

Applying Theory of Perceived Risk and Technology Acceptance Model in the Online Shopping Channel

Yong-Hui Li, Jing-Wen Huang

Abstract—As the advancement of technology, online shopping channel develops rapidly in recent years. According to the report of Taiwan Network Information Center, there are almost eighty percents of internet population shopping in online channel. Synthesizing insights from the previous research, this study develops the conceptual model to integrate Theory of Perceived Risk (TPR) and Technology Acceptance Model (TAM) to apply in online shopping. Using data collected from 637 respondents from online survey website, we use structural equation modeling to test measurement and structural models. The results suggest the need for consideration of perceived risk as an antecedent in the Technology Acceptance Model. The limitations and implications are discussed.

Keywords—perceived risk, perceived usefulness, perceived ease of use, behavioral intention, actual purchase behavior

I. INTRODUCTION

As the advancement of technology, more and more fast and convenient shopping channels are developed in recent years. For example, consumers could buy books from online bookstores, they could order movies tickets through the internet order systems, and they could buy anything from the online stores no matter where they are now. Many new ways of online shopping are introduced to Taiwan in recent years. The websites of online shopping are possessed of the detailed information of products and services, and customer could easily search product usage and service information on the internet. In the electronic commerce, online shopping is the new way used in shopping channel.

Since the emergence of the World Wide Web in the early 1990s, the internet has grown at a rapid pace. According to the report from Taiwan Network Information Center in 2008, there are over fifteen millions of people using the internet, and almost eighty percents of internet population shopping in the online channel. It means that twelve millions of people have the experiences of online shopping. Actually, these new kinds of shopping channels make human life different. In the transactions of business-to-customer (B2C), the internet has profoundly changed the way how firms operate in websites. For example, online stores, which implement electronic commerce,

organize and maintain a business network to deliver their products and services to markets while traditional business models improve the ability to manufacture products and deliver services [1]. In addition, the function of internet provides advanced search capabilities, and online shopping model can provide merchandise to consumers across regions and national frontiers [1].

While electronic commerce has become an important issue with the growth of the internet, there are insufficient empirical studies to explore consumer behavior in the online shopping channel. The Technology Acceptance Model (TAM) is one of the most widely used models in electronic commerce. The purpose of TAM is to explain and predict the acceptance of information technology based on two specific behavioral beliefs: perceived ease of use (PEOU) and perceived usefulness (PU). Since TAM has been applied to the transactions of electronic commerce, it may help us to understand the context of adopting electronic commerce.

Though internet provides online consumers with additional channel for searching information of products and services, it still has some problems to be solved. For instance, when consumers shop on internet, they can not feel, watch, and touch the reality of the products or services before they buy what they need. They may worry about the security of transmitting credit card information via the internet [2]. It is an obstacle that people perceive lack of security and privacy on the internet in the adoption of electronic commerce [3]. The users of internet hope that the providers of products and services on internet could offer more secure instruments to decrease perceived risk of the online shoppers.

Drawing on the above perspectives, this study is based on the Theory of Perceived Risk (TPR) by [4] and the Technology Acceptance Model (TAM) by [5] to discuss the relationships between perceived risk, perceived ease of use, perceived usefulness, behavioral intention, and actual purchase behavior. The main purpose of this study is to integrate Theory of Perceived Risk (TPR) and Technology Acceptance Model (TAM) to apply in the online shopping channels. The rest of the paper is set out as follows. The next section considers the previous literature and sets out the hypotheses of this study. Following is the methodology for the study. Then, the paper presents the results of the empirical study in achieving the goals as those set out above. Discussion and conclusions are provided

Yong-Hui Li is an assistant professor at Kao Yuan University, Taiwan (e-mail: r4682468@ms51.hinet.net).

Jing-Wen Huang is an assistant professor at Chia Nan University of Pharmacy & Science, Taiwan (e-mail: jeanwen@ms71.url.com.tw).

in the last section.

II. RESEARCH BACKGROUND

This study attempts to investigate the antecedents of behavioral intention and actual purchase behavior in Business-to-Customer shopping media of online shopping. Online shopping is defined as the shopping behavior of customers buying in online stores or websites used for online purchasing transactions [6]. Online shopping channel is one kind of the virtual retail stores, and virtual retail stores have the following two characteristics: (1) merchandise price comparisons and usage information among alternative products or services (2) quick access of websites of online stores [7]. The online shopping could reduce the time which the consumers spend on shopping [2]. And, the websites of virtual stores provide advanced searching capabilities, and they are frequently used to search information of products or services before purchasing [8]. Overall, online shopping is an efficient channel for shopping.

