their services and communication strategies. To the best of the author's knowledge, the number of studies that addressed the factors influencing adoption of Internet banking services in Morocco are very limited and focused on few factors (Echchabi, 2012).

## 2. Theoretical Framework

### 2.1 Technology Acceptance Model (TAM)

There is a plethora of theories and models that have been used to explain the reasons behind the adoption of technology in different areas of research and several studies focusing on adoption of mobile services have their roots in Technology Acceptance Model (TAM). This later is considered as one of the most popular research models to predict use and acceptance of information systems and technology by users thanks to its robustness, simplicity, and applicability in explaining and predicting the key motivators and inhibitors affecting users' intention to adopt new technologies (Venkatesh and Davis, 2000; Lu, Yu, Liu, and Yao 2003; Marangunic and Granic, 2015; Rauniar, Rawski, Yang, and Johnson, 2014). Technology Acceptance Model (TAM), introduced by Fred Davis in 1986, was developed to test and explain why users accept or reject information technology (Davis et al., 1989; Yousafzai, Foxall, and Pallister, 2007a, 2007b). It is also considered as the most widely applied and validated model for various contexts and across a variety of technologies (Venkatesh and Davis, 2000). According to Mathieson (1991) and Szajna (1996) (as cited in Yousafzai et al., 2010, pp.1177-1178), the widespread popularity of the TAM can broadly be attributed to three factors:

(a) it is parsimonious, IT-specific, and designed to provide an adequate explanation and prediction of a diverse user population's acceptance of a wide range of systems and technologies within varying organizational and cultural contexts and expertise levels; (b) it has a strong theoretical base and a well-researched and validated inventory of psychometric measurement scales, making its use operationally appealing; and (c) it has accumulated strong empirical support for its overall explanatory power.

The TAM is developed based on The Theory of Reasoned Action (TRA) which suggests that social behavior is motivated by the attitude and intention to use a technology (Fishbein and Ajzen, 1975). According to TRA, individuals often behave as they intend to do within available context and time. This means that a person's acceptance of a technology is determined by their willingness to use that technology. Intention, in turn, is determined by the person's attitude toward the use of that technology and their perception concerning its usefulness. Therefore, TAM adopts causal relationship between perceived usefulness and perceived ease of use, the attitude and intention, as well as actual technology adoption behavior (Davis et al., 1989). Besides, it uses TRA's constructs to explain how external variables influence the inner beliefs, attitude, behavioral intention of users, and the actual usage of technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, notably: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). These two predictors are the main determinants of the attitude towards a new technology (see **Figure 1** below). Research has provided empirical support to show that PU and PEOU play critical roles in predicting and determining behavior usage in technology acceptance situations (Horton, Buck, Waterson, and Clegg, 2001; Karahanna and Straub, 1999; Moon and Kim, 2001; Teo, Lim and Lai, 1999; Venkatesh et al., 2003; Venkatesh and Davis, 2000).
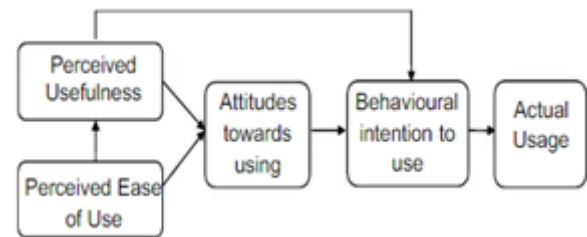


**Figure 1:** source: Original Technology Acceptance Model (Davis, 1989)

#### 2.1.1 Perceived Usefulness

Perceived usefulness has been found to have a great impact on attitude and intention to adopt a new technology (Davis, 1989; Venkatesh, 1999; Venkatesh and Davis, 2000). According to Davis (1989, p.26).), Perceived usefulness *(PU)* is "the extent to which a person believes that using a particular system will enhance his or her performance". In the context of internet banking, PU refers to the customer's perception about internet banking in terms of increased efficiency, effectiveness, and convenience in performing banking transactions. Prior research has revealed that Perceived usefulness has a significant positive influence on Intention to adopt technology (Luarn and Lin, 2005; Cheong and Park, 2005; Wang et al., 2012; and Venkatesh and Morris, 2000). As a result, usefulness is expected to be one of the major factors pushing customers to use Internet banking. It is thus proposed that:

**H1a**: - Perceived Usefulness positively influences the adoption to use online banking.
**H1b**: - Perceived Usefulness positively influences attitude towards the use of online banking.

