INTENTION TO PURCHASE VIA THE INTERNET: A COMPARISON OF TWO THEORETICAL MODELS

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ABSTRACT

This study compares two models for predicting intention to purchase via the Internet. The behavioral intention to purchase via the Internet was examined as a function of attitude towards purchase, perceived usefulness, and perceived ease of use Technology Acceptance Model (TAM), or attitude towards purchase, subjective norm, and perceived risk (Theory of Planned Behavior [TPB]). Results indicate that both models significantly influenced behavioral intention to purchase. We compared both models, and found that TPB (adjusted $R^2 = 0.55$) is better than TAM (0.44) in explaining behavioral intention to purchase (BI). After we integrated TAM and TPB, we found that perceived risk ($\beta = -0.332$) is the primary determinant of BI, with subjective norm (SN) ($\beta = 0.210$) as the significant secondary determinant, followed by attitude (A) towards purchase ($\beta = 0.175$), perceived usefulness ($\beta = 0.159$), and perceived ease of use ($\beta = 0.069$).

Keywords: Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Attitude (A), perceived usefulness (U), perceived ease of use (EOU), subjective norm (SN), perceived risk (PR), perceived value (PV), behavioral intention (BI), Model comparison

INTRODUCTION

The Technology Acceptance Model (TAM) which was developed by Davis (1989) has been widely used by researchers in predicting the adoption of information technology (Legris, Ingham, & Collerette, 2002; Mathieson, Peacock, & Chin, 2001). TAM states that usefulness (U) and ease of use (EOU) will influence behavioral intention (BI) to use a technology through attitude (A) as the mediating variable.

The use of TAM in predicting the adoption of information technology (IT) in making online purchases is not sufficient, as TAM only considers usefulness and ease of use as its independent variables for consumers' purchase decision via the Internet. In actual fact, consumers' purchase decision is also influenced by the perceived value of a product (Chapman & Wahlers, 1999; Sweeney, Soutar, & Johnson, 1999; Swait & Sweeney, 2000), the perceived risk if the purchase is

made (Barach, 1969; Donthu & Garcia, 1999; Garbarino & Strahilevitze, 2002; Smith & Sivakumar, 2002) and the subjective norm (SN) of the Internet user (Ryan & Bonfield, 1975; Oliver & Bearden, 1985; Cheung, Chang, & Lai, 2000; Malholtra & McCort, 2001). The three factors mentioned are important variables in consumers' decision making. Apart from that, these three independent variables are also found in the Theory of Planned Behavior (TPB) which was developed by Ajzen (1985, 1991). The variables in TPB are belief (perceived value), SN, and perceived behavioral control (perceived risk).

Consumer purchases through the Internet are steadily increasing. More than 90% of the Internet users in United States of America (USA) have made purchases via the Internet (http://www.bsa.org/usa/press/newsreleases, accessed on 2 July 2003), while in Singapore, more than 25% of the Internet users have purchased via the Internet (Phau & Poon, 2000). Forrester Research reported that online selling will reach USD269 billion in the year 2005, from USD45 billion in 2000 (Rohm & Swaminathan, 2002). The total number of the Internet users for the year 2002 in Indonesia was as big as 4.4 million (1.93% of its population), in Malaysia as many 5.7 million users (25.15% of its population) and 2.31 million users in Singapore (51.84% of its population) (http://www.nua.ie/surveys, accessed on 2 July 2003). Income derived from e-commerce for the year 2001 in Malaysia was around USD1000 million, USD800 million in Singapore and USD200 million in Indonesia.

This paper aims to compare TAM and TPB, and integrate the two models in predicting the BI to make online purchases among the Internet users in Indonesia, Malaysia, and Singapore.