In electronic commerce, [9] defined the applications of electronic commerce as four types: Business-to-Customer, Business-to-Business, Inter-Organizational, and Customer-to-Customer. In order to realize the research purposes in this study, the definition of online shopping in this study was only in the level of Business-to-Customer.

A. Theory of Perceived Risk

Online shopping is a new channel to purchase products or services on the internet. The novelty to consumers might result in some problems. Previous research has pointed out a relationship between the perceived risk of a new shopping channel and the choice of purchasing using that channel [2]. While consumers perceive risk in most purchasing decisions, non-store purchasing decisions tend to have a higher level of perceived risk associated with them [10]. Online shopping is one of non-store purchasing channels on the internet. [11] reported that online shopping is recent information technology-related form of direct marketing and is similarly perceived as higher risk or loss by consumers, and found that risk-averse consumers are less likely to shop on the internet.

Since [4] proposed the concept of perceived risk of consumers, many scholars have discussed the issue and have presented numerous extended definitions [12, 13, 14, 15, 16]. Perceived risk is a possibly previous measure of consumer perceived usefulness and perceived ease of use towards purchasing on the internet. Perceived risk is a construct of perceived situation [17] that has been defined in various ways. Scrutinizing prior debate on the definitions of perceived risk of consumers, [14] recapitulated that the scholars have favored the two major components as an appropriate definition of perceived risk: the probability of a loss and the subjective feeling of unfavorable consequences.

Perceived risk pertains primarily to searching and choosing information of products or services before purchasing decisions [18]. If the actual purchasing experiences of online customers differ from their purchasing goals, they will perceive higher risk

[13]. [19] depicted that perceived risk depended on the subjective uncertainty of the outcomes. For each purchasing decision, the consumers will have several buying goals or expected outcomes of purchasing products or services.

Several types of perceived risk have been widely used in previous research [12, 20, 21]. For instance, financial risk is the potential monetary loss that consumers may encounter after purchasing particular products or services. Performance risk is viewed as the likelihood that a product performs as expected. Physical risk is related to safe problems arising from using the product, especially those directly related to health and security. Psychological risk is the possibility that the selected product will be consistent with the consumer's self-image. Social risk is considered to be the perceptions of significant others towards the products or services. Convenience risk stands for the additive problematic inconveniences which the consumer will encounter when they purchase the products or services.

B. Technology Acceptance Model

Technology acceptance model (TAM) is a theoretical foundation to explain and predict the individual's acceptance of information technology [5]. TAM is based on Theory of Reasoned Action (TRA) [22], which suggests that social behavior is motivated by the attitude and intention to perform. According to TRA, individuals often behave as they intend to do within available context and time. TAM, introduced by [23], adopts TRA's causal links to explain how external variables influence the inner beliefs, attitude, behavioral intention of users, and the actual usage of technology.

TAM not only uses the personal consideration and cognition toward some certain behaviors, but also adopts another two perceptions: perceived usefulness and perceived ease of use. Perceived usefulness means that the users think that it is beneficial to use the technology in completing his/her work. Perceived ease of use is how the users perceive the ease of using the technology. Both perceived usefulness and perceived ease of use would be influenced by external variables. [24] explained that external variables are the connection between the inner belief, attitude, intention, and personal differences, state, and controllable behavior. Previous research has listed various external variables. For example, [25] have examined personal differences as external variables, including the role connection with technicians, job term, education, experiences, and training. [26] have used training, technical support, working experiences, previous benefit, and voluntary as the external variables, and most of them are about personal characteristics and population attribute.

TAM is widely used by researchers to provide explanations of usage behavior of adopting information technology. This study is based on the perspective of TAM to investigate the online shopping channel. For TAM, user's beliefs determine the attitudes toward using the system. Behavioral intention, in turn, is determined by these attitudes toward using the system. Finally, behavioral intention leads to actual purchase behavior.

C. Perceived Risk, Perceived Usefulness, and Perceived Ease of Use

As a new marketing channel of transaction, online shopping involves more uncertainties and risks than traditional ones. Two important reasons why customers do not purchase products or services on the internet are security of online shopping and privacy of personal information.

Before consumers purchase the products or services on the internet, buyers can not actually check the quality of them. Consumers also feel insecurity when they send out the financial and personal information (e.g., identification numbers and credit card numbers) via the internet. Online transaction includes numerous inherent uncertainties, such as injustices of pricing, violations of privacy, transmissions of inaccurate information, unauthorized tracks of transactions, and unauthorized uses of credit cards [27, 28, 29, 30].