#### 2.1.2 Perceived Ease of Use

Davis (1989) also defines *Perceived Ease of Use* (PEOU) as "the extent to which a person believes that using a particular system will be free of effort" (p. 26). In the context of

Internet banking, the websites should be more user-friendly and contain clear and detailed instructions. Thurow (2002) states that in order to design a flawless website, the designer has to respect the following rules: "the website should be easy to read, easy to navigate, easy to find, consistent in layout and consistent in design" (p.7). Hence, customers are likely to use Internet banking if it is uncomplicated, user-friendly, and straightforward. Empirical studies have revealed that there is a positive relationship between PEOU and intention to adopt a new technology ((Davis et al., 1989; Venkatesh, 1999; Wu and Wang, 2005; Lee, 2009; and Wei et al., 2009). It is proposed that:

**H2a**: - Perceived Ease of Use positively influences Attitudes towards the use of online banking.

**H2b**: - Perceived Ease of Use positively influences the Perceived Usefulness of online banking.

### 2.1.3 Attitude

*Attitude* (ATT) construct measures the feeling of favorableness or unfavorableness towards using a certain technology (Davis, 1989). It usually refers to the feeling or position that an individual develop from the usage of a product or information technology services. This feeling can be positive or negative and hence influences user's decision to adopt or reject this technology (Wang and Scheepers, 2012). Attitude is revealed to have a direct effect on intention (Davis, 1989). Based on that the following hypothesis is formulated:

**H3**: - Attitude positively influences the Intention to use online banking.

### 2.2 Perceived Risk Theory

Perceived Risk (PR) has been used to explain customer behavior since the 1960s (Forsythe and Shi, 2003). Perceived risk is commonly thought of as a feeling of uncertainty regarding possible negative outcomes of using a product or service (Featherman and Pavlou, 2003). Moreover, Dowling defines risk as "the situation where the decision maker has a prior knowledge of both the consequences of alternatives and their probabilities of occurrence" (2006:194). In the same vein, Bauer (1967) argues that PR is "a combination of uncertainty plus seriousness of outcome involved" (p.13). Furthermore, Cunningham (1967) defines risk as the amount that would be lost in case the outcome is not positive, and the individual's subjective feeling of certainty that the consequences will be negative. Lee (2008:2) defines perceived risk as "the subjectively determined expectation of loss by an internet banking user in contemplating a particular online transaction". In addition, Shin (2010) points out that perceived risk significantly influences consumer behavior in the sense that individuals are afraid that their personal data would be compromised and consequently be scammed.

In Internet Banking, security is one of the most important challenges, because customers are not enthusiastic to use the Web for their financial transactions (Aladwani, 2001; Black et al., 2001; Gerrard and Cunningham, 2003; Sathye, 1999). Perceived risk has been frequently identified as a key barrier to adopting online and mobile services (Featherman and Pavlou, 2003; Gefen et al., 2003; Lee and Turban, 2001). It

influences negatively the adoption of internet banking (Tan and Teo, 2000). Customers feel strong insecurity concerns to use Internet channels for financial transactions such as data leakage, phishing, hacking, etc. (Black et al., 2001) and they are not satisfied with the infrastructure of Web security systems as security violation may result in numerous problems such as destruction of operating systems, or disruption of information access. Therefore, if the risk perceived is low, customers would consider using online platform transactions. In the same line of thought, Lee (2009) examined a host of antecedents that influence the adoption of internet banking in Taiwan and found that the intention to use online banking is negatively affected by security, privacy, and financial risks. Nevertheless, Akturan and Tezcan, 2012; Kuo and Yen, 2009 found a negative relationship between perceived risk, attitude and intention to adopt mobile technology, especially in the technology acceptance context. Furthermore, Chen (2013) considers perceived risk as an important variable in online banking and payment services, especially in developing countries, which have fragile infrastructure and weak telecommunication network. Consequently, the following hypotheses are formulated:

