

## B2C

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# A Study on Information Technology Acceptance for B2C e-Commerce in Developing Countries

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개발도상국에 있어서 온라인 구매와 같은 B2C 전자상거래의 확산은 선진국에 비해 느리게 이루어지고 있다. 본 연구에서는 전자상거래에 대한 개발도상국의 정보기술 수용에 영향을 미치는 요인들을 실증적으로 분석하기 위하여, TAM 기반의 연구모형을 제시하고 그 가설들을 표본 데이터를 사용하여 검증하였다. 연구 결과, 명성이나 경험과 같은 선행 요인들은 선진국의 경우와 다른 양태로 기술 수용에 영향을 미친다는 점을 알 수 있었다. 이러한 연구 결과는 개발도상국의 B2C 전자상거래 확산을 위한 학계의 연구 및 기업의 운영에 도움이 될 것으로 기대한다.

**Keywords** : Technology Acceptance Model, Structural Equation Modeling, B2C e-Commerce

## 1. Introduction

As e-commerce such as online shopping continues to become a popular option, consumers are increasingly moving from traditional stores to e-commerce convenience. According to Nielsen report 2007, more than 85% of the world's online population have used the Internet to make their purchase. However, the adoption of B2C (business to consumer) e-commerce so far has been done mainly in developed countries. It has been relatively slower in the rest of the world. For example, only 45% of the internet clients in the Philippines are said to be participating in e-commerce transaction last year, compared to more than 90% for developed countries.

This means that technology acceptance for B2C e-commerce in developing countries is relatively low. To identify underlying dynamics of e-commerce acceptance, a comprehensive model describing the factors that drive customers to accept B2C e-commerce is required. This effort would be useful for both academic societies and e-commerce providers, in that it would help them to better understand customers' online behavior. However, most of the works on the issue have been conducted for developed and industrialized societies. Little has been done for developing countries where B2C e-commerce is not yet fully developed. In this paper, a model based on technology acceptance model (TAM) is proposed. It is empirically tested using the structural equation modeling methodology. The main ob-

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jective of this study is to present a theoretically justified research model based on TAM, empirically test it using data collected from B2C consumers of a developing country, and thus find factors which affect the technology acceptance of developing countries.

## 2. Research concept and background

### 2.1 Technology acceptance model

The technology acceptance model provides a conceptual framework for general technology acceptance. Based on theories in social psychology, including the theory of reasoned action and the theory of planned behavior [2], TAM suggests the belief-attitude-intention-behavior causal relationship for explaining and predicting technology acceptance. It proposes that two beliefs about a new technology, perceived usefulness (PU) and perceived ease of use (PEOU), determine a person's attitude toward using that technology, which in turn determines their intention to use it. PU is the degree to which one believes that using the technology will enhance his or her performance, while PEOU is the degree to which one believes that using the technology will be free of effort [5]. And the attitude towards using the technology determines the behavioral intention to use that technology.

### 2.2 Previous works on B2C e-commerce

Previous studies have validated TAM as a robust and parsimonious framework for understanding user's adoption of technology in a variety of contexts including banking, e-commerce, email, online games, online conferencing and remote diagnosis technology [2, 5, 6, 9, 11]. In some of them, researchers specifically directed the use of TAM framework in online shopping, employing various antecedents. One of the latest works on the technology acceptance in B2C e-commerce adopted antecedents like trust, e-shopping quality and enjoyment [4]. The result of their study shows that trust and enjoyment play considerable roles in consumers' adoption which supports previously conducted research [6]. Also, they attested that usefulness is the primary determinant of the use of technology while ease of use, trust and enjoyment are secondary determinants.

Some studies observed that enjoyment has a stronger effect on attitude rather than ease of use and usefulness in handheld internet device and grocery shopping contexts [3]. Also, some

TAM-based B2C e-commerce acceptance research employed personal innovation, subjective norm and compatibility as external variables or antecedents. They found out that personal innovation has a positive effect on the intention, but it has a negative influence on perceived risk in e-commerce [4]. Subjective norms, on the other hand, directly affect both the intention to make an online transaction and attitudes toward e-commerce [5].

