

行政院國家科學委員會專題研究計畫 成果報告

網路銀行採用行為之群體差異-以具有交叉作用的分解式計 劃行為理論為主 研究成果報告(精簡版)

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行政院國家科學委員會補助專題研究計畫 成果報告

網路銀行採用行為之群體差異-以具有交叉作用的分解式計劃行為理論為主

Group difference in consumer adoption behavior for Internet banking-
based on decomposed Theory of Planned Behavior with crossover

計畫編號：NSC 95-2416-H-216-009

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摘要

為了要順應金融自由化以及台灣加入世界貿易組織這種競爭情勢，國內銀行也漸漸地加速並且藉由網路銀行、電話以及其它的數位媒體來建立新的服務平台，以符合顧客需要。本研究則希望能夠從消費行為的觀點，以「計劃行為理論」為基礎，希望藉由瞭解影響使用者採用網路銀行的因素，進而提供銀行業在擴展網路銀行時的行銷策略建議。本研究計畫的成果包含如下：(1) 研究影響使用者採用網路銀行態度之相關因素；(2) 瞭解使用者採用網路銀行的主觀規範；(3) 瞭解使用者採用網路銀行的知覺行為控制；(4) 以「計劃行為理論」以及「具有交叉作用的分解式計劃行為理論」與分別加入網路特質相關的品質屬性的修正性理論等模式來比較使用者採用網路銀行意願上的差異情形；(5) 瞭解性別群體在各個模式中的影響力以及差異性。

關鍵字：網路銀行、網路品質屬性、計劃行為理論、群體差異、結構方程模式

Abstract

With the internationalization of the financial market and the entrance of Taiwan into WTO, the banks face dual competitive in service quality and administrative efficiency. To

accommodate themselves to the changed situation, banks provide services via Internet and digital media to fit customers' needs. This study is to know the possible factors in terms of Theory of Planned Behavior (TPB) and to involve the network characteristics to discuss the consumer adoption intention of Internet banking. The analytical results of project mainly investigates the consumer adoption intention and actual behavior of Internet banking, the research directions are listed as follows: (1) to study what factors will effect customers' attitude; (2) to know the factors of subjective norms; (3) to know the factors of perceived behavior control; (4) the verify four models fitting, those are Theory of Planned Behavior, Decomposed Theory of Planned Behavior with Crossover and combined network characteristics with each other; (5) to explore the group difference between those models.

Keyword : Internet banking, network quality attributes, Theory of Planned Behavior, Group difference, Structural equation modeling.

1. Background and research objective

Following Taiwan's entry into the World Trade Organization (WTO), foreign banks will enter the island's domestic market and bring with them the advantages of capital and financial innovation. Banks in Taiwan are thus facing dual competitive pressure in the areas of service quality and administrative efficiency. To cope with the increasing competition and government financial liberalization, Taipei Bank has accelerated the establishment of new communication networks via Internet banking, telephone centers and other digital channels.

Internet banking is a new type of information system that uses the innovative resources of the Internet and WWW to enable customers to effect financial activities. Liao, et al. (1999) identified the virtual bank as a "non-branch bank" and virtual banking as the provision of services via electronic media such as ATM, telephone, or the Internet.

One advantage of banks going online is the potential savings in the cost of maintaining a traditional branch network. 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. Previous studies have shown that IT has helped banking organizations. For instance, a recent study of the US retail banking sector showed that the transaction costs of telephone banking are only 40% of those of providing the same service via physical branches (Talmor, 1995).

Although Internet banking may help banks to reduce costs, there are important considerations, such as, the extent to which retail bank customers adopt new forms of banking, that is, the factors that influence intention toward adopting another form of banking and adoption differences between different forms of banking. These considerations are very important to the practitioners who plan and promote new forms of banking in the current competitive market.

Accordingly, Liao and Cheung (2002) presented empirical estimates to predict the marginal effects of the factors underlying perceived usefulness and willingness to use, and the substitutability between them. Additionally, Howcroft et al. (2002) obtained a better understanding of consumer attitude towards home-based services, i.e. telephone and Internet banking. Sohail and Shanmugham (2003) examined the factors that influence the adoption of Internet-banking and investigated whether Internet users and others differed in terms of these factors.

