A study on user behavior and acceptance of electronic banking services

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Abstract—**This paper presents a study which investigates user behavior towards electronic banking (e-banking) and particularly in internet banking based on behavioral theoretical models and scales such as the theory of planned behavior (TPB), the diffusion of innovations theory, the technology acceptance model (TAM) and Kirton's adaptor-innovator scale (KAI). In this study, behavioral and personality patterns lead to certain hypothesis regarding adoption towards internet banking. In addition, we categorize the most important factors affecting e-banking and propose the use of dependencies among different factors within the e-banking infrastructure in order to assess potential impacts and risks.**

Keywords: electronic banking, internet, user behaviour, information security

I. INTRODUCTION

With the banking industry becoming fragile amid recession, banks are looking for channels that can offer their range of products and services to a wider scope of customers, with minimum effort, added value and maximum security. In this effort, electronic banking (e-banking) provide convenient mediums (e.g. telephone banking, ATM's, phone banking, etc) for individuals and organizations to help manage financial transactions. One of the most popular channels of distribution to be used in the financial services industry is internet banking, which was introduced in the mid 1990s and is thereafter steadily becoming a mainstream channel [2].

Internet banking provides an alternative for faster delivery of banking services compared to the traditional user-bank relationship. According to [8], internet banking refers to the deployment over the internet of retail and commercial banking services with individual and corporate clients including bank transfers, payments and settlements, documentary collections and credits, cards business and others. Additionally, internet banking can mean the provision of information about the bank and its products via a page on the World Wide Web. The potential competitive advantage of the Internet for banks lies in the areas of cost reduction and satisfaction of consumer needs [6].

In this paper, due to ongoing security challenges, the varying nature of human behavior and the lack of sector-specific dependencies, we study behavioral patterns based on theoretical models and scales in order to determine hypothetical rules that determine adoption towards internet banking and e-banking in general. Moreover, based on the assumptions made from analyzing behavioral models and the variety of factors that influence internet banking adoption, we categorize user determinants towards adoption of e-banking services in order to set the base for future assessment of the dependencies, within the e-banking sector infrastructure, when an impact occurs.

II. INTERNET BANKING ADOPTION BASED ON THEORETICAL MODELING

Previous literature has mainly focused on the adoption of electronic banking among users, thus there is still little evidence on key factors that affect particularly the internet banking channel adoption. Based on two main behavioral theories that influence the concept of internet banking; the theory of planned behavior (TPB) [1] and the diffusion of innovations theory [19], the combined theoretical framework assumes that a person's intention to adopt internet banking is determined by three factors. These are: (1) attitude, which describes a person's perception towards internet banking; (2) subjective norms, which describes the social influence that may affect a person's intention to use internet banking; and (3) perceived behavioral control, which describes the beliefs about having the necessary resources and opportunities to adopt internet banking. Further analysis of each of the above parameters will lead to certain hypothesis as far as adoption of internet banking among users is concerned.

A. Attitude

Attitude is defined as an individual's positive or negative feelings about performing a target task [7]. A review on the literature will picture the different dimensions of attitudinal belief towards an innovation. Internet banking, perceived as an innovation channel, has attributes that shape its environment. Hence, certain rules abide by:

TABLE I .HYPOTHESIS RULES BASED ON ATTITUDE

Rule 1: The greater the perceived relative advantage of using electronic banking services, the more likely that internet banking will be adopted [25].
Rule 2: The greater the perceived compatibility of internet banking with an individual's values, the more likely that internet banking will be adopted [24].
Rule 3: The greater the experience with using the internet, the

more likely that internet banking will be adopted [19].
Rule 4: The greater the use of banking products and services, the more likely that internet banking will be adopted [23].
Rule 5: The lower the perceived complexity of using internet banking, the more likely that internet banking will be adopted [3].
Rule 6: The greater the trialability of internet banking, the more likely that internet banking will be adopted [19].
Rule 7: The lower the perceived risk of using internet banking, the more likely that internet banking will be adopted [16].