**H4a**: - Perceived Risk negatively influences the Perceived Usefulness of using online banking.

**H4b**: - Perceived Risk negatively influences Attitude towards the use of online banking.

**H4c**: - Perceived Risk negatively influences Intention towards the use of online banking.

All in all, the theory of Technology Acceptance Model (TAM) is important to the current research as it aims at predicting and highlighting the reasons why Moroccan banking clients adopt or reject the use of Internet banking services. The relevance of this model lies on the fact that it is both specific and parsimonious and it displays a high level prediction power of technology use. More than that, TAM helps in clarifying the factors that influence positively or negatively the use of Web 2.0 technologies in customers' interaction with their banks. However, TAM key factors, namely Perceived ease of use (PEOU) perceived usefulness (PU) and attitude (ATT) cannot sufficiently measure the factors that influence online banking usage in Morocco. So, in order to strengthen the model, it was deemed necessary to include a measure of Perceived Risk because research has revealed that a huge number of customers are skeptical to use Internet banking services because of reliability and security issues. They are afraid that their banking accounts will be compromised since it is perceived as being easily susceptible to fraud which can damage consumer's confidence of the system as a whole (Featherman and Pavlou, 2003; Kesharwani and Bisht, 2012). Therefore, according to TAM and PR model, it can be postulated that:
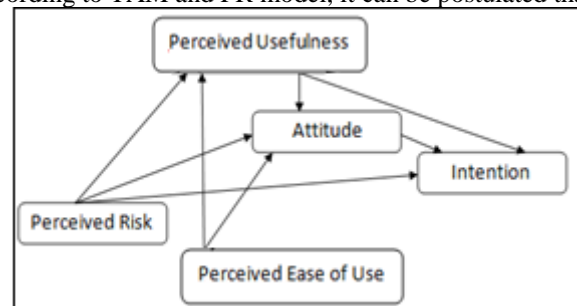


**Figure 2:** The Proposed Research Theoretical Model

## 3. Research Methodology

### 3.1 Measurement Instrument Development

The instrument used in this study was a questionnaire. A total of 200 questionnaires were administered randomly, plus 109 participants responded to the same questionnaire delivered through the Internet. However, 29 questionnaires that were not filled in properly and completely were taken out. Hence, the actual sample used for the current study is 280 respondents. The questionnaire was organized into two sections. The first section was intended to collect respondents' demographic variables and gather basic information about the participants' characteristics. The second section was meant to evaluate five constructs of Perceived Usefulness (PU), Perceived Ease of use (PEU), Perceived Risk (PR), attitude (ATT) and Adoption/Intention as listed in **Table 1**. In this section the respondents rate the questionnaire items by the extent to which they agree with each statement. Each item was scored on a seven-point Likert Scale 1 (strongly disagree) to 7 (strongly agree). Items selected for the constructs were mostly adapted from prior studies in order to ensure content validity. Items to measure Perceived usefulness and Attitude were adapted from the measurements defined by Cheng et al. (2006) and Lai and Li (2005), Perceived Ease of Use and Intention to use were adapted from the measurements defined by Cheng et al. (2006) and Lai and Li (2005), Perceived Risk (PR) constructs were adapted from the measurement defined by Littler and Melanthiou (2006), Cheng et al. (2006), and Featherman and Pavlou (2003). Minor modifications were made to fit the context of Internet banking (**Table 1**).

**Table 1:** Constructs and corresponding Items

| Constructs | Item Sources |
|---|---|
| *Perceived Usefulness*<br>• Online banking is useful<br>• Web 2.0 technologies implemented by the bank save my time and enable me to accomplish my tasks more quickly<br>• Online banking is better for tracking spending.<br>• Online banking offers a wide range of banking services and investment opportunities | Chen et al. (2006) |
| *Perceived ease of use*<br>• Web 2.0 applications are not complex<br>• With online banking I don't have to visit the bank<br>• It's easy to use online banking services for handling my banking transactions. | Chen et al. (2006)<br>Lai & Li (2005) |
| *Perceived risk*<br>• Online banking provides insecure transactions<br>• I don't feel secure sending sensitive information across the online banking<br>• I don't feel totally safe providing personal privacy information over the internet banking<br>• when I transfer money over the Internet, I'm afraid of losing money because of carelessness such as improper account number entry<br>• I'm worried to use online banking because other people may be able to access my account. | Featherman &<br>Pavlou (2003)<br>Littler &<br>Melanthiou<br>(2006)<br>Cheng et al.<br>(2006) |
| *Attitude*<br>• Using online banking has a lot of advantages<br>• Using mobile banking is beneficial<br>• Using online banking is a wise / good idea | Chen et al. (2006) |
| *Intention / Adoption*<br>• I would use the online banking for my banking needs<br>• Using online banking for handling my banking transactions is something I would do<br>• I would see myself using the online banking for handling my banking transaction | Chen et al. (2006)<br>Lai & Li (2005) |

### 3.2 Measurement Model

In order to ensure rigor and validity of the results, Structural Equation Modeling (SEM) approach and the Statistical Package Analysis Moment of Structures (AMOS Version 24) were adopted in our data analysis (Bagozzi et al., 1991). SEM is meant to test and measure causal relationship among multiple variables simultaneously, to estimate the strength of interrelationship between latent constructs (Gallagher et al., 2008) as well as to verify and test model hypotheses through a path coefficient comparison analysis (Bagozzi et al., 1991).