### 2.3 Antecedents

In the original TAM, factors that affect PU and PEOU have not been explicitly specified. Instead, they have been left as further research issues. Those factors are called external variables or antecedents. TAM is a model used to explain the user's acceptance of technology, and thus antecedents affect user's acceptance. Therefore, which antecedents should be included in the model depends on the environment and context of the empirical study.

(1) Trust : One of the most exploited antecedents of TAM is trust. Since trust is a central concept in business relationships and practices, trust to an online retailer is believed to play an essential role in consumers' internet shopping behaviors [1, 7]. The lack of trust can be an important barrier to the widespread diffusion of electronic commerce among consumers [6]. Trusting beliefs positively influence online consumers' purchase intentions. Consequently, understanding the factors that influence the generation of trusting beliefs in an online environment is of considerable interest to researchers.

(2) Enjoyment : Shopping enjoyment is the extent to which one believes that shopping will provide reinforcement in its own right, going beyond performance consequences [3]. Several authors have found online shopping enjoyment perception as another antecedent since it plays a considerable role in consumer's acceptance of online shopping [6]. Enjoyment is also a major factor that drives users to use a new technology [5]. It has been reported that shopping enjoyment plays an essential role in influencing online shopping attitude, and that the role is conceptually different from the roles of perceived ease of use and usefulness [3, 7].

(3) e-Shopping quality : E-shopping quality refers to overall consumer perceptions of the excellence and effectiveness of an online store product and services. Both the quality of user inter-

face performance and the quality of other features influence a consumer's perception of Internet shopping [1]. Also, high quality online shopping sites may result in the perception that one's shopping experience is fun and enjoyable. Furthermore, online store features that appeal to consumers' motivation, such as personalization and experience of pleasure, will support greater enjoyment and fun for the consumer [3].

(4) Security : In most of the online transactions over a public network like the Internet, security is always a critical issue with which consumers are concerned. As the amount of products and services offered via the Internet grows rapidly, consumers are more and more concerned about security issues. The Office of the Fair Trading survey of May 2009 shows that 20% of Internet users are still afraid to shop or purchase online due to the personal security problems. The importance of security for the acceptance of online shopping has been noted in various e-commerce studies. Having noticed the importance of security, online stores have made a great effort to make customers feel safe to shop in their stores. Encryption technologies and privacy statements posting are such examples.

(5) Reputation : Reputation is second-hand information about a seller's traits [12]. In situations where users do not have any past experience with e-business and there is absence of dependable referral, online reputation can be one of the crucial factors for establishing relation with the users. The effect of reputation may be more prominent in the initial phase when consumers have no direct experience. Previous empirical studies have demonstrated that reputation is an important factor leading to online trust [11].

(6) Experience : It has been found that users' adoption of technology is highly associated with their use of other functionally similar technologies. Lin, for example, noted that computer

adoption is related to Internet adoption intentions [6]. Hamilton also found that system usage is greatly affected by previous usage experiences of other systems [8]. In an online shopping framework, the concept of experience is much more complicated due to its cultural and psychological aspects, compared to simple computer system acceptance.

### 3. Research method

#### 3.1 Research model and hypotheses

The proposed model is basically based on TAM theory. And in addition to that, the authors identified antecedents that will fit in the environment and settings of developing countries. <Figure 1> depicts the proposed research model.

**Hypothesis 1 :** The perceived ease of use has a positive influence on the perceived usefulness.

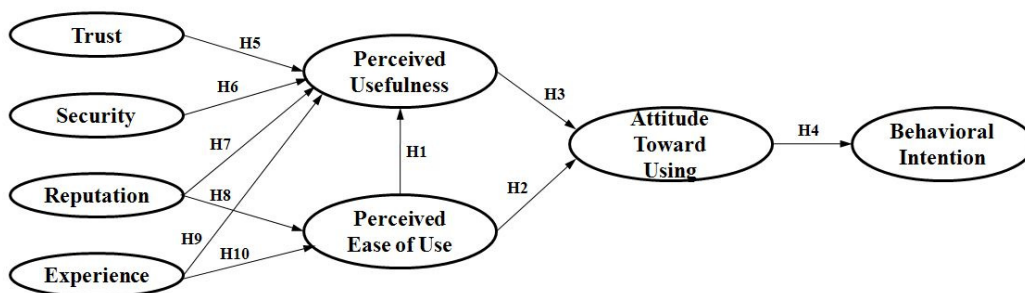
**Hypothesis 2 :** The perceived ease of use has a positive influence on the attitude towards using.

