Internet Banking Adoption: An Empirical Study

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Abstract—**Rejection of Internet banking is one of the most important problems that faces banks in developing countries. So far, very few academic studies have been conducted on internet banking adoption in Arab countries. Hence, this research aims to investigate factors that influence the behavioral intention to use Internet banking in Yemen. Cross-sectional data were collected from 1286 respondents through a survey. Data were then analyzed by structural equation modeling. The findings verified the research hypotheses and confirmed that perceived relative advantages and perceived ease of use, all impact attitude toward the intention of adopting Internet banking. This paper makes a contribution to Internet banking literature by providing insights on the factors that affect Internet banking adoption. The results hint that information about Internet banking services, and its benefits is a critical factor influencing the adoption of Internet banking service. The findings made a contribution in terms of understanding the factors that can contribute to the adoption of Internet banking by Yemeni consumers.**

Keywords—**Internet Banking, Technology Acceptance Model and Structural Equation Modeling**

I. INTRODUCTION

Internet banking is the most advance channel in financial services. Internet banking offers many benefits to banks, as well as to customers. However, when comparing globally, the percentage of Internet banking in Yemen users is not as high in the USA as in other regions of the world. There can be several reasons for this phenomenon. Customer's use of Internet banking requires acceptance of the technology, which can be complicated because it involves the changing of behavioral pattern. Moreover, internet technology could be difficult for some customers understand. Besides that the consumers also need to understand the complex nature of financial services. The combined effect of consumers' understanding of factors could contribute to the acceptance level of the intention of Internet banking usage. Internet banking is relatively new, especially in a Yemeni banking environment [1].

Many banks in Yemen have their own Internet banking system. But unfortunately, the rate of usage of the Internet banking is rather low compared to the European countries and the United States of America. Therefore, Internet banking acceptance is studied by examining the causes behind reluctant customers to use Internet banking. In addition, there is still very limited studies that conducted on Internet banking in Arab countries, in general, and in Yemen, in particular. Therefore, this study attempts to fill this gap.

II. THEORETICAL BACKGROUND

A great deal of research has been conducted to determine factors that influence the adoption of a new technology. Due to a lack of grounded theory in the information technology (IT) field, researchers have turned to models that have been developed in other areas as a foundation for their research. In the case of predicting an individual's intention to adopt IT, information systems (IS) researchers have borrowed intention models from social psychology as the foundation for their research [2]. The following sub-sections discussed on of the most important theories, which serve as a base for the development study model.

A. Technology Acceptance Model (TAM)

After an extensive review of the information systems literature, [3] developed a Technology Acceptance Model (TAM). TAM as it is commonly known was adapted from the theory of reasoned action [4], [5]. TAM has been the most influential theoretical tool for explaining the user acceptance of technology in terms of numbers of the citations it has received [6]. In fact, TAM has been claimed to have become so influential that its pre-eminence has led scholars to discuss whether it has reached a paradigmatic position [7] and led to other important aspects of technology adoption behavior being neglected or unnoticed [8]. TAM views perceived usefulness and perceived ease of use as the most salient beliefs affecting the decision of an individual to adopt new technology.

III. RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

This study aims to provide a theoretically justified research model using TAM factors. Then empirically test the factor's effect on the behavioral intention to use Internet banking services. The research model for this study is shown in Figure 1. The following literature review explains hypotheses and the relationship between variables.

A. Relative Advantage

Relative advantage is defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" [9]. The positive influence of relative advantage on individuals' intention to adopt Internet banking has been found in several previous studies [10], [11]. In this study, we define the relative advantage as the degree to which Internet

banking is perceived as being better than the idea it supersedes. Therefore, we posited that:

H 1: Perceived relative advantage of using Internet banking positively affects the attitude toward using the technology.
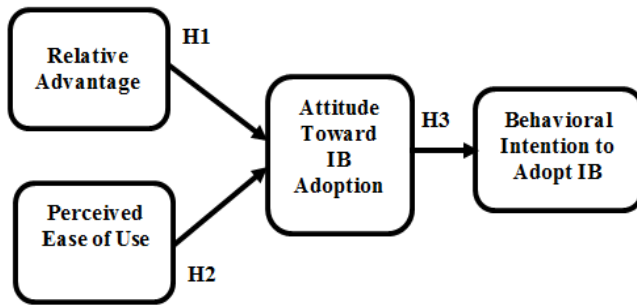

Figure 1.   The proposed model

B.   Perceived Ease of Use

Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free from effort" [3]. Perceived ease of use was found to influence the adoption of Internet banking service [12], [13], [14]. Generally, when a system is found to be easy to use, users will have the intention to use the system. Here, we define ease of use as the extent to which customer' use of Internet banking services is perceived as easy or effortless. Accordingly, we hypothesize that:

H 2: Perceived ease of use of using Internet banking positively affects the attitude toward using the technology.