Furthermore, Exploratory Factor Analysis (EFA) using Principal Component Analysis (CPA) was performed on the survey data. PCA was conducted so as to condense construct items into a smaller number of basic components and to explain the variance-covariance structure of a set of variables through linear combinations (Wold et al., 1987) and also to get a clear picture of which construct loads on and which factor the extracted constructs are rotated with using Varimax rotation principle. The rotated factor loading with their comprising variables and their factor loadings are presented in **Table 3**. None of the factors are less than 0.60 and the reasonably high factor loadings provided evidence that an item loads to one component and there is no cross loadings. Besides, Crombach's alpha values of variables ranged from 0.876 to 0.971, significantly above 0.8. The coefficients surpass the threshold value of 0.5 showing evidence of internal consistency as suggested by Nunnally and Bernstein (1994). Furthermore, to support the factorability of the correlation matrix, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was found to be 0.910 which is well above the recommended value of 0.600 (Kaiser, 1974), and the significance of Bartlett's test of Sphericity (Bartlett, 1954) also reached statistical significance (0.000) that is less than 1% (see **Table 2**

below). Therefore, the data of the current study is suitable for using factor analysis.

**Table 2:** KMO and Bartlett's Test

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | 0.910 |
|---|---|---|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 5078,917 |
| | Df | 171 |
| | Sig. | .000 |

**Table 3:** Results of Exploratory Factor Analysis

| Factor | Acronym | Scale items | FL | EV | CA |
|---|---|---|---|---|---|
| PU | PU1 | Internet banking is useful. | 0.903 | 3.253 | 0.922 |
| | PU2 | Web 2.0 technologies implemented by the bank save my time and enable me to accomplish my tasks more quickly. | 0.949 | | |
| | PU3 | Internet banking is better for tracking spending. | 0.929 | | |
| | PU4 | Internet banking offers a wide range of banking services and investment opportunities. | 0.821 | | |
| PEOU | PEOU1 | Web 2.0 applications are not complex | 0.862 | 2.406 | 0.876 |
| | PEOU2 | With online banking I don't have to visit the bank. | 0.897 | | |
| | PEOU3 | It's easy to use online banking services for handling my banking transactions | 0.926 | | |
| PR | SR1 | Online banking provides insecure transactions | 0.829 | **3.659** | **0.908** |
| | SR2 | I don't feel secure sending sensitive information across Internet Banking | 0.871 | | |
| | SR3 | I don't feel totally safe providing personal privacy information over the internet banking | 0.895 | | |
| | FR | when I transfer money over the Internet, I'm afraid of losing money because of carelessness such as improper account number entry | 0.825 | | |
| | PR | I'm worried to use online banking because other people may be able to access my account | 0.848 | | |
| ATT | ATT1 | Using online banking has a lot of advantages | 0.945 | 2.672 | 0.939 |
| | ATT2 | Using mobile banking is beneficial | 0.951 | | |
| | ATT3 | Using online banking is a wise / good idea | 0.935 | | |
| INT | INT1 | I would use the online banking for my banking needs | 0.975 | **2.836** | **0.971** |
| | INT2 | Using online banking for handling my banking transactions is something I would do | 0.968 | | |
| | INT3 | I would see myself using the online banking for handling my banking transaction | 0.974 | | |

Note: FL= Factor Loading, EV=eigenvalue, CA= Cronbach's alpha.
PU- Perceived Usefulness, PEOU- Perceived Ease of Use, PR- Perceived Risk, ATT- Attitude, INT- Intention.
Source: survey

In accordance with Hair et al., (2010), only those items with factor loading more than 0.50 and only those factors with Eigen values greater than 1 were retained for further analysis. The items below the threshold value of 0.40 have to be eliminated; therefore, the item "Internet banking is a safe place to transmit sensitive information" was excluded due to its low loading and lack of statistical significance. Concerning the others items, they were all retained. This resulted in the loading of 18 items across five factors. The five factors were namely: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Risk (PR), Attitude (ATT) and Intention (INT).