B. Subjective norms

Subjective norms refer to "the person's perception that most people who are important to him think he should or should not perform the behavior in question" [7, (p. 302)]. The same author suggests that the adopter's friends, family, and colleagues/peers are groups that will potentially influence the adoption. Hence:

TABLE II. HYPOTHETICAL RULES BASED ON SUBJECTIVE NORMS

Rule 8: The beliefs associated with subjective norms are significantly related to an individual's intention to adopt internet banking.
Rule 9: The surroundings of an individual (e.g. relatives, friends, colleagues)influence the adoption of internet banking.

C. Perceived behavioral control

Perceived behavioral control refers to the factors that may impede the performance of a behavior. This definition encompasses two components. The first component is "self-efficacy" and is defined as an individual's self-confidence to perform a specific type of behavior. The second component is "facilitating conditions" and it reflects the availability of resources needed to engage in a potential behavioral activity. Hence:

TABLE III. HYPOTHETICAL RULES BASED ON PERCEIVED BEHAVIOUR CONTROL

Rule 10: The greater the self-efficacy toward using internet banking, the more likely that internet banking will be adopted.
Rule 11: The greater the extent of perceived technological support for internet banking, the more likely that internet banking will be adopted.
Rule 12: The greater the extent of perceived government support for electronic commerce, the more likely that internet banking will be adopted [9].

Apart from the two theories; the theory of planned behavior and the diffusion of innovations theory, research on the factors derived from the technology acceptance model (TAM) will help the analysis towards behavioral characteristics on internet banking adoption [4]. TAM is based on the theory of reasoned action (TRA), which is concerned with the determinants of consciously intended behaviors. TAM is also based on the assumption that consumers' behave rationally, collect, and evaluate systematically all the available information. This model determines the perceived usefulness (PU) and perceived ease of use (PEOU) relating to the attitude toward actual behavior. Perceived usefulness (PU) refers to the prospective user's subjective likelihood that the use of a certain application will increase the individual's performance. In addition, perceived ease of use (PEOU) is defined as the degree to which the prospective user expects the potential system to be free of effort. Reference [14] found that TAM's ability to explain attitude toward using an information system is better than other model's such as TRA and TPB. Hence:

TABLE IV. HYPOTHETICAL RULES BASED ON TAM

Rule 13: Perceived usefulness (PU) has a positive effect on consumer acceptance of internet banking.
Rule 14: Perceived ease of use (PEOU) has a positive effect on consumer acceptance of internet banking.

D. Individual characteristics

Personality traits are variables that are based on individual differences that may have an impact upon channel choice. Kirton's adaptor-innovator inventory [26] is a stable and reliable scale that explains individual differences towards the adoption of innovative channels such as the internet banking. This approach supports that all payment transactions are not equal, suggesting that the channel choice decision is dependent upon customer preferences and individual characteristics. Demographic variables that influence the adoption and use of e-banking services include age, sex, income, level of financial assets and education. These variables (H1, H2...Hf) support evidence on potential adoption of electronic banking services and indicate differences and similarities in an individual's behavior. Hence:

TABLE V. DEMOGRAPHIC VARIABLES

Age (H1a, b)
H1a. Younger individuals are more likely to adopt e-banking.
H1b. Married households are more likely to adopt e-banking.
[12]
Sex (H2)
H2. Men rather than women are more likely to adopt e-banking.
[12]
Income and level of financial assets (H3a, b, c, d)
H3a. Individuals with higher incomes are more likely to

adopt e-banking.
H3b. Individuals with higher net worth are more likely to adopt e-banking.
H3c. Individuals with expectations of higher incomes in the future are more likely to adopt e-banking.
H3d. Individuals with a larger economic activity are more likely to use e-banking than persons with lower economic activity.
[11]
Education (H4)
H4. Individuals with higher levels of education are more likely to adopt e-banking.
[17]
Minorities (H5)
H5. Minorities are less likely to adopt e-banking.
[21]

III. Factors Affecting the Adoption of Internet Banking

Consumer attitudes are among the most major factors influencing buying behavior and have, therefore, attracted considerable attention from various researchers probing the behavior of bank customers and their relationship with financial institutions. Reference [11] found that attitude towards e-banking and actual behavior was influenced by prior experience of computers and technology as well as attitudes towards computers. Evenmore, [13] found that individual expectations regarding accuracy, security, transaction speed, user-friendliness, user involvement, and convenience were the most important quality attributes in the perceived usefulness of internet-based banking. Among these, the first five determined the willingness to use by consumers. Parallel findings came from [15] who studied the behavior of established bank customers in the United Kingdom and concluded that ease of banking and convenience were the two important expectations. However, the main barrier was seen as security, privacy and electronic trust concerns [20].