**Hypothesis 3 :** The perceived usefulness has a positive influence on the attitude towards using.

**Hypothesis 4 :** The attitude has positive influence on the behavioral intention.

The role of trust in TAM is well defined in the area of online shopping [7]. Trust is one of the determinants of PU, especially in an online environment, because consumers' usefulness is based on the sellers behind the web site. While consumers initially trust their online vendors and have an idea that adopting online service is beneficial to their job performance, they will believe the online service is useful. Hence, the authors hypothesized that :

**Hypothesis 5 :** The trust to an online store has a positive



<Figure 1> Proposed Research Model

influence on the perceived usefulness.

Another barrier to the online shopping is related to security issues. As explained in the above, the success of e-commerce depends upon trust and confidence in the underlying information infrastructures. Within this context, the effects of perceived security problems inhibit the development of e-commerce as a whole. Hence, the following hypothesis is proposed:

**Hypothesis 6 :** The security of an online store has a positive influence on the perceived usefulness.

Another obstacle that is encountered by B2C e-commerce

is online retailers' reputation [11]. Since consumers are influenced by factors related to the standing, name, character and the status of the company maintaining it, it is essential to believe that the web site's reputation has an impact on the consumers' PU and PEOU. Hence, the authors hypothesized that:

**Hypothesis 7 :** The reputation of an on line store has a positive influence on the perceived usefulness.

**Hypothesis 8 :** The reputation of an on line store has a positive influence on the perceived ease of use.

Lack of related experience in e-commerce participation is another predicament. The length of online usage and experience,

<Table 1> Measures and Questionnaire

Constr.	Meas. Var.	Questionnaire	Ref.
Trust	TR1	I know that the online store cares about customers.	[7, 11]
	TR2	I know that the online store is not opportunistic.	
	TR3	I feel safe conducting business with this online store.	
	TR4	I think this online store will keep its promise.	
	TR5	I believe this online store will use my information reasonably.	
Reputation	RP1	The online store is well known.	[9, 11]
	RP2	The online store has a good reputation.	
	RP3	The online store is respected by people.	
	RP4	The online store is one that keeps promises and commitments.	
	RP5	I feel very confident about this online store skill.	
Experience	EP1	My past experience with the computer and the internet has been good.	[12]
	EP2	My past performance with the computer and the internet has been good.	
	EP3	My past attitude with the computer and the internet has been positive.	
	EP4	My experience in computers is relevant to my internet usage.	
	EP5	Using the Internet shopping has been a good experience to me.	
Security	SC1	The online store takes security measures to protect customers' interests.	[11]
	SC2	I feel the payment system of this online store is secure.	
	SC3	I am not worried about the security of this online store.	
Perceived Ease of Use	PEOU1	It is easy for me to learn using the web site of the online store.	[5, 7]
	PEOU2	It is easy to interact with this online store web site.	
	PEOU3	The online store web site is flexible to interact with.	
	PEOU4	It is not difficult to operate the web site of the online store efficiently.	
	PEOU5	My interaction with the online store is clear and understandable.	
Perceived Usefulness	PU1	The search function of this online store web site is useful for me.	[5, 7]
	PU2	I can quickly find and acquire what I want in this online store web site.	
	PU3	The online store web site improved my efficiency of purchase.	
	PU4	The online store improves my performance in searching and buying.	
Attitude Toward Using	ATU1	The online store provides access to more products.	[6]
	ATU2	The online store makes shopping easier.	
	ATU3	The online store is better than the traditional shopping.	
	ATU4	The online store provides accurate information about the product.	
	ATU5	The online store provides integrated, timely and reliable information.	
Behavioral Intention	BI1	I think it would be very good to use the Internet for my shopping.	[6]
	BI2	In my opinion it is very desirable to use the Internet for my shopping.	
	BI3	It is much better to use the Internet for shopping.	
	BI4	Using this online store for my shopping activities is a good idea.	
	BI5	I will revisit an online store and purchase from it later.	
	BI6	Overall, I like to use this online store for my shopping activities.	

or online tenure, is a critical aspect for the development of e-commerce [8]. The Statistical Indicators Benchmarking the Information Society survey of 2003 shows that at least two years experience is required to be a more skilled online e-commerce participant. Thus, a user's previous computer and internet experience will highly affect his or her PU and PEOU.