[31] indicated that perceived risk or loss would negatively influence perceived usefulness toward online shopping. [32] depicts that perceived risk negatively influenced both perceived usefulness toward online shopping and perceived ease of use to shop online. Other studies similarly find that perceived risk negatively influenced consumers' perceived usefulness or perceived ease of use to purchase on the internet [33, 34]. Therefore, perceived risk is a previous measure of perceived usefulness and perceived ease of use before purchasing products or services, based on the buying goals of the consumers. Accordingly, the following hypotheses are proposed.

H1: Perceived risk is negatively related to perceived usefulness in the online shopping channel.

H2: Perceived risk is negatively related to perceived ease of use in the online shopping channel.

D. Perceived Usefulness, Perceived Ease of Use, and Behavioral intention

Perceived usefulness (PU) is the individual's assessment of the utility offered by using new information technology in a specific context [5, 35]. Perceived usefulness in the TAM model reflects task-related productivity, performance, and effectiveness [5]. Perceived ease of use (PEOU) refers to the degree to which the user expects the target system to be free from effort [5, 35]. The concepts of perceived usefulness and perceived ease of use are individual subjective judgments about the usefulness and ease toward specific system [35]. Perceived usefulness and perceived ease of use are distinct but related constructs. In TAM, perceived usefulness is a major belief factor, and perceived ease of use is a secondary belief factor in determining behavioral intentions toward using information technology [5, 29, 30, 36, 37, 38, 39].

[36] validated TAM for the context of World Wide Web, and claimed that perceived usefulness and perceived ease of use increase the intention and willingness to access the e-commerce environment through the website. [30] extended TAM in B2C e-service, and proposed that perceived usefulness, perceived ease of use, and trust are positively related to the purchasing intentions of consumers. Applying TAM to incorporate social influences and flow experience to predict users' acceptance of

online games, [38] found that perceived usefulness and perceived ease of use have positive impact on intention to play an online game. The results of [39] also indicated that the positive relationships between perceived usefulness and perceived ease of use and behavioral intention. According to the empirical studies of TAM, individuals form their intentions on the basis of the belief that using a particular technology will enhance their job performance. On the other hand, greater perceived ease of use or the less complexity of the information systems will increase the likelihood of individual intention.

Based on TAM and the results of previous studies, behavioral intention information technology is jointly determined by users' perception of usefulness and perceived ease of use. Thus, this study suggests that perceived usefulness and perceived ease of use are predictors of behavioral intention online shopping channels. Accordingly, the following hypotheses are proposed.

H3: Perceived usefulness is positively related to behavioral intention in the online shopping channel.

H4: Perceived ease of use is positively related to behavioral intention in the online shopping channel.

The internal belief ties to an individual's assessment of the mental effort involved in using a system [5]. Perceived ease of use is an indicator of the cognitive effort needed to learn and utilize new information technology [37]. Improvements in perceived ease of use may contribute to enhance productivity, performance, and effectiveness that are equivalent to usefulness [35]. Prior research has provided evidences of the significant effect of perceived ease of use on behavioral intention, either direct or indirect relationship through its effect on perceived usefulness [36, 38, 39, 40, 41, 42]. Thus, perceived ease of use would have a direct and positive effect on perceived usefulness.

Because the positive effect of perceived ease of use on perceived usefulness has been discussed, this study also verifies the following hypothesized relationships of TAM in the context of online shopping. Accordingly, the following hypothesis is proposed.

H5: Perceived ease of use is positively related to perceived usefulness in the online shopping channel.

E. Behavioral intention and Actual purchase behavior

Previous research following the theoretical rationale of TRA and TAM has showed a high correlation between behavioral intention and actual purchase behavior [36, 37, 40, 41, 43, 44, 45]. For example, [36] indicated that individuals with greater behavioral intentions and acceptances are more inclined to increase the actual behavior in World Wide Web. [41] applied TAM to introduce trust as another belief that has an impact on the acceptance of internet banking. They found that the behavioral intention dominated the actual usage of internet banking. Likewise, [44] suggested that there is a positive correlation between transactional intention and actual transactional behavior. Drawing upon the perspectives of TRA and prior empirical evidences, this study suggests that behavioral intention has positive relationship with actual online shopping behavior. Thus, the following hypothesis is proposed.

H6: Behavioral intention is positively related to actual

purchase behavior in the online shopping channel.