### 3.3 Confirmatory Factor Analysis (CFA)

Confirmatory Factor analysis (CFA) is considered as one of the most rigorous methodological approaches to testing for the validity of factorial structures within the framework of structural equation modeling (SEM). It is meant to assess the measurement reliability and construct validity of identified factors and also to test the model fitness of the hypothesized model. It has been conducted using AMOS 24.0. The overall model fit was assessed using six goodness-of-fit indices, which are normalized fit index (NFI), comparative fit index (CFI), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), and root mean square residual (RMSR). **Table 4** below shows the results of the structural model of this research, along with the recommended values of

common model fit suggested by Bentler, 1989; Hair et al., 2010; Gefen et al., 2003; Hu and Bentler, 1999. The overall goodness of fit measurement model reflected a fairly good fit with chi-square χ2 (545.250) and Degree of Freedom (128) as suggested by previous research. A comparison of all model fit indices with their respective suggested values provided evidence of a good model fit (**see Table 4**). Therefore, the path coefficients of the structural model were analyzed.

**Table 4:** Fit Statistics (Confirmatory Factor Analysis)

| Fit Statistic | Recommended Value | Obtained | References |
|---|---|---|---|
| Chi-Square | | 545.250 | |
| DF | | 128 | |
| Chi-square significance | *P ≤ 0.05* | <0.0005 | |
| χ2 /df | <5.0 | 2.32 | Bentler, 1989 |
| GFI | >0.90 | 0.90 | Hair et al. 2010 |
| AGFI | >0.80 | 0.86 | Gefen et al., 2003 |
| NFI | >0.90 | 0.94 | Bentler, 1992 |
| CFI | >0.90 | 0.96 | Bentler, 1992 |
| RMSEA | <0.08 | 0.06 | Hu & Bentler, 1999 |

*Note*: χ2/ df- Chi Square/ degrees of freedom, GFI- Goodness of Fit, AGFI - Adjusted Goodness of Fit, NFI- Normed Fit Index, CFI- Comparative Fit Index, RMSEA- Root Mean Square Error of Approximation.

Recommendation as low as 0.80 as a cutoff have been preferred for Normed Fit Index (NFI) (Hooper et al., 2008, p.55)

In order to assess convergent validity, average extracted (AVE) was used. The AVE is the amount of indicator variance that is accounted by the underlying items of construct. It measures the variance extracted by the indices in relation to measurement errors and must be higher than 0.5 to justify using a construct (Barclay et al., 1995), so that latent variables explain more than half of the variance of its indicators (Hair and Anderson, 2010), that is, the average variance shared between each construct and its indicator must be more than the variance shared between that construct and other ones. As seen in **Table 5**, AVE for each construct ranged between 0.729 and 0.945 and all values were above the expected threshold of 0.5. Therefore, the value of CR and AVE, respectively more than 0.60 and 0.50 showing appropriate construct reliability and convergent validity.

### 3.4 Discriminant Validity

**Table 5:** Average Variance and Discriminent Validity

|  | PEOU | PR | PU | ATT | INT | AVE |
|---|---|---|---|---|---|---|
| PEOU | 1 |  |  |  |  | 0.802 |
| PR | 0.049 | 1 |  |  |  | 0.729 |
| PU | 0.636(**) | 0.016 | 1 |  |  | 0.813 |
| ATT | 0.487(**) | 0.031 | 0.554(**) | 1 |  | 0.891 |
| INT | 0.190 | 0.014 | 0.249(**) | 0.348(**) | 1 | 0.945 |

Finally, discriminant validity of the instrument was also confirmed by investigating the correlation of the indicators of different variables in the covariance matrix of AMOS output. The main difference between convergent and discriminant validity is that content validity investigates the correlation of indicators that measure a construct and must be related to each other, on the other hand, discriminant validity tests indicators that must not be related to each other. The results obtained show that square root of AVE are greater than the correlation between the constructs which can be verified in **Table 6** for all constructs. Campell and Fiske (1959) stated that the value of correlation must be less than 85%. Thus, so as to estimate discriminant validity, the correlation between the constructs must be less than 0.85. The correlation coefficient of more than this value indicates that the constructs measure the same concept. Based on these results, we conclude that all the constructs show evidence of discrimination validity. Moreover, cross-loading was also used to assess discriminant validity. It should be lower than the loading of each indicator (Hair & Anderson, 2010). This was analyzed and verified that no indicator has loadings with lower values than their crossing loadings (see **Table 7)** and that the indicators truly represent the intended latent constructs; therefore, the results suggested good convergent validity.