Research into customer acceptance of Internet banking has thus improved understanding of what beliefs lead customers to use the facility and demonstrate how the beliefs influence Internet bank customer behavior. For example, Suh and Han (2002) conducted an investigation based on the TAM. They proposed a further aspect of belief, that of trust, to enhance understanding of that acceptance. They claimed TAM as an appropriate model for explaining acceptance in the context of Internet banking.

Further examples are provided by Liao et al. (1999) and Tan and Teo (2000). They used the theory of planned behavior (TPB) and innovation diffusion to study intention toward adopting Internet banking in an international financial city. In those studies, Liao et al. postulated that the TPB only partly explained relationships, in that behavioral intention is a function of attitude and subjective norm. In a further step, an additional construct, that of perceived behavioral control, is included in the TPB model to account for situations where individual cannot completely control their behavior (Ajzen, 1985, 1991; Ajzen and Madden, 1986). Since behavioral intention may not be reflected in actual use, this paper also examined the relationship between intended and actual use. Models are compared using data from a survey of approximately 425 consumers considering a decision to adopt and use Internet banking. We use the Structural Equation Modeling (SEM) approach to validate the research model. The theoretical and managerial relevance of the models are then discussed.

2. Related works

2.1 Network quality attributes

1. Information quality

The proliferation of the web potential for business, together with its profuse customer information has offered an alternative sales channel for a growing number of firms. Research has demonstrated that operational precision is a significant quality consideration in products and services involving computer technology

(Davis et al., 1992). Since the Internet has become a major area for marketing and transactions, individuals would expect accuracy in the information they receive on the Internet. This study introduced a Likert seven-point semantic differential scale with four items to measure the importance to users of: (a) providing correct information; (b) providing complete information; (c) rapidly updating information; and (d) belief in the information provided.

2. Transaction speed

The advent of web technology constitutes a new medium of commerce which puts the customer in a position to directly and quickly interact with the web services of the bank and never communicate with any employees. According to Lin and Lu (2001), despite the popularity of the Internet, many people resist using the Internet due to low response time arising from poor Web site designs and heavy traffic loads. Turban et al. (2000) also indicated that Internet banking could respond to complaints more quickly. Three attributes included: (a) faster than branch banking; (b) efficient interactions; and (c) quick response. These were used in terms of a seven-point Likert scale, to measure the importance of attributes to users.

3. User-friendliness

The Internet has already built up a critical mass (Timmers, 1999), which attracts not only more users but also providers. Therefore, from

the viewpoint of technology, ease of use is generally considered an important quality attribute in technical computer services (Davis et al., 1989; Liao and Cheung, 2002). Accordingly, transactions conducted via traditional branch banking only involve communication with operators, increasing the importance of issues like ease of resource use and available help information. Obviously, user-friendliness sheds some light on the behavior intention of Internet banking. A Likert seven-point semantic differential scale was used to measure this quality attribute and was applied to the following three items: (a) clear and easy-to-follow instructions; (b) comprehensive HELP menus; and (c) simple operating procedures.

4. Security

Instead of a direct physical experience with the services or products, the virtual nature of the web medium seeks to retain traditional customer trust by graphic display. Van Slyke and Belanger (2003) pointed out that in e-business, security must go both ways: (1) the user identity needs to be verified so the merchant knows this is a legitimate user; and (2) the merchant identity must be verified so the user knows the merchant is legitimate. According to Parasuraman et al. (1988), Van Gorder (1990) and Liao and Cheung (2002), reliability is essential to product or service quality. A seven-point Likert scale was used as the response format. The respondents were queried on how closely this attribute agreed with: (a) authorization; and (b) security awareness of Internet banking.

2.2 Model explanation

This study postulates on the bases of the TPB and the diffusion of innovations theory that an individual's intention to adopt Internet banking is determined by three factors – attitude, subjective norm and perceived behavioral control (Rogers, 1983). Two alternative models –the TPB and the decomposed TPB, primarily adapted from Taylor and Todd (1995) - are here examined and compared.