III. RESEARCH METHODS

A. Sample and Data Collection

The empirical study employs a questionnaire approach designed to collect data for testing the reliability and validity of the model and research hypotheses. The questionnaire includes measures of variables to be studied, including perceived risk, perceived usefulness, perceived ease of use, behavioral intention, actual purchase behavior, and some basic information. Variables are measured with multi-items. All items are required five-point Likert-style responses ranged from 1 = "strongly disagree," through 3 = "neutral," to 5 = "strongly agree." The population in the study was the consumers who ever shopped in the online shopping channel. We selected the consumers online. A questionnaire survey was developed to obtain the responses about their opinions on various variables. There were 648 questionnaires received, and eleven of them were incomplete. The remaining 637 valid and complete questionnaires were used for the quantitative analysis. It represented a useable response rate of 98.3%. Preliminary analyses were conducted to provide information about the characteristics of sample consumers, including gender, age, marriage, education, occupation, and disposable income. We used a two-tailed t-test to compare the early respondent with late respondent consumers. Respondent consumers did not significantly differ from nonrespondents in terms of consumers' gender, age, marriage, education, occupation, and disposable income ($p > 0.10$). Within each consumer, we collected the measures of perceived risk, perceived usefulness, perceived ease of use, behavioral intention, and actual purchase behavior. Because all measures were collected from the same source, the Harman's one-factor test was used to examine the potential problem of common method bias. A principal component factor analysis on the questionnaire measurement items yielded six factors with eigenvalues greater than 1.0 that accounted for 59.14 percent of the total variance, and factor 1 accounted for 15.99 percent for the variance. Since several factors, as opposed to one single factor, were identified and the first factor did not account for most of the variance, common method bias is unlikely to be a serious problem in the data [46].

B. Measures

Perceived Risk. The perceived risk would discourage consumers from transacting in the online shopping channel. Based upon the work of previous research [10, 16, 17], seven-item scale was used to measure the level of perceived risk of the customers.

Perceived Usefulness. Perceived usefulness refers to the degree to which a person believes that using a particular system would enhance his/her job performance [5]. To measure the perceived usefulness, six items were adopted from prior studies in TAM model [5, 24, 36, 38, 39].

Perceived Ease of Use. Perceived ease of use refers to the degree to which a person believes that using a particular system

would be free of effort [5]. The measurements of the perceived ease of use construct stress on how easy and simple respondents feel in the online shopping channel. Based upon the previous research [5, 24, 36, 38, 39], six questionnaire items were adopted to measure the perceived ease of use.

Behavioral Intention. Behavioral intention reflects the extent to which a person purposes to purchase particular products or services [24]. According to the literature about the measurement of the construct of behavior intention [36, 38, 39, 40, 41, 45, 47], six questions were used to assess the behavioral intention of respondents in the online shopping channel.

Actual Purchase Behavior. Actual purchase behavior refers to the frequency, time, and money which an individual devotes to online shopping actually. Four items were adapted from prior research [40, 41, 44, 45, 47] to measure the construct of actual purchase behavior.

C. Reliability and validity

Reliability of the multi-item scale for each dimension was measured using Cronbach alphas. Measures of reliability were above the recommended minimum standard of 0.60 [48, 49, 50]. For all five dimensions, measures of reliability were above 0.63.

LISREL provides a chi-square value and five additional indices that assess the fit of path models, the goodness-of-fit index (GFI), the adjusted goodness of-fit index (AGFI), the normed fit index (NFI), the comparative fit index (CFI), and the root mean square residual (RMSR). The fit indexes of confirmatory factor analysis for the measurement models ranged from adequate to excellent (perceived risk: GFI=0.98, AGFI=0.97, NFI=0.96, CFI=0.97, RMSR=0.03; perceived usefulness: GFI = 0.93, AGFI = 0.84, NFI = 0.96, CFI = 0.96, RMSR=0.03; perceived ease of use: GFI = 0.98, AGFI = 0.95, NFI = 0.98, CFI = 0.98, RMSR=0.02; behavioral intention: GFI = 0.96, AGFI = 0.91, NFI = 0.98, CFI = 0.96, RMSR=0.01; actual purchase behavior: GFI = 0.99, AGFI = 0.98, NFI = 0.98, CFI = 0.98, RMSR=0.02). Additionally, five models had chi-squares less than three times their degrees of freedom (perceived risk, $32.74/14 = 2.34$; perceived usefulness, $25.87/9 = 2.87$; perceived ease of use, $26.67/9 = 2.96$; behavioral intention, $26.91/9 = 2.99$; actual purchase behavior, $5.67/2 = 2.84$). Overall, the CFA results suggested that the models of perceived risk, perceived usefulness, perceived ease of use, behavioral intention, and actual purchase behavior provided a good fit for the data.

According to [51], convergent validity can be assessed from the measurement model by determining whether each indicator's estimated pattern coefficient on its posited underlying construct factor is significant (greater than twice its standard error). Convergent validity was assessed using the t-statistics for the path coefficients from the latent constructs to the corresponding items. As mentioned above, all the path coefficients from the five constructs to the twenty-nine measures are statistically significant, with the highest t-value for the items measuring behavioral intention being 24.16 and the lowest t-value for the items measuring perceived risk being 7.01. That all the t-values exceed the standard of 2.00 [51] indicates satisfactory

convergent validity for all twenty-nine dimensions.