**Table 6:** Cross-loading

|  | PU | ATT | PEOU | INT | PR |
|---|---|---|---|---|---|
| PU1 | **0,903** | 0,700 | 0,695 | 0,445 | -0,086 |
| PU2 | **0,949** | 0,713 | 0,742 | 0,472 | -0,119 |
| PU3 | **0,929** | 0,675 | 0,714 | 0,437 | -0,140 |
| PU4 | **0,821** | 0,590 | 0,724 | 0,446 | -0,110 |
| ATT1 | 0,706 | **0,945** | 0,685 | 0,592 | -0,173 |
| ATT2 | 0,697 | **0,951** | 0,646 | 0,539 | -0,164 |
| ATT3 | 0,704 | **0,935** | 0,643 | 0,539 | -0,160 |
| PEOU1 | 0,692 | 0,553 | **0,862** | 0,317 | -0,271 |
| PEOU2 | 0,733 | 0,672 | **0,897** | 0,447 | -0,123 |
| PEOU3 | 0,715 | 0,642 | **0,926** | 0,400 | -0,207 |
| INT1 | 0,502 | 0,578 | 0,419 | **0,975** | -0,128 |
| INT2 | 0,490 | 0,581 | 0,437 | **0,968** | -0,109 |
| INT3 | 0,463 | 0,562 | 0,415 | **0,974** | -0,105 |
| SR1 | -0,120 | -0,156 | -0,208 | -0,143 | **0,829** |
| SR2 | -0,097 | -0,142 | -0,199 | -0,106 | **0,871** |
| SR3 | -0,109 | -0,192 | -0,198 | -0,114 | **0,895** |
| FR | -0,089 | -0,108 | -0,129 | -0,049 | **0,825** |
| PS | -0,119 | -0,129 | -0,187 | -0,060 | **0,848** |

### 3.5 Structural Model

Since the assessment of construct reliability, indicator reliability, convergent validity, and discriminant validity of the constructs were satisfactory, It was possible to analyze the structural model. The causal relationship between latent exogenous variables and latent endogenous variables were measured through standard coefficients and significance value using AMOS, some hypotheses were confirmed while others were rejected according to the results of the data analysis.

To test the statistical significance of the parameter estimates from SEM, the test statistic is the Critical Value (C.R.), which represents the parameter estimate divided by its standard error (S.E.). Based on a significant level of 0.05, the C.R. needs to be $>\pm1.96$. Below this level, the parameter can be unimportant to the model. Perceived Usefulness was hypothesized to have a positive effect on Attitude. A positive path coefficient (C.R. =5.233, $p<0.001$) between the two constructs provided evidence to support H4b. Hypothesis H4a stated that Perceived usefulness had a positive impact on Intention. The path coefficient between these two constructs (C.R. =9.031, $p<0.001$) provided evidence to support hypothesis H4a. Hypothesis 5a stated a positive relationship between Perceived ease of use and attitude. The path coefficient between the two constructs (C.R. =3.831, $p<0.001$) provided evidence to support H5a. Hypothesis 5b stated a positive impact of perceived ease of use on perceived usefulness. The path coefficient between the two constructs (C.R. =14.924, $p<0.001$) revealed great evidence to support H5b. Hypothesis 6 stated that attitude positively influenced intention to use IB. The path coefficient between these two constructs (C.R. = 6.322, $p<0.001$) provided evidence to support H6.

However, the factor loading on PR-PU was 0.066 (with C.R. =1.552, p=0.121), which was not significant, and thus H7a which stated a negative relationship between PR and PU was not supported. Hypothesis 7b stated a negative influence on attitude. The path coefficient between the two constructs (C.R. =-0.990, $p>0.05$) provided evidence that H7b was not supported. Hypothesis 7c stated a negative influence on attitude. The path coefficient between the two constructs (C.R. =-0.030, $p>0.05$) provided evidence that H7c was not supported.

The results about Perceived Risk were very surprising since PR didn't influence PU, ATT and INT to adopt IB. However, the model reveals a strong and significant

negative covariance between PR and PEOU which was not predicted in the research model. The factor loading on both PR and PEOU is -0.645 with (C.R.=-3.325, p<0.001) which The hypotheses results are shown in **Fig. 2.**