THEORETICAL MODEL

TAM

TAM is an adaptation of the theory of reasoned action (TRA) which was developed by Fishbein and Ajzen (1975) and Ajzen and Fishbein (1980). Comparatively, TRA is more generic whereas TAM is more specific, whereby TAM which was developed by Davis (1989), is used to study the BI to use IT. As shown in Figure 1, there are two independent variables in TAM; U and EOU. These two variables will influence BI through attitude as the mediating variable. Davis, Bagozzi, and Warshaw (1989) defined U as the extent to which a person believes that using the system will enhance his or her job performance, and EOU as the extent to which a person believes that using the system will be free of effort.

Currently, TAM is commonly used by many researchers to predict the BI of using software such as office automation tools, software development tools, and business application tools (Legris et al., 2002). Unlike TRA, researchers such as Davis et al. (1989) and Chau and Hu (2002) discovered that subjective norm (SN) does not influence BI directly, which is the reason that SN is not included in TAM. Nevertheless, in the findings of Venkatesh and Davis (2000); Brown, Massey, Montoya-Weiss, and Burkman (2002); and Ma'ruf, Ramayah, Mohamad, and Lubis (2002), it was discovered that SN does significantly influence BI.

Venkatesh and Davis (1996) revised TAM by excluding attitude from the model as attitude does not fully mediate the relationship between EOU and U with BI. The findings of Brown et al. (2002) also did not support the role of attitude as the mediating variable towards the relationship between EOU and U with BI. The revised TAM (without the attitude construct) was successfully applied by Venkatesh and Davis (1996); Venkatesh and Davis (2000); Jantan, Ramayah, and Chin (2001); Ndubisi, Jantan, and Richardson (2001); Ramayah and Aafaqi (2004); Ramayah and Jantan (2004); Ramayah, Jantan, and Aafaqi (2003); and Ramayah, Ma'ruf, Jantan, and Mohamad (2002).

In this paper, attitude is still included in the model because consumer theory states that attitude is a crucial construct in predicting consumer purchase decisions (Howard & Sheth, 1967; Sheth, 1967; Bagozzi & Warshaw, 1990; Bobbitt & Dabholkar, 2001; George, 2002; Goldsmith & Goldsmith, 2002; Olson & Boyer, 2002).

Some researchers have used the TAM model to predict BI still used the original TAM (defending the attitude construct as the mediating variable). For instance, the researchers of Pin, Jantan, and Nasirin (2000); Lin and Lu (2000); Mathieson et al. (2001); Moon and Kim (2001); Chau and Hu (2002); Ma'ruf et al. (2002); O'Cass and Fenech (2003); Olson and Boyer (2002); and Riemenschneider, Harrison, Mykytyn, and Peter (2002).
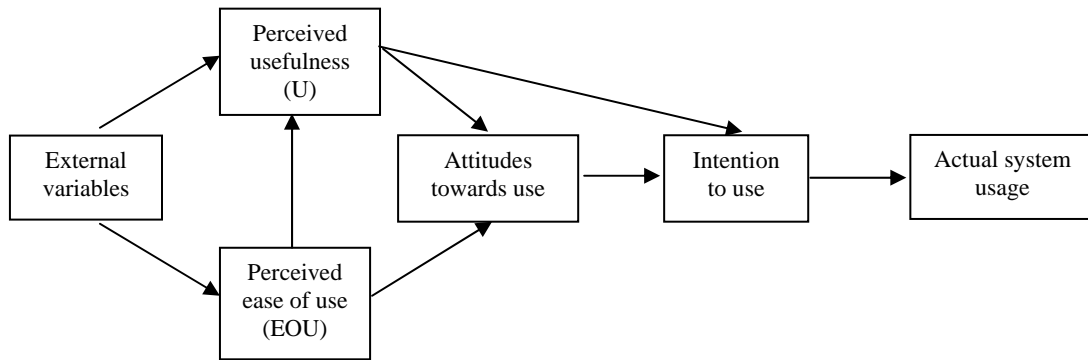
Figure 1. TAM (Davis et al., 1989)

TPB

Like TAM, TPB is also adapted based on TRA. This is due to the fact that TRA possesses certain limitations which have to do with the incomplete volitional control of behavior (Ajzen, 1991). Hence, in TPB, another construct is added to TRA which is called perceived behavioral control (PBC). According to TPB, a person's BI can be explained directly by A, SN and PBC. Belief also influences BI through A as the mediating variable.