Discriminant validity was assessed in three ways [50]. First, the confidence interval for each pairwise correlation estimate (i.e., \pm two standard errors) should not include 1 [51]. This condition was satisfied for all pairwise correlations in three measurement models. Second, for every construct, the percentage of variance extracted should exceed the construct's shared variance with every other construct (i.e., the square of the correlation) [52, 53]. Finally, within every measurement model, we constrained the correlation between each pair of constructs, one at a time, to be equal to 1 [51, 53], and then performed a chi-square test comparing this model to the model freeing that correlation. In all cases, the chi-square difference was significant at $p \leq 0.001$ level, thereby further indicating discriminant validities among all pairs of constructs in every measurement model.

IV. ANALYSIS AND RESULTS

Table 1 shows the mean, standard deviation, number of items, reliability, and the correlation matrix of the research variables. To test the hypothesized relationships in the path-analytic framework, this study employed LISREL [51]. LISREL provides a chi-square value and five additional indices that assess the fit of path models, the goodness-of-fit index (GFI), the adjusted goodness of-fit index (AGFI), the normed fit index (NFI), the comparative fit index (CFI), and the root mean square residual (RMSR). Calculating parameter estimates and standard errors that can be used to test statistical significance, LISREL also analyzes hypothesized relationships.

This study tested the hypotheses using LISREL 8.80. Paths between constructs represent individual hypothesis, and this study assessed each for statistical significance of the path coefficient. This study tested the model to examine the study's hypothesized relationships, and the LISREL analysis of this model produced a chi-square of 1026.842 (d.f. = 371). In addition to this chi-square value, the various goodness-of-fit indices also suggested a very good fit (GFI = 0.900, AGFI = 0.882, NFI = 0.951, CFI = 0.968, RMSR=0.047). The analysis also provided support for the study's first three hypotheses. Table 2 reports the results of standardized path estimates, including the construct relationship, path coefficient, t-value, and result.

As hypothesized, a negative relationship between perceived risks and perceived usefulness is confirmed ($\gamma_{11} = -0.08$, $t = -2.03$). Therefore, H1 is supported. A negative relationship between perceived risks and perceived ease of use is established ($\gamma_{21} = -0.11$, $t = -2.13$). Therefore, H2 is supported. As predicted, a significantly positive relationship between perceived usefulness and behavioral intention is accepted ($\gamma_{31} = 0.48$, $t = 7.62$). Therefore, H3 is supported. As hypothesized, a positive relationship between perceived ease of use and behavioral intention is confirmed ($\gamma_{32} = 0.21$, $t = 3.44$). Therefore, H4 is supported. A positive relationship between perceived ease of use and perceived usefulness is established ($\beta_{12} = 0.72$, $t = 13.68$). Therefore, H5 is supported. As predicted, a significantly

positive relationship between behavioral intention and actual purchase behavior is accepted ($\beta_{43} = 0.23$, $t = 4.55$). Therefore, H6 is supported.

V. DISCUSSION AND CONCLUSIONS

The aim of this study is to advance our understanding of online shopping channel. The major contribution of this study is to empirically investigate the application of Theory of Perceived Risk and Technology Acceptance Model in the online shopping channel. We develop a comprehensive research framework and conduct LISREL analysis. The results show that there are significant relationships between research variables. Perceived risk is negatively related to perceived usefulness and perceived ease of use. Perceived ease of use is positively related to perceived usefulness. Perceived usefulness and perceived ease of use positively affect behavioral intention, and in turn, behavioral intention affects actual purchase behavior in the online shopping channel.

Online shopping is considered as one of the emerging shopping channels. The priority for providers of products or services is to realize purchase behaviors and potential requirements of consumers in the online shopping channel. As noted in previous research, perceived usefulness and perceived ease of use lead to increased behavior intention [Karahanna, & Straub, 2003; Gefen & Straub, 2004]. Online vendors and relevant suppliers need to adjust their contexts of websites to match the preference of their major customer groups. For example, online vendors can provide a simple and easily used interface or a richness and useful interface to enhance the shopping intention of consumers, and further promoting actual shopping behaviors. Although perceived usefulness and perceived ease of use are conceived as important issues in online shopping, the results of this study showed that perceived risk plays an important role in increasing instability in the online shopping environment. It implies that online vendors rely not only on the operational characteristics of websites, its perceived usefulness and perceived ease of use, but also on a greater degree of perceived risk of consumers toward the websites and online commodities. Managers need to take perceived risk into account in their website planning efforts. To diminish perceived risk, online vendors can improve the contents of website, especially for the information that consumers most directly perceive, such as exclusively personalized website and frequently updated information. They also need to make special efforts to improve defects and problems that could influence consumer's perception of online shopping. On the other hand, the findings indicate that the behavioral intention toward online shopping has positive impact on actual purchase behavior. Online vendors need to be devoted to understand the factors that may influence the formation of consumer's behavioral intention toward online shopping.

