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Sawang, S, Sun, Y & Salim, SA

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It's not only what I think but what they think! The moderating effect of social norms

Abstract

The current research extends our knowledge of the main effects of attitude, subjective norm, and perceived control over the individual's technology adoption. We propose a critical buffering role of social influence on the collectivistic culture in the relationship between attitude, perceived behavioral control, and Information Technology (IT) adoption. Adoption behavior was studied among 132 college students being introduced to a new virtual learning system. While past research mainly treated these three variables as being in parallel relationships, we found a moderating role for subjective norm on technology attitude and perceived control on adoption intent. Implications and limitations for understating the role of social influence in the collectivistic society are discussed.

Keywords: Technology adoption; Social influence; Subjective norm; Theory of Planned Behavior

1. Introduction

Chinese higher education faces the challenge of growing numbers of students and wide geography (Qiyun, 2007). As a result, Chinese higher education gradually moves from traditional classroom toward e-learning. The Chinese government has initiated a number of national projects to set up or upgrade the Information Technology (IT) infrastructure for better online teaching delivery. Chinese universities gradually introduce online teaching platforms from very simple functions of information dissemination and resource-sharing towards more sophisticated functions such as Blackboard collaboration (Zhuzhu & Weiyuan, 2005). In many Chinese universities, this virtual learning system is a voluntary technology among students. Implementing technological innovations is a challenging, high-risk task for many institutions (Kozma & Voogt, 2003; Romiszowski, 2004). Institutional adoption of a given technology is no guarantee that the implementation will be effective (i.e., a sufficient proportion of the institutional members agree to use technology efficiently) (Sawang & Unsworth, 2011). Technological innovations that fail to be implemented effectively can be very costly, both in terms of their implementing costs and foregone benefits (Unsworth, Sawang, Murray, Norman, & Sorbello, 2012). Our study thus aims to identify and examine significant factors that contribute to technological adoption by Chinese students.

Information Technology acceptance and usage are the key dependent variables in the Information System (IS) literature. Many authors have used the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) to explain users' behavior and illustrate three major independent predictors of IT adoption, i.e., attitude, social influence, and perceived control (e.g. Benbasat &Barki 2007; Hsu & Lu 2004; Lee 2009; Sentosa & Mat, 2012). However, past research mainly treats these three variables as being in parallel relationships. Our study further attempts to explore the interaction effects between paired constructs of TPB. Consequently, the contributions of our study are twofold. First, our study

sheds light on the nature and moderating role of subjective norms, which is still not well understood. Second, a theoretical rationale is provided for a critical buffering role of social influence in the collectivistic culture on the relationship among attitude, perceived behavioral control, and IT adoption.

The remainder of this paper is organized as follows. In the next section there is a theoretical framework discussion. In this section, three underpinning constructs will be discussed further. The data analysis methods used to validate the scales and test the research model are then presented, with the results of the study discussed. The study concludes with a discussion of the theoretical and practical implications of the results.

2. Theory of Planned Behavior (TPB)

Originating from the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB) has been well validated to provide an understanding of and a prediction of people's use of technology (Pelling & White, 2009). The TPB is a social psychological model aimed at understanding the link between attitudes and behavior (Yousafzai, Foxall, & Pallister, 2010). TPB explains that individuals' intentions to perform behavior are the immediate antecedent of that behavior. Intention is predicted by the interaction of three factors: 1) attitudes; 2) subjective norms; and 3) perceived behavioral control. Management, education, and Information Systems research commonly used behavioral decision theories such as TAM (Davis, 1989), TRA, (Fishbein & Ajzen, 1975) and TPB (Ajzen, 1991) to explain individual adoption behavior (see Brown & Venkatesh, 2005; Lee, 2009; Pelling & White, 2009) . Having the same grounded concepts and principles does not mean that these three theories will be suitable for every kind of technologies. Different levels of complexity of technologies call upon us to look carefully at which of these three theories is the most appropriate to our research context. We reviewed recent studies and found that TAM is commonly used to