Attitude towards behavior is defined as a person's favorable/unfavorable evaluation of the behavior in question, while SN refers to perceived social pressure to perform (or not to perform) the behavior in question. PBC relates to the extent to which the person believes that he/she has control over personal or external factors that may facilitate or constrain the behavioral performance (Ajzen, 1991).

TPB is also used widely in predicting BI. For example, in consumer behavior studies conducted by Shim, Eastlick, Lotz, and Warrington (2001) who endeavored to predict consumers' intention to purchase via the Internet revealed that all three variables, A, SN, and PBC significantly influence the intention to use the Internet for information search. Figure 2 presents the model of TPB.
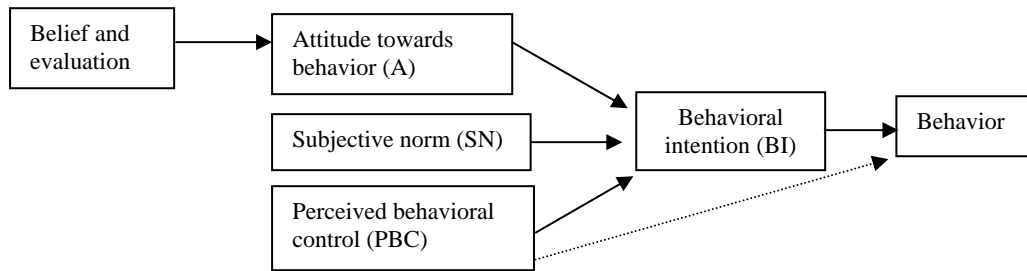
Figure 2. TPB

METHODOLOGY

As mentioned in the earlier sections of this paper, the objective of this study is to compare the two models, TAM and TPB. Apart from that, this paper also combines TAM and TPB to see if there is greater prediction power. Thus, there are two variables which are shared by both TAM and TPB, which are attitude (AP) and behavioral intention (BI). For the purpose of this study, AP towards purchase via the Internet and BI to purchase is used. The measurement for AP is adapted from Shim et al. (2001); Venkatesh, Morris, and Ackerman (2000); Chung and Ackerman (2000); and Hu, Chau, Sheng, and Tam (1999), while the measurement for BI is adapted from Koufaris (2002); Shim et al. (2001); and Chung and Pysarchik (2000).

The variables U and EOU are variables adapted from TAM. The measurement for U is derived from Chen, Gillenson, and Sherrell (2002); Koufaris (2002); and Moon and Kim (2001), while the measurement for EOU is adapted from Koufaris (2002); Moon and Kim (2001); and Davis et al. (1989). On the other hand, the variables which are adopted from TPB are perceived value (PV), perceived risk (PR) and SN. The measurement for PV is adapted from Cronin, Brady, and Hult (2000); Chapman and Wahlers (1999); and Sweeney, Soutar, and Johnson (1999), the variable PR from Grewal, Gotlieb, and Marmorstein (1994); and Salisbury, Pearson, Pearson, and Miller (2001). The variable SN is adapted from Shim et al. (2001); Venkatesh and Davis (2000); and Bagozzi, Baumgartner, and Yi (1992).

The population used for this study was the Internet users of Indonesia, Malaysia, and Singapore. In the year 2002, the Internet users in Indonesia are 1.93% of the whole population or 4.4 million people. In Malaysia, 25.15% of the whole population or 5.7 million people, and the Internet users in Singapore was 50.70% of the whole population or 2.26 million people (http://www.nua.ie/surveys, accessed on 2 July 2003).