**Hypothesis 9 :** The experience of a user has a positive influence on the perceived usefulness.

**Hypothesis 10 :** The experience of a user has a positive influence on the perceived ease of use.

### 3.2 Measures

In structural equation modeling, the construct of a model is not directly measured. Instead, measurement variables or measures are used for that purpose. Questionnaire items of survey should be chosen to ensure the content validity of a measurement model. For that purpose, most of the measures were adopted or transferred from previous works. The 8 constructs, or latent variables, are measured with 46 measures using a 5-point Likert-type scale questionnaire. The measures and associated questionnaire are shown in <Table 1>.

After the questionnaire had been prepared and before they were distributed for survey, they were sent to experts for review and advice. They confirmed that the questionnaire items are clear and understandable to respondents. Then a pre-test was carried out with 30 senior university students, whose majors are mainly information technology and computer science. Results showed that the questionnaire had a good promise in terms of reliability and validity.

### 3.3 Sample data

In this study, a group of university students in Luzon, Philippines has been selected as a sample group. Out of 350 survey sheets distributed to university students in the Philippines, 307 have been tallied, representing 85% return. The mean age of respondents is 26 ranging from 18 to 38 years old. The majority of the respondents are male with a total of 201 (65%) compared to 106 female (35%) respondents. The average number of B2C e-commerce transactions per respondents for the last 12 months is 2. Two hundred eight participants, which is about 70%, have purchased computer parts and accessories, while others have purchased electronic devices and apparel items.

## 4. Analysis

In this paper, data analysis was conducted according to the two-stage methodology, where the measurement model is first evaluated and then the structural model is analyzed. The measurement model measures factor loading between indicators and latent variables. The structural equation model shows the causal relationship between latent variables.

### 4.1 Measurement model

Reliability of the measurement model was evaluated with Cronbach's  $\alpha$  values using SPSS. Reliability is about the measurement accuracy and reflects the extent to which the respondents answer the same question consistently. Values of  $\alpha$  more than 0.70 indicate good internal reliability. All  $\alpha$  values of the constructs were above 0.7, with 0.751 (experience) the largest. Also, the deleted Cronbach's  $\alpha$  for each construct, the result of which is not presented here, were all satisfactory. The result shows that the questionnaire used has good reliability.

The validity of the measurement model was evaluated with principal component analysis. The factor loading values with varimax rotation are shown in <Table 2>. All the items have high loadings on their related factors, demonstrating that the questionnaire has good convergent validity and discriminant validity. In this phase, three measurement variables have been dropped for better fit.

<Table 2> Factor Loading Matrix

Meas.	Loading	Meas.	Loading
TR3	.568	PEOU1	.679
TR5	.520	PEOU5	.614
TR2	.679	PEOU2	.606
TR4	.616	PEOU4	.501
TR1	.611	PEOU3	.341
SC1	.857	PU2	.410
SC2	.671	PU4	.500
SC3	.649	PU1	.336
		PU3	.491
RP1	.691	ATU4	.772
RP2	.610	ATU3	.753
RP5	.586	ATU1	.648
RP4	.545	ATU2	.559
RP3	.483	ATU5	.533
EP4	.761	BI3	.758
EP2	.645	BI4	.720
EP3	.642	BI6	.706
EP1	.618	BI5	.684
EP5	.590	BI1	.627
		BI2	.610

### 4.2 Structural equation model

A structural equation modeling (SEM) software, LISREL 8.80, was used to analyze the proposed model. An estimation method of maximum likelihood has been adopted. The results show that eight out of ten hypotheses achieved significant results. The results are summarized in <Table 3>. The two hypotheses from the external variable reputation and experience proved to be statistically insignificant, meaning that H7 and H10 are not supported by the proposed model and data.