Model 1: Theory of Planned Behavior

The TPB (Ajzen, 1985, 1991; Mathieson, 1991) is an extension of the well-known TRA (Fishbein and Ajzen, 1975). Both the TRA and the TPB assert that behavior is a direct function of behavioral intention. With the TRA, that intention is modeled as the weighted sum of attitude and subjective norm (Fishbein and Ajzen, 1975).

Like the TRA, the TPB postulates that behavioral intention is a function of attitude and subjective norm. For our empirical case of Internet banking, the control belief refers to knowing how to perform transactions via Internet banking (self-efficacy; Bandura, 1977) and facility refers to externally based resource constraints, such as time, money and resources. The key role of these factors reflects the perceived difficulty (or ease) with which the behavior may be effected (Ajzen, 1991).

Model 2: Decomposition TPB

Taylor and Todd (1995) indicated that a better understanding of the relationships between the belief structures and antecedents of intention requires the decomposition of

attitudinal beliefs. Shimp and Kavas (1984) argued that the cognitive components of belief could not be organized into a single conceptual or cognitive unit. Taylor and Todd (1995) also specified that, based on the diffusion of innovation theory, the attitudinal belief has three salient characteristics of an innovation that influence adoption is relative advantage, complexity and compatibility (Rogers, 1983). Taylor and Todd (1995) showed that the decomposed model of the TPB has better explanatory power than the pure TPB and TRA models. So, the argument of our empirical study is that Internet banking is a technological innovation and thus the decomposed TPB model gives a more satisfactory explanation of adoption intention.

3. Research methodology

3.1 Subjects

To determine user intention to adopt Internet banking and actual use, a survey was conducted. The data was gathered on personal banking customers with fifty-three Taiwanese banks. The participants in the main investigation were all customers at the bank where the data collection took place. Participation in the study was voluntary and was limited to customers with at least one bank account. A total of 425 usable, complete responses were obtained. The gender breakdown was 49% male and 51% female, almost all were in twenties or thirties. 34% had more than one experience with Internet banking, and approximately 65% at least once a week. Moreover, 81% had been using the Internet for more than a year.

3.2 Measurements

A questionnaire using a seven-point scale was employed to collect the data for the constructs of the research model. Items from previous studies were modified for adaptation to the Internet banking context. The measures of actual use, behavioral intention to use, attitude toward using, subjective norm, and perceived behavioral control were adapted from various studies related to the TRA and TPB (Ajzen and Fishbein, 1980; Taylor and Todd, 1995). Six decomposed beliefs – relative advantage, compatibility, complexity, normative influence, efficacy and facility - were adapted from Taylor and Todd (1995), those were primary combined with the evaluative component using the expectancy-value approach suggested in the TRA and TPB (i.e., $b_i e_i$, $n b_j m c_j$, $p f_k c b_k$). Items associated with any particular attribute were reliably related to each other ranging from 0.66 to 0.93. We agree with Nunally (1967) that a minimum Cronbach's alpha of 0.6 is sufficient for the early stages of the research.

The measures were pilot tested on MIS graduate majors, who were asked to indicate agreement or disagreement with the survey items using a seven-point scale. The wording of the items was then modified based on the pilot test results and advice from MIS professors. A final version of the scales is presented in the appendix. We adopted Cudeck and Browne's (1983) suggestions regarding cross-validation to assess the model fit. The majority of the respondents were randomly assigned to a calibration sample of 300, and the remainder to a validation sample of 125.

4. Results

The hypothesized paths in each of the above-described models were tested by the Lisrel 8.3 package (Joreskog and Sorbom, 1993) to which a matrix of correlation between the variables was input, using the maximum likelihood estimated. As suggested by Bagozzi and Heatherton (1994), each scale was divided to provide two indicators for each latent variable. In conducting the analysis, errors in the equations for the determinants of intention were specified as free parameters, and the independent constructs were allowed to co-vary.