Sixty newsgroups were selected for this study; 20 newsgroups from each country. Invitation letters to participate in this research was sent out to 60 newsgroups. However, out of the 20-selected Indonesian newsgroups, only six newsgroups were willing to distribute the questionnaires to their members. The total number of members from the six newsgroups was 997 members. Besides that, three newsgroups from Malaysia distributed the questionnaires to 12,227 members while in Singapore only one newsgroup distributed to its 616 members. As many as 200 online invitation letters were sent to the e-mail addresses of the Internet users in Indonesia, Malaysia, and Singapore.

As many as 753 responses were received, 357 Internet users from Indonesia, 336 Malaysian Internet users and 60 Singaporean Internet users. Overall, the average age of the respondents is 31.08. More than half of the respondents are college-educated and are married (51.50%). Table 1 summarizes the participants' profile.

Table 1 also shows that more than half (57%) of the Internet users have not tried online purchasing. This presents a great difference if compared to the Internet users of USA, whereby 93% of its Internet users have purchased via Internet before (http://www.bsa.org/usa/press/news releases, accessed on 2 July 2003). Among the three countries, Singapore holds the highest record of online purchasing, whereby 70% of its Internet users have purchased online before. About 85% of respondents admitted to have used the Internet for more than two years, indicating that these respondents are suitable for analysis considering their two years of experience.

TABLE 1
PROFILE OF PARTICIPANTS IN VARIOUS COUNTRIES

	Indonesia	Malaysia	Singapore	Aggregate
1. Number of respondents	357	336	60	753
2. Mean years of age	30.87	31.00	32.08	31.08
3. The highest level of education: college	54.50%	55.10%	51.70%	54.60%
4. Marital status: married	55.50%	48.50%	45.00%	51.50%
5. Using the Internet: two years or more	77.60%	94.30%	88.30%	85.90%
6. Spent time a week for surfing: more than 10 hours	58.80%	56.50%	66.70%	58.40%
7. Tried purchase via Internet	44.30%	36.60%	70.00%	57.10%

RESULTS

Factor Analysis and Scale Reliabilities

The factor analysis was done based on the type of variables, which is the independent variable (IV), mediating variable (MV), and dependent variable (DV). The factor analysis process with varimax rotation condensed the 21 indicators into four factors. This is consistent with previous findings which have collected all the indicators into four main constructs which are SN, PR, EOU, and PV. All constructs showed eigenvalues larger than 1, which are SN (8.474) with factor loadings in the range of 0.707 to 0.831, PR (2.204) with factor loadings in the range of 0.841 to 0.884, EOU (1.956) with factor loadings in the range of 0.688 to 0.734, and PV (1.416) with factor loadings in the range of 0.559 to 0.807. The variances that can be explained by each construct are 40.35% for SN, 10.49% for PR, 9.31% for EOU, and 6.74% for PV.

The results for the factor analysis also showed that the Kaiser-Meyer-Olkin (KMO) score for IV is 0.914, MV (U) is 0.864, and A is 0.877, with the factor loading of: U (0.743–0.854) and A (0.821–0.922). The KMO score for BI is 0.873 with the factor loading of (0.689–0.910).

The Cronbach Alpha reliabilities for the constructs are SN (0.93), PR (0.93), EOU (0.82), PV (0.77), U (0.88), A (0.92), and BI (0.91). Table 2 presents the results of the analysis done on goodness of data.