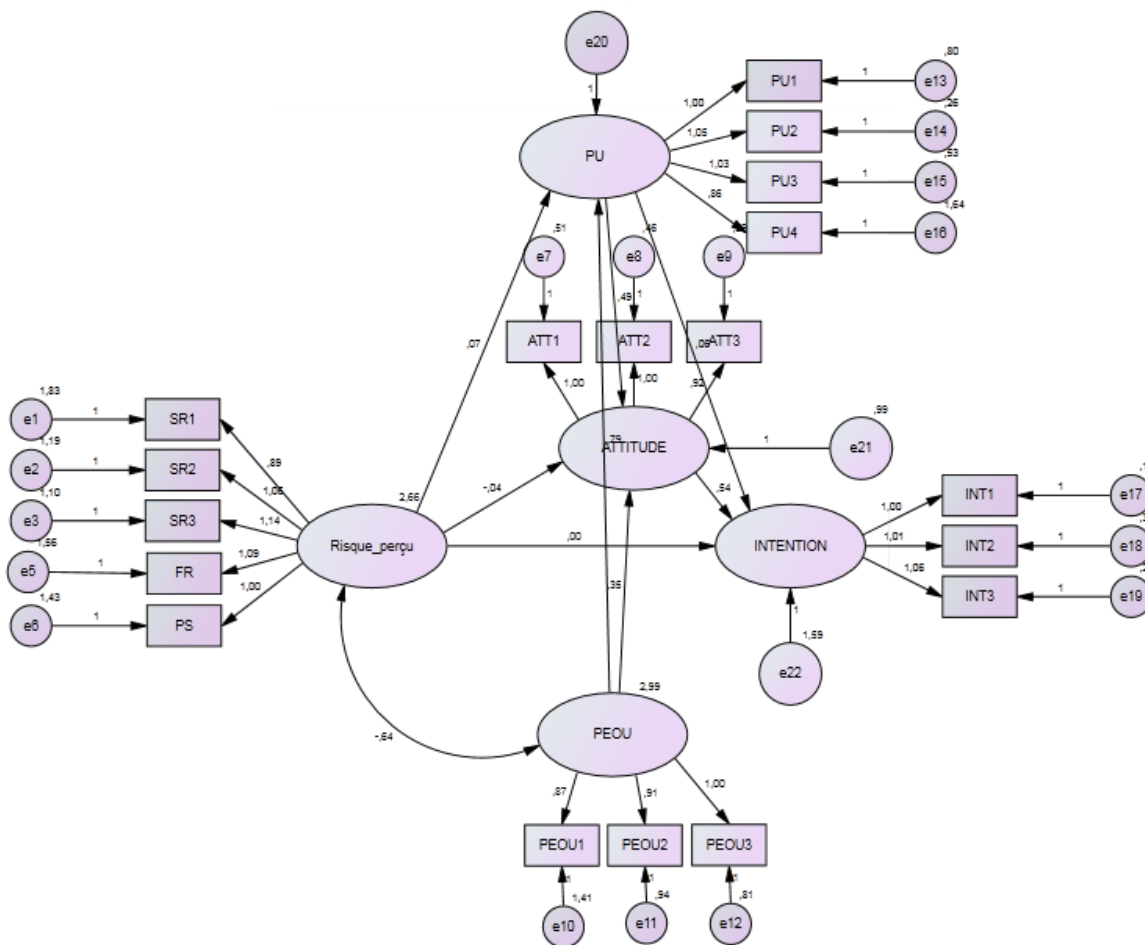is surprising and does not go in line with the results of previous studies.



**Figure 3:** Results of the structural model

$X^2$/ d$f$=2.323, GFI= 0.900, AGFI=0.864, CFI=0.966,
NFI=0.942, RFI=0.930, RMSEA=0.069
*P<0.05
**P<0.01
***P<0.001
Note: dotted line represents no significance

The results of the study concerning the factors influencing Internet banking adoption showed that PU has a significant effect on the Intention to use IB (β=0.480, p<0.001). Besides, PU has an indirect influence, via attitude (β=0.724, p<0.001), on Intention to adopt IB. This result is similar to the finding reported in Taylor and Todd (1995), which indicated that perceived usefulness has both direct and indirect influence on Intention toward system use. Furthermore, PEOU has a significant indirect positive relationship with Attitude towards the use of Internet banking services and the value of the correlation coefficient is found to be (β=0.420. p<0.001)and also has a strong significant relationship with PU correlation coefficient value (β=0.805; p<0.001). In other words, PEOU does not have a direct impact on INT to use, although it affects PU, which in turn leads to greater acceptance of online banking. ATT has a strong direct influence on INT and the value of the correlation coefficient is found to be (β=0.589. p<0.001). The results obtained are consistent with those of Davis 1989; Pikkarainen et al. 2004; and Chen et al. (2003) which

revealed that PU has a direct impact on usage INT and ATT while PEOU has a strong positive impact on PU and Internet banking ATT and thus adoption. Consequently, the results obtained in the current research are in line with the following studies: Davis, 1989; Taylor & Todd 1995. Venkatesh & Davis 2000; Alsamydai, 2014; and Pavlou 2001.