In explanation, the total coefficient of determination (TCD) R^2 for the structural equations is shown in this paper. Furthermore, t-statistics for examining the correlation between the latent constructs and correlation among the latent constructs were used to test path links. T-statistics exceeded the critical value (1.96) for the 0.05 significant level as well as for the 0.01 significance level (critical value = 2.576) (Reisinger and Turner, 1999). The levels of significance for individual paths were assessed by examining the β 's and γ 's.

Then, the following four most acceptable indices were used to measure the overall model fit. These were as follows: (1) a normed Chi-square (Chi-square/df) with a level between 1.0 and 2.0 (Hair et al., 1995). (2) a Comparative fit index (CFI) larger than 0.9 (Hair et al., 1995). (3) a Non-normed fit index (NNFI) with a level of 0.9 (Hair et al., 1995). (4) a Root-mean-square error of approximation (RMSEA) with a marginal acceptance level of 0.08 (Steiger, 1990).

4.1 Theory of planned behavior

The statistics indicate that the TPB model provides a good fit to the data ($\chi^2_{398} = 615.98$, $p < 0.01$; CFI = 0.97; NNFI = 0.96; RMSEA = 0.043). In terms of predictive power, the variance in all five dependent variables (R^2_{BI} , R^2_{Usage} , R^2_A , R^2_{SN} and R^2_{PBC}) of the TPB model are equal to 0.54, 0.24, 0.63, 0.90 and 0.41, respectively. As the analytical results of Taylor and Todd (1995) show, although PBC is reasonably explained by belief control, it does not in turn provide better prediction of intention over and above that provided by subjective norm and attitude.

Path coefficients are as hypothesized in each case ($p < 0.05$ in all instances). Not only are the attitudinal and normative structures significant determinants of attitude and subjective norm respectively, but the path from the control structure to PBC is particularly significant. Finally, although attitude is significantly related to intention, subjective norm and PBC are not. A further significant determinant of actual use is behavioral intention.

4.2 Decomposed TPB and group difference

The decomposed version of the TPB provides essentially the same fit as the pure TPB model ($\chi^2_{398} = 794.57$, $p < 0.01$; CFI = 0.95; NNFI = 0.94; RMSEA = 0.054). The decompositon TPB is better explains attitude, subjective norm and behavioral intention in relation to the TRA or the TPB ($R^2_{BI} = 0.66$; $R^2_{Usage} = 0.23$; $R^2_A = 0.82$; $R^2_{SN} = 0.99$ and $R^2_{PBC} = 0.39$). Figure 1 illustrates the significant paths in the decomposed model. Relative advantage and complexity are significantly

related to attitude. However, complexity has a negative impact on attitude. Although efficacy is a significant determinant of the PBC, facility is not. Attitude and PBC are significantly related to behavioral intention. Like the pure TRA and pure TPB models, subjective norm is not significantly related to behavioral intention. Finally, intention has a significant influence on actual use.

A structural equation modeling was used to change relative between male group and female group in terms of gender. The normed Chi-square was between the desired value of 1.0 and 2.0. The RMSEA is greater than the desired value of 0.05. The GFI, NFI and CFI were less than the desired value of 0.9. Modification indices for the data indicate several fell above the desired 3.84, with ranges from 4.08 to 23.74. These measures indicated the proposed model do not fit the data collected from male and female. Therefore, the analytical result did support by the data and thus that we can state the models of males and female is different.

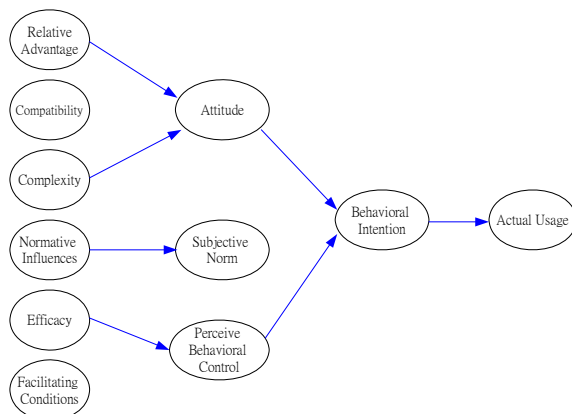


Fig.1: Theory of Planned Behavior with belief decomposition: significant paths.