Reference [18] found that people have a weak understanding of e-banking security risks although they are aware of the risks. Fact is that although consumers' confidence in their bank was strong, their confidence in technology was weak [10]. Users want to control what kind of data is collected, for what purposes, how long data is recorded for, how and for what purposes their data is processed. Gathering and recording user data without consumers' awareness is one of a major concern [5].

The authors believe that all the referred factors that shape the electronic banking environment are dependent and correlated with each other. For example, if a security violation occurs due to a loss of integrity during an internet banking transaction then the source of impact influences all the other parameters of user acceptance towards electronic banking services such as the expected user experience, user's convenience etc. This type of influence may also have impacts to other channels within the electronic banking environment such as ATM's or mobile banking. The idea of using dependencies to examine whether a product or service will perform the initial identification is also supported by experts [22]. As shown from literature and behavior modeling and without loss of generality the most important determinants of user acceptance towards electronic banking can be summarized in the table below.

TABLE VI. MAJOR FACTORS AFFECTING USAGE OF ELECTRONIC BANKING SERVICES

Determinants of user acceptance towards electronic banking services	Explanation
Perceived Credibility	Refers to the objectivity, competence, and reputation of the service operator under which e-banking services are provided.
Perceived Information Risk	Refers to the information security triad (integrity, confidentiality, availability), e-trust, threat, vulnerability and privacy issues.
Expected User Experience	Refers to the expected transaction speed and accuracy of actions, the end-user interaction and the level of usability.
Expected Convenience	Refers to the accessibility, flexibility and usefulness of the e-banking experience.
Expected User Friendliness	Refers to the added user value, simplicity and communication effectiveness.

Important is to distinguish the difference between similar words with different meaning such as usability and usefulness. In this context we refer to usability as a quality attribute that assesses how easy user interfaces are to use and is a necessary condition to determine user experience [26]. Usefulness is concerned with the functionality characteristics and is expected to optimize user performance. Reference [19] stated that usefulness refers to valuable services and products that enhance user convenience.

IV. Conclusions

In this paper we came up with certain hypothesis about e-banking and internet banking in particular based on the requirements from related behavioral modeling and scales. Furthermore, we determined the major factors that influence user acceptance towards e-banking services and addressed the issue of dependencies among different factors when an impact occurs. As for future work, we plan to provide more detailed and sector-specific impact scale, assess the dependencies of the e-banking sector on economic terms and reflect how factors may interact

with each other in order to protect the whole banking sector from common sector-wide security threats and improve the adoption rate among liable e-banking users.

REFERENCES

[1] I. Ajzen, "From intentions to actions: a theory of planned behavior, in action control: from cognition to behaviour", J. Kuhl and J. Beckmann (eds.), New York: Springer-Verlag, pp.11-39, 1985.

[2] F. Allen, J. McAndrews, and P. Strahan, "E-finance: an introduction", Working Paper, No. 01-36, Financial Institutions Center, Wharton University, Philadelphia, 2001.

[3] R. B. Cooper, R. W. Zmud, "Information technology implementation research: a technological diffusion approach", Management Science, Vol.36, No.2, pp. 123-139, 1990.

[4] F.D. Davis, R.P. Bagozzi, and P.R. Warshaw, "User acceptance of computer technology: a comparison of two theoretical models", Management Science, Vol. 35, No. 8, pp. 982-1003, 1989.

[5] J. Devlin, "Technology and innovation in retail banking distribution", International Journal of Bank Marketing, Vol. 13, No. 2, 1995.

[6] S. Elliot, C. Loebbecke, "Interactive, inter-organisational innovations in electronic commerce", Information Technology & People, Vol. 13, No.1 pp. 46-67, 2000.