<Table 3> Path Coefficient and Wald Statistics

	Hypothesis	Path. Coeff.	Wald Stat.
H1	PEOU → PU	0.46	4.26**
H5	Trust → PU	0.14	2.11*
H6	Security → PU	0.15	2.15*
H7	Reputation → PU	0.12	1.06
H9	Experience → PU	0.24	3.01**
H2	PEOU → ATU	0.25	1.97*
H3	PU → ATU	0.32	2.55**
H4	ATU → BI	0.76	8.04**
H8	Reputation → PEOU	0.57	5.66**
H10	Experience → PEOU	0.17	1.88

Note : \*\* : p < 0.01, \* : p < 0.05.

The squared multiple correlations coefficients ( $R^2$ ) of PU, PEOU, ATT and BI are estimated to be 0.70, 0.46, 0.28 and 0.58, respectively.  $R^2$  is the percentage of explained variance in a dependent variable by all the independent variables, and it is recommended to be greater than 0.2 [10]. Therefore, the constructs of the proposed model can be assumed to explain much of the variance satisfactorily.

In order for the proposed model to be valid, there should be no large discrepancy between the theoretical model and the observed data, which requires that goodness-of-fit indices should show good results. For this, various relevant statistics and indices may be used. In this paper, a set of indices which have been recommended by [10] is adopted. Chi-square statistic is often referred to as either badness of fit or a lack of fit measure and there are limitations in its use. So, the ratio of the chi-square to degrees of freedom ( $X^2/df$ ) or the relative/normed chi-square is utilized in many cases. The value of the proposed model was 1.56, which falls within the acceptable range. Other indices such as comparative fit index (CFI), normed fit index (NFI), standardized root mean square residual (SRMR) and root mean square error of approximation (RMSEA) were also assessed. In general, the model fit is considered to

be adequate if CFI and NFI are larger than 0.95, SRMR is smaller than 0.05, and RMSEA is smaller than 0.06. In this study, the CFI value is 0.96 and RMSEA 0.043 which satisfies the recommended criterion. Although, NFI value is 0.91, it is still significant at the cutoff of not less than 0.80. SRMR was 0.069, which is higher than the recommended value. Therefore, it can be said that the model basically has a good fit with the sample data.

### 5. Discussion

The proposed model of this study can be considered as an application of extended TAM because it uses the TAM framework to explain the attitude and behavior of users in the context of online shopping for developing countries. In comparing the path coefficients of antecedents of attitude, PU emerged as more powerful predictor of attitude toward B2C e-commerce than the other belief factors. This supports most of TAM research findings for usefulness [3, 5]. This is also consistent with previous TAM research works for online shopping in developed countries.

However, the antecedent-influence pattern is different from that of developed countries. First, the impact of trust in the proposed model is significant, but the strength is just moderate. This is contrary to many of the TAM-based research findings which are mostly for developed countries [9]. This may be due to the difference of shopping style. Online users in developing countries are much more accustomed to offline stores, whose level of trust is not so high, compared to the cases of developed countries. Thus, they take for granted low-level trust arising from actions such as refusal to accept returns. Therefore, a moderate level of trust is acceptable for them. Another antecedent, security, also turned out to be just moderately fair. Due to the increasing number of products sold on the internet and the growing number of online buyers, security is deemed important in developing countries. However, because of the limited volume of transactions in developing countries, security problems are not so seriously perceived as in developed countries. Huge volume of transactions means a large amount of money involved, which will attract potential offenders.

The behavior of the remaining antecedents, reputation and experience, are also different from the results of previous research. Reputation and experience affect PEOU and PU respectively, but their influence over PU and PEOU turned out to be statistically insignificant. Reputation is an implication of

quality, and increasing market competition drives the improvement of an online store's web site's quality. Thus, both popular and local sites are offering better and easy-to-use interface functionality in online shopping. For that reason, users can easily manage to use any online store without difficulties, regardless of the reputation. Also, reputation is acquired through continuous positive actions. Thus, obtaining reputation for online stores requires frequent interaction with them. Because the respondents of this study are mostly infrequent users, they may not have time to appreciate the usefulness of online shopping.