There are some limitations in this study. Firstly, most of the respondents were highly educated and well experienced regarding the Internet. Future research might examine more diverse web users such as older, less educated, and less

experienced on the Internet to validate the more generalized model. Secondly, this study has not included some characteristics of product/service, which may influence the choice of online shopping. Future research might identify some additional applicable factors such as product/service characteristics or individual differences for a better understanding of the online shopping behaviors. Finally, this study was done by empirically investigating the online shopping channels. Potential cultural limitation should be noted. In addition, future research might expand the research field to other shopping channels such as TV shopping, telephone shopping, or catalog shopping.

TABLE I
DESCRIPTIVE STATISTICS, RELIABILITIES, AND CORRELATIONS (N = 637)

	PR	PU	PEOU	BI	APB
Mean	3.32	3.83	3.81	3.71	2.67
Standard Deviation	0.58	0.65	0.54	0.63	0.59
Number of items	7	6	6	6	4
Reliability	0.68	0.89	0.81	0.92	0.63
Correlations ^a					
1. Perceived Risk	1.00				
2. Perceived Usefulness	-0.12	1.00			
3. Perceived Ease of Use	-0.10	0.63	1.00		
4. Behavioral Intention	-0.19	0.58	0.48	1.00	
5. Actual Purchase Behavior	-0.35	0.11	0.08	0.18	1.00

^aCorrelations with absolute value greater than 0.08 are significant at $p < 0.05$, and those greater than 0.10 are significant at $p < 0.01$ (two-tailed test)

TABLE II
STANDARDIZED PATH ESTIMATES^a

Hypothesized Relationships				
H	Construct relationship	Coefficient	t	Result
H1	Perceived risk is negatively related to perceived usefulness in the online shopping channel.	-0.08*	-2.03	Support
H2	Perceived risk is negatively related to perceived ease of use in the online shopping channel.	-0.11*	-2.13	Support
H3	Perceived usefulness is positively related to behavioral intention in the online shopping channel.	0.48**	7.62	Support
H4	Perceived ease of use is positively related to behavioral intention in the online shopping channel.	0.21**	3.44	Support
H5	Perceived ease of use is positively related to perceived usefulness in the online shopping channel.	0.72**	13.68	Support
H6	Behavioral intention is positively related to actual purchase behavior in the online shopping channel.	0.23**	4.55	Support

^a n = 637 (two-tailed test).