5. Discussion and conclusions

The Cross-Validation Index (CVI) suggested by Cudeck and Browne (1983) was used to test the model structure of extended TPB. The computation of CVI measures the distance between the restricted variance-covariance matrix for the calibration sample and the unrestricted variance-covariance matrix for the validation sample. According to this, smallness of the CVI value better estimated the predictive validity of the model. According to the analytical results, models of CVI value fell in the 90% interval of confidence. These models enable accurate location of specific parameter estimates well.

The findings show that intention to adopt Internet banking can be explained by attitude in both models. However, in the decomposed TPB model, only relative advantage and complexity are related to attitude, while compatibility is not. In our study, only 34% of the respondents had already adopted Internet banking services. Most users were accustomed to traditional branch banking. Therefore, we may infer that although people understand the advantages of Internet banking, many have yet to try it. As a result, they are unable to perceive whether Internet banking is compatible with their individual lifestyles or values.

With regard to subjective norm, the path from subjective norm to Intention failed to achieve significance in either model. More than 80% of the sample respondents had had at least a year's experience with the Internet. They may well have been more than averagely equipped to

operate Internet banking services, but only 34% had actually opted to do so. Therefore, we may not infer that people who are important to them are able to influence their intention to adopt Internet banking. The possible factors of influence could be other network characteristics, such as information quality and security.

6. Project evaluation

We have accomplished 90% of the work described in the proposal. From the commercial viewpoint, Internet banking has become more and more essential and is broadly accepted. Thus, how to build, maintain, and enhance customer relationships is an important issue in a fiercely competitive environment. Therefore, the results of this study indicate that it would be a valuable strategy for marketers to rethink how to educate potential customers and promote Internet banking using innovation characteristics.

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出席 2007 International Conference on Business and Information 會議的報告內容

今年度很榮幸有機會受邀參加 2007 商務與資訊國際會議(2007 International Conference on Business and Information, BAI 2007)。該會議於日本東京舉辦，共計有來自全球 45 個國家，這些國家包括 Australia, Bangladesh, Canada, China, Czech Republic, Denmark, Egypt, Finland, France, Germany, Ghana, Greece, Hong Kong, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Kingdom of Saudi Arabia, Macau 等，會議時間為 2007 年 7 月 11 日至 13 日，地點為日本東京灣洲際飯店(InterContinental Hotel Tokyo Bay)，共收到 830 篇論文，發表共計 300 餘篇，接受之論文主題以商業、電子商務與資訊技術為主，包括：Accounting、Business Administration、Business Policy and Strategy、Economics、Electronic Commerce、Entrepreneurship、Financial and Banking、Health Care Administration 等。

本篇論文被安排在 7 月 11 日下午 15:00 至 17:00 的 Session C2 場次，此次與會安排之行程為 7 月 10 日下午搭機赴日本東京，11 日早上至會場參加其他場次之論文發表，下午發表論文，12 日下午搭機返台。此次自己發表論文主題：The study of customer attitude towards Internet Banking based on the Theory of Planned Behavior。

在本次的與會人士中，多數是歐亞地區的學者，而且有些教授學者在學術上很活躍。尤其是我參與聆聽幾個場次的報告中發現，印度人的報告，除了講話速度普遍都很快之外，英文的流暢度還有論文的貢獻度都很高，這點實在令我相當的感到訝異及佩服。這幾個場次下來，我真是倍感壓力，因為不管是印度人、本地人、甚至是大陸人及韓國人，他們的英文都非常的好，不管是報告或是對答的過程中，都是非常的流暢得體，這些表現讓我覺得我除了要好好的學習英文之外，還希望有更多出席國際研討會的機會，除了更能與他們分享研究成果之外，也能夠增加吸取相關領域的研究內容。

在此，感謝國科會對本人出席國際會議時所給予的經費補助(NSC-95-2416-H-216-009)，我希望未來有更多出席國際研討會的機會，除了更能與學者分享研究成果之外，也能夠增加吸取相關領域的研究議題。

施雅月