C.   Attitude

Attitude is defined as "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" [15]. The effect of attitude on intention has been confirmed in the Internet banking domain [16], [17], [18], [19], [20], [21]. It can be concluded that, the attitude has played a significant role in influencing an individual's intention to adopt new technology. Therefore, the following hypothesis is presented:

H3: Attitude about Internet banking positively affects the intention to use the technology.

IV.   RESEARCH METHODOLOGY

A.   Instrument Development

The instrument was designed to evaluate a strength of the relationship. Items to measure behavioral intention, attitude, were generated based on the procedures suggested by [4], [19] containing five items for intention and four items for attitude. Items to measure the relative advantage was adapted from the measurements developed by [18], containing four items. Items to measure perceived ease of use was adapted from the measurements developed by [3], containing four items. All items designed based on a seven-point Likert's scales, ranging from ''disagree strongly'' (1) to ''agree strongly'' (7).

B.   Participants and Data collection

Participants in the study were bank customers who have never used the Internet banking service at four banks that provide the Internet banking service in Yemen. A personally-administered questionnaire method was employed for the survey. The questionnaire was distributed at four banks in Yemen. A total of 1500 questionnaires were distributed in this study. One thousand and four hundred forty-six (1446) questionnaires were returned, indicating a 96.4 percent rate of return. The final count for this study was 1286 cases after excluding incomplete questionnaires, responses from users of Internet banking, missing data and outliers. Eighty-five percent (85%) of the respondents were male and 15% were female. In terms of age the respondents 16% were in the 18-24 age group, 33% were 25-34 in age, 16% were 35-44 in age and 20% were 45-54. Few were under the age of 18, or over 55. It can also be observed that the majority of the sample holds a Bachelor qualification 31%, followed by Diploma holders 25%, and Ph.D (14%).

V.   ANALYSES AND RESULT

The two-step procedure of structural equation modelling (SEM) in analyzing the collected data was employed in this study as suggested by [22]. First, we examined the measurement model to measure reliability and validity. Then, we examined the structural model to investigate the strength and direction of the relationships among the theoretical constructs.

A.   Measurement model

A confirmatory factor analysis (CFA) using AMOS version 18 package was used to test the measurement model. As shown in Table 1, all individual measurement model indices exceed their respective common acceptable levels recommended by previous researchers, thus demonstrating that the measurement model posited a good fit with the data collected [23], [24].

TABLE I.   MEASURE OF THE MODEL FIT

Goodness of Fit Measures	Recommended Value	Measurement Model	Structural Model
X2/df	>1 and < 5	2.040	2.436
GFI	≥ 0.90	0.944	0.886
NFI	≥ 0.90	0.952	0.943
IFI	≥ 0.90	0.959	0.948
TLI	≥ 0.90	0.966	0.941
CFI	≥ 0.90	0.959	0.947
RMSEA	< 0.08	0.056	0.061

The measurement quality of these reflective instruments was assessed based on their convergent validity, reliability, and discriminant validity. Convergent validity is suggested if factor loadings (FL) are 0.60 or higher [22]. As shown in Table 2, all indicators exceed recommended threshold of 0.6. Thus, convergent validity was established. We then assessed the reliabilities of all latent constructs using Cronbach alpha (CA), composite reliability (CR) and average variance extracted (AVE). A scale is considered reliable if it has CA

and CR above 0.7 and AVE above 0.5 [22], [24]. As shown in Table 2, all the scales were reliable. Regarding, discriminant validity the result of AVE is well above 0.5 and is significant at $p = 0.001$. The correlations between items in any two constructs should be lower than the square root of the average variance shared by items within a construct. Based on the result in Table 2 and 3, discriminant validity is supported for all constructs. In brief, the measurement model demonstrated adequate reliability and validity.