* $p < 0.05$, ** $p < 0.001$

REFERENCES

- [1] J. Park, D. Lee, and J. Ahn, "Risk-focused e-commerce adoption model: A cross-country study," *Journal of Global Information Technology Management*, vol. 7, no.2, pp. 6-30, 2004.
- [2] A. Bhatnagar, S. Misra, and H. R. Rao, "On risk, convenience and internet shopping behavior, association for computing machinery," *Communications of the ACM*, vol. 43, no.11, pp. 98-105, 2000.
- [3] Y. Lieberman and S. Stashevsky, "Perceived risks as barriers to internet and e-commerce usage," *Qualitative Market Research*, vol. 5, no.4, pp. 291-300, 2002.
- [4] R. A. Bauer, *Consumer Behaviour as Risk Taking*. Ed. D. F. Cox. 1967. Risk Taking and Information Handling in Consumer Behavior, Boston, MA: Harvard University Press: 1960, pp. 23-33.
- [5] F. D. Davis, "Perceived usefulness, perceived ease of use, and use acceptance of information technology," *MIS Quarterly*, vol. 13, no.3, pp. 319-340, 1989.
- [6] T. P. Y. Monsuwe, B. G. C. Dellaert, and K. D. Ruyter, "What drives consumers to shop online? A literature review," *International Journal of Service Industry Management*, Vol. 15, no.1, pp. 102-121, 2004.
- [7] A. Chiravuri and D. Nazareth, "Consumer trust in electronic commerce: An alternative framework using technology acceptance," *Seventh Americas Conference on Information Systems*, 2001.
- [8] R. D. Hof, *Don't Cut Back Now*. Business Week, Issue 3751, 2001.
- [9] L. M. Applegate, F. W. McFarlan, and J. L. McKenny, *Corporate Information Systems Management: Text and Case*. Irwin, Chicago, 1996.
- [10] B. Dollin, S. Dillon, F. Thompson, and J. L. Corner, "Perceived risk, internet shopping experience and online purchasing behavior: A New Zealand perspective," *Journal of Global Information Management*, vol. 13, no.2, pp. 66-88, 2005.
- [11] S. J. Tan, "Strategies for reducing consumers' risk aversion in internet shopping," *Journal of Consumer Marketing*, vol. 16, no.2, pp. 163-180, 1999.
- [12] W. Huang, H. Schrank, and A. J. Dubinsky, "Effect of brand names on consumers' risk perceptions of online shopping," *Journal of Consumer Behavior*, vol. 4, no.1, pp. 40-50, 2004.
- [13] G. Pires, J. Stanton, and A. Eckford, "Influences on the perceived risk of purchasing online," *Journal of Consumer Behavior*, vol. 4, no.2, pp. 118-131, 2004.
- [14] V. W. Mitchell, "Consumer perceived risk: Conceptualizations and models," *European Journal of Marketing*, vol. 33, no.1, pp. 164-196, 1999.
- [15] J. R. Bettman, "Perceived risk and its components: A model and empirical test," *Journal of Marketing Research*, vol. 10, no.2, pp. 184-190, 1973.
- [16] S. M. Cunningham, *The Major Dimensions of Perceived Risk*. In D.F. Cox(ed), *Risk Taking and Information Handling in Consumer Behavior*, Boston: Harvard University Press: pp. 82-108, 1967.
- [17] G. R. Dowling and R. Staelin, "A model of perceived risk and intended risk handling activity," *Journal of Consumer Research*, vol. 21, no.1, pp. 119-134, 1994.
- [18] G. R. Dowling, "Perceived risk: The concept and its measurement," *Psychology and Marketing*, vol. 3, no.3, pp. 193-210, 1986.
- [19] D. F. Cox and S. U. Rich, "Perceived risk and consumer decision-making: The case of telephone shopping," *Journal of Marketing Research*, vol. 1, no.4, pp. 32-39, 1964.
- [20] A. Rindfleisch and D. Crockett, "Cigarette smoking and perceived risk: A multidimensional investigation," *Journal of Public & Marketing*, Vol. 18, no.2, pp. 159-171, 1999.
- [21] R. Lutz and P. Reilly, "An exploration of the effects of perceived social and performance risk on consumer information acquisition," In *Proceedings, Fourth Annual Conference, The Association for Consumer Research*, pp. 393-405, 1973.
- [22] M. Fishbein and I. Ajzen, *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Addison-Wesley, reading, MA, 1975.
- [23] F. D. Davis, *A Technology Acceptance Model of Empirically Testing New End-User Information Systems: Theory and Results*, Doctoral Dissertation, Sloan School of Management, Massachusetts Institute of Technology, 1986.
- [24] F. D. Davis, R. P. Bagozzi, and P. R. Warshaw, "User acceptance of computer technology: Comparison of two theoretical models," *Management Science*, vol. 35, no.8, pp. 982-1003, 1989.