[7] M. Fishbein, I. Ajzen, "Belief, attitude, intention, and behaviour: an introduction to theory and research", Reading, MA.: Addison-Wesley. 1975.

[8] K. Furst, W. W. Lang, D. E. Noelle, "Internet banking", Journal of Financial Services Research, Vol. 22, No. 1/2, pp. 95-117, 2002.

[9] T Hill, N. D. Smith, M. F. Mann, "Communicating innovations: convincing computer phobics to adopt innovative technologies, Advances in Consumer Research, Vol. 13, pp. 419-422, 1986.

[10] B. Howcroft, R. Hamilton, P. Hewer, "Consumer attitude and the usage and adoption of home-based banking in the united kingdom", The International Journal of Bank Marketing, Vol. 20, No. 3, pp. 111-21, 2002.

[11] H. Karjaluoto, M. Mattila, T. Pento, "Factors underlying attitude formation towards online banking in finland", International Journal of Bank Marketing, Vol. 20, No. 6, pp. 261-272, 2002.

[12] A.B. Kennickell, M.L. Kwast, "Who uses electronic banking?" results from the 1995 Survey of Consumer Finances. Paper presented at the Annual Meeting of the Western Economic Association, Seattle, 1997, Retrieved 9th March 2010 from <www.federalreserve.gov/pubs/feds/1997/199735/199735pap.pdf>

[13] Z. Liao, M. T. Cheung, "Internet-based e-banking and consumer attitudes: an empirical study", Information & Management, Vol. 39, No. 4, pp. 283-95, 2002.

[14] K. Mathieson, "Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior", Information Systems Research, Vol.2, No.3, pp. 173-91, 1991.

[15] L. Moutinho, A. Smith, "Modelling bank customer satisfaction through mediation of attitudes towards human and automated banking", International Journal of Bank Marketing, Vol. 18, No. 3, pp. 124 – 134. 2000.

[16] L. E. Ostlund, "Perceived innovation attributes as predictors of innovativeness", Journal of Consumer Research, Vol.1, pp. 23-29, 1974.

[17] T. Pikkarainen, K. Pikkarainen, H. Karjaluoto, S. Pahnila, "Consumer acceptance of online banking: An extension of the technology acceptance model", Internet Research, Vo.14, No.3, pp. 224-235, 2004.

[18] G. Roboff, C. Charles, "Privacy of financial information in cyberspace: banks addressing what consumers want", Journal of Retail Banking Services, Vol. 10, No. 3, pp. 51-6, 1998.

[19] E.M. Rogers, "Diffusion of Innovations", 3rd ed., The Free Press. New York, NY, 1983.

[20] S. Rotchanakitumnuai, M. Speece, "Barriers to internet banking adoption: a qualitative study among corporate customers in thailand, International Journal of Bank Marketing, Vol. 21, No. 6/7, pp. 312-23, 2003.

[21] R. Sannes, "Self-service banking: value creation models and information exchange". Informing Science, Vol.4, No.4, pp.139–148, 2000.

[22] R. Setora, S. De Porcellinis, M. Srofna, "Critical infrastructure dependency assessment using the input-output inoperability model", International Journal of Critical Infrastructure Protection, Vol. 1, No.4, pp 170-178, 2009.

[23] M. Tan, T. Teo, "Factors influencing the adoption of internet banking, Journal of the Association for Information Systems, Vol.1, No.5, pp. 6-42, 2000.

[24] S. Taylor, P. A. Todd, "Understanding information technology usage: a test of competing models", Information Systems Research, Vol.6, No.2, pp. 144-176, 1995.

[25] L. G. Tornatzky, K. J. Klein, "Innovation characteristics and innovation adoption-implementation: a meta-analysis of findings", IEEE Transactions on Engineering Management, Vol.29, No.1, pp. 28-45, 1982.

[26] J. Nielsen, "Usability for the masses", Journal of Usability Studies, Issue 1, Vol 1, November 2005, pp. 2-3.

[27] M. J. Kirton, "Adaptors and innovators: styles of creativity and problem-solving" London: Routledge, 1989.