TABLE II. CRONBACH'S ALPHA, COMPOSITE RELIABILITY AND AVERAGE VARIANCE EXTRACTED

Code	Variable	Range Factor Loading	CA	CR	AVE
RA	Relative Advantage	0.91-0.96	0.92	0.93	0.75
EU	Perceived Ease of Use	0.81-0.94	0.93	0.94	0.83
AT	Attitude	0.88-0.93	0.90	0.91	0.75
IN	Behavioral Intention	0.85-0.95	0.91	0.92	0.82

CA= Cronbach's alpha, CR= Composite reliability, AVE= Average variance extracted

TABLE III. DISCRIMINANT VALIDITY

Construct	RA	EU	AT	IN
RA	0.867			
EU	0.440	0.898		
AT	0.141	0.498	0.892	
IN	0.632	0.319	0.309	0.863

Note: Diagonal elements are square roots of the average variance extracted

B. Structural model

In the second step of the structural equation model, we run CFA to test structural model. Table 5 present structural model test results. From Table 2, it can be clearly seen that model's key statistics are very good. We can thus safely conclude that the model is valid, and we can continue to analyze the outcome of the hypothesized effects.

C. Results of hypothesis testing

The results of this study provide support for the research model presented in Figure 1 and for the hypotheses regarding the directional linkage between the model's variables. The parameter unstandardized coefficients and standard errors for the structural model are shown in Table 4. All paths were significant. In addition, the explanatory power of our research model is estimated that the predictors of behavioral intention explain 56.7 percent of its variance. In other words, the error variance of behavioral intention is approximately 43.3 percent of the variance of behavioral intention itself. Several insightful results could be summarized from our research framework, and these are presented below.

VI. DISCUSSION AND IMPLICATIONS

Table 4 shows that relative advantage ($\beta = 0.174$, $p < 0.001$) has a direct positive and significant effect on customers' attitude. Thus, H1 is supported where individuals believe that it is convenient to use Internet banking services and also efficient to use it. The significant effect of the perceived relative advantage on attitude is not surprising given the fact that the extrinsic benefits of using Internet

banking are numerous. Banks should publicize these benefits to create a positive attitude among its customer towards Internet banking.

TABLE IV. REGRESSION WEIGHTS

Independent	Path	Dependent	Estimate	S.E.	C.R.	P
RA	→	AT	0.174	0.019	3.974	***
EU	→	AT	0.236	0.025	9.723	***
AT	→	IN	0.706	0.023	30.887	***

Findings in Table 4 also confirmed that perceived ease of use ($\beta = 0.236$, $p < 0.001$) has significantly influenced individuals' attitude toward behavior intention to use Internet banking service. Hence, H2 is verified. The positive attitude to use Internet banking services is due to the reasons that individual's learned to use Internet banking quickly and unearth that it is easy to use it.

The final hypothesis, H3 proposed that attitude will have a positive effect on behavioral intention to use Internet banking services. H6 was also supported as ($\beta = 0.706$, $p < 0.001$). The attitude had a strong positive and highly significant influence on Intention to use Internet banking services. Encouragingly, banks' customers believe that using the Internet banking would be a pleasant experience for them, as it is a good idea. They would be able to use the Internet banking well because they have the resources, knowledge and ability to use it successfully.

VII. CONCLUSION

This paper has examined the relationship between perceived relative advantage, perceived ease of use, attitude and customers' intention to use Internet banking service. The results provide evidence for the theoretical model embracing TAM. The results support the view that perceived relative advantage and perceived ease of use are predicting variables. They have played a significant role in influencing individuals' attitudes toward adoption of Internet banking. At the same time, the result showed that attitude has a significant and positive effect on individuals' intention to adopt Internet banking services. All hypotheses were supported. As it is clear from the key fit statistics, the model testing yielded a set of fit indices with an overall well-fit, indicating that the model fitted well with the data. The results of hypothesis testing provide satisfactory support for the TAM through the SEM analysis. Overall, the results indicate that the model provides a good understanding of factors that influence the intention to use Internet banking. The model explains approximately 56.7 % of the variance on the individuals' behavioral intention.

VIII. LIMITATIONS AND FUTURE STUDIES

There are several limitations in this study. Firstly, this study has examined only the determinants of behavioral intention. Although beyond the scope of this research, future study can enhance the research model, and include the determinants of re-intention or continue of using new

technology. Secondly, our research is conducted specifically in Yemen. However, it would be interesting to test this model in other countries and compare the results with this study. Such cross comparison studies would allow us to have a better understanding of the factors that affect Internet banking adoptions. Thirdly, there are various activities available to customers when using Internet banking, e.g. transfers between accounts, check balances, conduct financial transaction and, etc. An investigation into these specific activities instead of adoption will bring this research to the next stage, which allows Internet banking providers to understand the factors that affect the usage of specific Internet banking activities. Fourthly, future study can also consider using the demographic variables in this research as control variables and compare the effects with the ones found in the present research.

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