- [25] R. Agarwal and J. Prasad, "Are individual differences germane to the acceptance of new information technologies?" *Decision Science*, vol. 30, no.2, pp. 361-391, 1999.
- [26] H. Mallette and R. Fisher, "The effects of non-volitional use on perceptions and intention of end user," 28th Annual Atlantic Schools of Business Conference, Wolfville, Nova Scotia, 1998.
- [27] N. Luhmann, *Trust and Power*. New York, New York, John Wiley and Sons, 1979.
- [28] O. E. Williamson, *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. New York, New York: The Free Press, 1985.
- [29] D. Gefen, E. Karahanna, and D. W. Straub, "Trust and TAM in online shopping: An integrated model," *MIS Quarterly*, vol. 27, no.1, pp. 51-90, 2003.
- [30] D. Gefen and D. W. Straub, "Consumer trust in B2C e-commerce and the importance of social presence: Experiments in e-products and e-services," *Omega*, vol. 32, no.6, pp. 407-424, 2004.
- [31] S. L. Jarvenpaa, N. Tractinsky, and M. Vitale, "Consumer trust in an internet store," *Information Technology and Management*, vol. 1, no.12, pp. 45-71, 2000.
- [32] L. R. Vijayasarathy and J. M. Jones, "Print and internet catalog shopping: Assessing attitudes and intentions," *Internet Research*, vol. 10, no.3, pp. 191-202, 2000.
- [33] X. Liu and K. K. Wei, "An empirical study of product differences in consumers' e-commerce adoption behavior," *Electronic Commerce Research and Applications*, vol. 2, no.5, pp. 229-239, 2003.
- [34] H. Van der Heijden, T. Verhagen, and M. Creemers, "Understanding online purchase intentions: Contributions from technology and trust perspectives," *European Journal of Information Systems*, vol. 12, no.1, pp. 41-48, 2003.
- [35] F. D. Davis, "User acceptance of information technology: System characteristics, user perceptions and behavioral impacts," *International Journal of Man-Machine Studies*, vol. 38, no.3, pp. 475-487, 1993.
- [36] J. W. Moon and Y. G. Kim, "Extending the TAM for a world-wide-web context," *Information & Management*, vol. 38, no.4, pp. 217-230, 2001.
- [37] M. Featherman and P. Pavlou, "Predicting E-services adoption: A perceived risk facets perspective," *International Journal of Human-Computer Studies*, vol. 59, no.4, pp. 451-471, 2003.
- [38] C. L. Hsu and H. P. Lu, "Why do people play on-line games? An extended TAM with social influences and flow experience," *Information & Management*, vol. 41, no.7, pp. 853-868, 2004.
- [39] J. Yu, I. Ha, M. Choi, and J. Rho, "Extending the TAM for a t-commerce," *Information & Management*, vol. 42, no.7, pp. 965-976, 2005.
- [40] B. Suh and I. Han, "The impact of customer trust and perception of security control on the acceptance of electronic commerce," *International Journal of Electronic Commerce*, vol. 7, no.3, pp. 135-161, 2003a.
- [41] B. Suh and I. Han, "Effect of trust on customer acceptance of internet banking," *Electronic Commerce Research and Applications*, vol. 1, no.2, pp. 247-263, 2003b.
- [42] I. L. Wu and J. L. Chen, "An extension of trust and TAM model with TPB in the initial adoption of on-line tax: An empirical study," *Human-Computer Studies*, vol. 62, no.6, pp. 784-808, 2005.
- [43] S. Bernadette, "Empirical evaluation of the revised technology acceptance model," *Management Science*, vol. 42, no.1, pp. 85-93, 1996.
- [44] P. A. Pavlou, "Consumer acceptance of electronic commerce—Integrating trust and risk with the Technology Acceptance Model," *International Journal of Electronic Commerce*, vol. 7, no.3, pp. 69-103, 2003.
- [45] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: Toward a unified view," *MIS Quarterly*, vol. 27, no.3, pp. 425-478, 2003.
- [46] P. M. Podsakoff and D. W. Organ, "Self-reports in organizational research: Problems and prospects," *Journal of Management*, vol. 12, no. 4, pp. 531-544, 1986.
- [47] Y. Malhotra and D. F. Galletta, "Extending the technology acceptance model to account for social influence: Theoretical bases and empirical validation," *Proceedings of the 32nd Hawaii International Conference on System Sciences*, pp. 1-14, 1999.
- [48] J. C. Nunnally, *Psychometric Theory*. New York: McGraw-Hill, 1978.
- [49] R. P. Bagozzi and Y. Yi, "On the evaluation of structural evaluation models," *Journal of the Academy of Marketing Science*, vol. 16, no.1, pp.74-94, 1988.
- [50] J. Baker, A. Parasuraman, D. Grewal, and G. B. Voss, "The influence of multiple store environment cues on perceived merchandise value and patronage intentions," *Journal of Marketing*, vol. 66, no.2, pp. 120-141, 2002.
- [51] J. C. Anderson and D. W. Gerbing, "Structural equation modeling in practice: A review and recommended two-step approach," *Psychological Bulletin*, vol. 103, no.3, pp. 411-423, 1988.
- [52] C. Fornell and D. F. Larcker, "Evaluating structural evaluation models with unobservable variables and measurement error," *Journal of Marketing Research*, vol. 18, no.1, pp. 39-50, 1981.
- [53] G. T. M. Hult, R. F. Hurley, L. C. Giunipero, and E. L. Nichols, "Organizational learning in global purchasing: A model and test of internal users and corporate buyers," *Decision Sciences*, vol. 31, no.2, pp. 293-325, 2000.

Yong-Hui Li is an assistant professor at Kao Yuan University, Taiwan. His research focuses on strategy management, technology and innovation management, knowledge management, and organization management. He has published papers in *Journal of Business Research*, *International Journal of Manpower*, and other journals.

Jing-Wen Huang is an assistant professor at Chia Nan University of Pharmacy & Science, Taiwan. Her current research interests include knowledge management, interfirm collaboration, and innovation management. She has published papers in *Journal of Business Research*, *International Journal of Information Management*, and other journals.