TABLE 2
GOODNESS OF DATA

Measure	Items	Factor loading	KMO	Eigenvalue	Variance explained	Cronbach's alpha
Independent variables						
SN	7	0.707–0.831	0.914	8.474	40.35%	0.93
PR	4	0.841–0.884		2.204	10.49%	0.93
EOU	5	0.688–0.734		1.956	9.31%	0.82
PV	5	0.559–0.807		1.416	6.74%	0.77
Mediating variables						
U	5	0.743–0.854	0.864	3.359	67.19%	0.88
A	5	0.821–0.922	0.877	3.844	76.88%	0.92
Dependent variable						
BI	6	0.689–0.910	0.873	4.156	69.26%	0.91

Explaining Behavioral Intention

From Table 3, both TAM and TPB can significantly explain the variance in the dependent variables. The coefficient of determination (R^2) for TAM's regression is 0.442, showing that 44.2% of variance in BI can be explained by A and U. On the other hand, the coefficient of determination (R^2) for TPB is 0.551 meaning 55.1% of variance in BI is explained by A, SN, and PR.

TABLE 3
PREDICTING AND EXPLAINING BI AND A WITH TAM AND TPB

Model	R^2	Adjusted R^2	Beta
(2) TAM			
BI=A + U	0.442***	0.441***	
A			0.400***
U			0.332***
A=U + EOU	0.477***	0.476***	
U			0.443***
EOU			0.316***
U=EOU	0.419***	0.418***	0.647***
(3) TPB			
BI=A + SN + PR	0.551***	0.550***	
A			0.273***
SN			0.278***
PR			-0.348***
A=PV	0.317***	0.316***	0.653***

*p<0.05, **p<0.01, ***p<0.001

TAM	= Technology Acceptance Model	TPB	= Theory of Planned Behavior
BI	= Behavioral intention to purchase	A	= Attitude towards purchase via Internet
U	= Usefulness		
PV	= Perceived value	EOU	= Ease of use
PR	= Perceived risk	SN	= Subjective norm

A closer look at the IV individually indicated that the contribution of the IV towards either TAM or TPB were significant, which are: (1) the contribution for BI towards TAM by A is higher ($\beta = 0.400$) compared to U ($\beta = 0.332$); and (2) the contribution for BI towards TPB by PR is higher ($\beta = -0.348$) compared to SN ($\beta = 0.278$) and A ($\beta = 0.273$).

Explaining A

Similar to the prediction on BI, both TAM and TPB can significantly influence A (Table 3). The coefficient of determination (R^2) for A's regression in TAM is 0.477 or 47.7% of the variance in A can be explained by U and EOU, whereas the coefficient of determination (R^2) for A's regression in TPB is 0.317 or 31.7% of the variance explained by PV.

Individual influence demonstrated that all IV have a significant influence on A, both in TAM or in TPB whereby: (1) the contribution of A in TAM is U ($\beta = 0.443$) and EOU (0.316), and also (2) contribution of A in TPB is PV ($\beta = 0.653$).

Attitude's Role as a Mediating Variable

Hierarchical regression was used to test A role as a MV. The test was carried out in two stages. The first stage whereby U is included in TAM, then A is added in the second stage. Aside from that, PV is added in the first stage for the test of A on TPB, followed by A for the second step (Table 4). The test results for TAM and TPB showed partially mediated results where the adjusted R^2 increased. Nevertheless, the relationship between U on TAM and PV on TPB with BI in the second stage still remained significant.

TABLE 4
RESULTS OF HIERARCHICAL REGRESSION ANALYSES OF TAM AND TPB

Variable	Step 1	Step 2
(1) TAM		
A as mediating variable on BI		
U	0.591***	0.332***
A		0.400***
Adjusted R^2	0.348	0.441
U as mediating variable on A		
EOU	0.603***	0.316***
U		0.443***
Adjusted R^2	0.603	0.691
(2) TPB		
A as mediating variable on BI		
PV	0.480***	0.196***
A		0.505***
Adjusted R^2	0.230	0.403

*$p<0.05$, **$p<0.01$, ***$p<0.001$

Integrated Models

It can be concluded that the relationship between constructs in TAM and TPB is very strong. The two models can be explained clearly by the IV. The integration between TAM and TPB was done by Chau and Hu (2002) who studied health care professionals' decisions to accept telemedicine; and Riemenschneider et al. (2002) who studied IT adoption decisions of small business executives regarding a website.