The reason why the antecedent experience resulted an insignificant path to PEOU can be explained as follows. Previous study has proven that computer and internet experience are requisites in online shopping activity [8]. However, in these days, even relatively inexperienced users may deal with online shopping very easily. This leads to the conclusion that experience may not affect PEOU. On the other hand, many experienced users can easily find products that they want, search for cheaper prices of similar items on different online stores and manipulate web sites faster. This makes them feel compatible for usefulness, which means that experience positively affects PU.

## 6. Conclusion and further research issues

In this paper, a TAM-based theoretical model was proposed and tested to predict and explain information technology acceptance of B2C e-commerce in developing countries. The results show that the basic TAM beliefs are supported. PU and PEOU determine a person's attitude toward using B2C e-commerce, which in turn determines their intention to use it. However, as discussed in section 5, the antecedents show a different form of influence. Trust, security and experience positively affect PU and reputation positively affects PEOU, which is much the same as the previous findings for developed countries. But reputation on PU and experience on PEOU hypotheses are not supported. It is partly due to the difference in shopping behaviors and B2C e-commerce environment.

The authors hope that the results of this work would be useful for both academic societies and online e-commerce practitioners, helping them to better comprehend customers' online shopping behavior. However, for the promise to be fully realized, further research is required. First, more general sample data sets need to be tested. More diverse users such as mature online clients, less educated customers, and less experienced

users, other than student respondents of this research, should be tested to validate the proposed model. Also, additional concepts need to be included as antecedents, which may also influence technology acceptance in online shopping. Finally, a more rigorous test of the arguments of this study could be employed by using a longitudinal study which covers different time periods.

## References

- [1] Ahn, T., Ryu, S., and Han, I.; "The Impact of the Online and Offline Features on the user Acceptance of Internet Shopping Malls," *Electronic Commerce Research and Applications*, 3(4) : 405-420, 2003.
- [2] Ajzen, I. and Fishbein, M.; "Understanding Attitude and Predicting Social Behavior," Prentice-Hall, Englewood Cliffs, NJ, 1980.
- [3] Childers, T. L., Carr, C. L., Peck, J., and Carson, S.; "Hedonic and Utilitarian Motivations for Online Retail Shopping Behavior," *Journal of Retailing*, 77(4) : 511-535, 2001.
- [4] Crespo, A. H., Rodriguez Del Bosque Rodriguez, I. A.; "Explaining B2C E-Commerce Acceptance : An Integrative Model Based on the Framework by Gatingnon and Robertson," *Interacting with Computers*, 20(2) : 212-224, 2008.
- [5] Davis, F. D, Bagozzi, P. R., and Warshaw, P. R.; "User Acceptance of Computer Technology : A Comparison of Two Theoretical Models," *Management Sciences*, 45(8) : 982-1003, 1989.
- [6] Gefen, D.; "What Makes an ERP Implementation Relationship Worthwhile : Linking Trust Mechanisms and ERP Usefulness," *Journal of Management Information System*, 21(1) : 263-288, 2004.
- [7] Gefen, D., Karahanna, E., and Straub, D. W.; "Trust and TAM in Online Shopping : An Integrated Model," *MIS Quarterly*, 27(1) : 51-90, 2003.
- [8] Hamilton, M.; "Adding Contextual Specificity to the Technology Acceptance Model," *Computers in Human Behavior*, 22(3) : 427-447, 2006.
- [9] Holsapple, C. W. and Sasidharan, S.; "The Dynamics of Trust in B2C E-commerce : A Research Model and Agenda," *Information Systems and E-Business Management*, 3(4) : 377-403, 2005.
- [10] Hooper, D., Caughlan, J., and Mullen, M. R.; "Structural Equation Modelling : Guidelines for Determining Model

- Fit,” *The Electronic Journal of Business Research*, 6(1) : 53-60, 2008.
- [11] Koufaris, M. and Hampton-Sosa, W.; “The Development of Initial Trust in an Online Company by New Customers,” *Information and Management*, 41(3) : 377-397, 2004.
- [12] Walczuch, R. and Lundgren, H.; “Psychological Antecedents of Institution-Based Consumer Trust in E-retailing,” *Information and Management*, 42(1) : 159-177, 2004.