However, as far as Perceived risk is concerned, the results demonstrate that PR has an insignificant negative impact on PU (β=0.06, p>0.05), Attitude (β=-0.04, p<0.05) and Adoption (β= -0.002, p<001).Nevertheless, PR has been revealed to have a significant negative influence on ATT and INT through the mediation of PEOU construct. There is a strong negative relationship between PEOU and PR (β=0.84, p<0.001).This relationship was not predicted in the current research model. This means that the higher the risk of using IB tools, the more complex the technology is perceived, and the willingness to its use. These findings concerning PR are not consistent with prior research.

## 4. Conclusion and Implications

The objective of this research was to investigate the factors that influence Moroccan banking customers to adopt Internet banking services. In this study, both the TAM constructs and Perceived Risk were adopted. The SEM approach was applied to test the hypotheses and investigation the interrelation among constructs. The results of the structural Equation Modeling indicate that usefulness perceived by the Moroccan customer in relation to the potential advantages of online banking services has the greatest influence on customer intention to adopt internet banking services. PU is revealed to be an important factor in determining the adoption of IB among Moroccan banking customers. PU is related to the technology efficiency and effectiveness which means that the Moroccan banking customer's willingness to use IB depends upon their perception of its usefulness. On one hand, IB is useful for customers in terms of convenience and the availability of the services, 24hours a day 7 days a week, without the need for face-to-face interactions. On the other hand, it is useful for the bank as it reduces cost, strengthens bonds with customers, improves communication and increases revenues. Moreover, our findings show that PEOU is the second factor that helps in increasing the adoption of new technologies. It has a significant positive effect on attitude towards using Internet banking which is due to the fact that simplicity, accessibility and convenience enhance job efficiency and performance when using IT. That is, the easier a given IT can be learned or used, the more useful it is considered. In addition, the results indicated another significant direct relationship between attitude (ATT) and Intention to adopt Internet banking (INT). Attitude (ATT) exhibited a significant relationship with Intention towards using IB services which means that using IB is an excellent and wise idea. As far as PR variable is concerns, the results demonstrate that PR has no significant direct relationship with PU, Attitude and Adoption. Nevertheless, PR has been revealed to have significant negative influence on ATT and INT through the mediation of PEOU construct. PR has a significant negative impact on PEOU. That is to say, the higher the risk of using IB tools, the more complex the technology is perceived, and the willingness to its use. The ease of use of IB as an innovative service reduces the negative perception of the risky nature of the service. PEOU primarily reduces the negative effect of perceived risk on attitude and intention to adopt IB services. When Moroccan customers perceive IB services easy and simple to use then their perception of risk is reduced and it doesn't influence directly their ATT and INT to use IB. Nonetheless, these findings concerning PR are not consistent with prior research.

### 4.1 Limitation and Directions for Future Research

This study was conducted in Morocco and concerns Moroccan banking customers with a view to investigating the factors (TAM and PR) that influence customer's adoption of Internet banking. There are further research opportunities that could be developed from this study. Firstly, the model adopted was cross-sectional. It measures perceptions and Intentions at a single point in time; thus, perceptions may change over time as individuals develop their personality and gain new experiences. Therefore, a longitudinal study should be credited to determine users' intention to adopt IB over a long period of time. Secondly; besides TAM and Perceived risk constructs, future research may include more variables such as cultural norms and social influence to provide better results. These variables were found to be important during the investigation because cultural differences have played a crucial role in influencing individuals with respect to how they respond to new technology acceptance.

However, despite the various contributions, the current study is not free from limitations. This work naturally leaves clues and limitations for further research. First, the respondents in the current research belong mostly to the urban areas of Morocco. Further research should include people living in rural areas who face some difficulties concerning access to the Internet and/or poor quality of Internet connection. Second, the respondents in the sampling were highly educated (64% of respondents were Bachelors, Master or Ph.D. holders). Their behavior might differ somehow from the population average. They are generally more technology savvy and faster to adopt new technologies. Moreover, it is highly likely that digital illiterate customers or those who possess little skills and knowledge about computing and Internet would be less motivated to use Internet banking services because of the complexity and risk perceived. Furthermore, as with any research, there should be a great care when generalizing the results of the study. There is a need of a more representative sample to enhance the generalizability of the research conclusions.

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