BI via the Internet on the integrated model can be significantly explained by the IV (Table 5). The coefficient of determination adjusted (R^2) is 0.569 indicating that 56.9% of variance in BI can be explained by A, SN, PR, U, and EOU. If we were to compare TAM (adjusted $R^2 = 0.441$) with TPB (adjusted $R^2 = 0.550$), it can be concluded that the integrated model is much stronger (adjusted $R^2 = 0.569$). Looking at the influence of variables individually, three biggest variables which influence BI in the TPB models are PR ($\beta = -0.332$) which has the biggest potential of influencing BI, the second largest influence on BI is SN ($\beta = 0.210$), and the third strongest to influence BI is A ($\beta = 0.175$). This is further followed by the variable in the TAM, which is U ($\beta = 0.159$), and EOU ($\beta = 0.069$).

TABLE 5
PREDICTING AND EXPLAINING BI AND A WITH INTEGRATED MODEL
(TAM AND TPB)

Model	R^2	Adjusted R^2	Beta
BI=A + SN + PR + U + EOU	0.572***	0.569***	
A			0.175***
SN			0.21***
PR			–0.332***
U			0.159***
EOU			0.069**
A=U + EOU + PV	0.505***	0.503***	
U			0.336***
EOU			0.275***
PV			0.215***
U=EOU	0.419***	0.418***	0.647***

*p<0.05, **p<0.01, ***p<0.001

TAM	=	Technology Acceptance Model	TPB	=	Theory of Planned Behavior
BI	=	Behavioral Intention to purchase	A	=	Attitude towards purchase via Internet
U	=	Usefulness	EOU	=	Ease of use
PV	=	Perceived value	SN	=	Subjective norm
PR	=	Perceived risk			

As shown below in Table 6, PV, EOU and U have a significant influence on BI. When it comes to the second stage whereby PV, EOU, and U is controlled by A, it is discovered that the three independent variables (PV, EOU, and U) still significantly influenced BI although the beta values for PV, EOU, and U have reduced. Thus it can be concluded that A possesses the ability to mediate partially the relationship between PV, EOU, and EOU with BI.

TABLE 6
RESULTS OF HIERARCHICAL REGRESSION ANALYSIS OF
INTEGRATED TAM AND TPB MODEL

Variable	Step 1	Step 2
A as mediating variable on BI		
PV	0.154***	0.085*
EOU	0.182***	0.260***
U	0.378***	0.078*
A		0.351***
Adjusted R^2	0.389	0.450

*$p<0.05$, **$p<0.01$, ***$p<0.001$

DISCUSSION AND CONCLUSION

The main objective of this research was to compare TAM and TPB. When these two models were compared, it was shown that the ability to explain A, SN, and PR towards BI for TPB (55%) is stronger compared to ability to explain A and U towards BI in TAM (44.1%). This finding does not agree with the findings of Chau and Hu (2002) who studied health care professionals' decisions to accept telemedicine. The difference is probably due to the dissimilarity in the area of research, whereby the research of Chau and Hu (2002) is more inclined to the mandatory setting whereas this study is more inclined towards the voluntary setting. In the condition of mandatory setting, the employee has only two choices, which are to accept the technology or leave the organization (Brown et al., 2002). In the voluntary setting, the individual is free to decide his/her choice. Therefore, in the BI via the Internet model, the decision to buy is influenced more by the variables in TPB, namely A, SN, and PBC (PR) compared to the variables contained in TAM which are EOU and U. This is similar to the models developed in the area of consumer research, which are individual choices, systematic choices, and voluntary choices (Sheth, Newman, & Gross, 1991). The integrated model of TAM and TPB can be applicable only if the BI via the Internet is based on the individual desire of the Internet users, the product to be purchased is readily through e-retailing and the product purchase is voluntary in nature.

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