examine standalone software such as personal computers and mobile phones (e.g., Schepers & Wetzels, 2007). However, TAM has been widely criticized that the model is overly focused on individuals' perceived usefulness and ignores the essentially social aspects of IS adoption (Bagozzi, 2007). Likewise, the Unified theory of acceptance and use of technology (UTAUT), which is the extended model of TAM, has been criticized as a stage of chaos (i.e. 41 independent variables) and less parsimonious than TAM model (Bagozzi, 2007; Van Raaij & Schepers, 2008). Due to these limitations, TPB, an extended model of TRA, is a widely adopted framework in innovation adoption literature. TPB includes the notion of social influence, which is a critical factor for Chinese IT users (which will be a detailed discussion in section 3). Further the TPB accounted for 27% and 48% of the variance in behavior and intention (Armitage & Conner, 2001; French et al., 2005; Sawang & Unsworth, 2011). Therefore, TPB is deemed appropriate as our research framework.

2.1. TPB construct: Attitude

Similarly to TAM, TPB suggests that a person's intention to adopt technology is a function of the person's attitude toward innovation (Yousafzai, Foxall, & Pallister, 2010). This attitude is defined as the individual's overall positive or negative evaluation of the behavior (Pelling & White, 2009), including beliefs and valance about the perceived behavioral outcomes (Jacobs, Hagger, Streukens, Bourdeaudhuij, & Claes, 2011). Attitude is considered one of the most significant predictors of behavior. Past research demonstrated a positive relationship between the individual's attitude and technology adoption. For example, a survey study among 1012 mobile phone Singaporean consumers indicated that a positive attitude led to the adoption of a WAP-enabled mobile phone (Teo & Pok, 2003). This was similar to a study by Howcroft, Hamilton, and Hewer (2002) that illustrated that consumers' positive attitudes directly impacted on their adoption of home-based banking. An example of

attitude question is "Using [technology name] is a good idea." In line with previous literature, we hypothesize that:

Hypothesis 1: Individual attitudes toward a technology will positively influence the adoption intent.

2.2. TPB Construct: Perceived behavioral control

The second TPB's construct, Perceived Behavioral Control (PBC) is defined as a person's intention to adopt new technology based on the extent to which the person believes that he or she has control over personal or external factors that may facilitate or restrain the behavioral performance (Ajzen, 1991). PBC could also be explained as a person's perception of how easy or how difficult it would be to carry out the behavior of interest (Ajzen, 1991; Pelling & White, 2009). Taylor and Todd (1995) concluded that self-efficacy, resource facilitating conditions, and technology facilitating conditions were the determinants of the PBC construct. Several studies that applied TPB to prediction intentions have consistently suggested that PBC positively impacts the intention to adopt new technology. For example, perceived control (defined as level of controllability and self-efficacy) was the second most salient predictor (after attitude) of e-commerce adoption among internet users (Pavlou & Fygenson, 2006). An example of perceived behavioral control question is "I possess the knowledge necessary to use [technology name]." Hence, we hypothesize that:

Hypothesis 2: Individual perceived behavior control toward a technology will positively influence adoption intent.

2.3. TPB Construct: Subjective norm

When technology is relatively new, individuals may have insufficient knowledge or information to form their feelings toward the new technology. Therefore, behavioral intention can be influenced greatly by the opinions expressed by significant others (Thompson, Higgins, & Howell, 1994). Social influence is defined as the degree to which an

individual perceives that important others believe he or she should use the new system (Venkatesh, Morris, Davis, & Davis, 2003). In technology adoption literature, social norms very much explain new media adoption (Webster & Trevino, 1995). For example, a quasi-experiment of 70 US manufacturing employees indicated that peers influenced individual media choice. Studies by Hung , Ku, and Chang (2003) and Kleijnen, Wetzels, and de Ruyter (2004) also supported the positive influence of social norms on mobile service adoption. Individuals can be influenced by social norms, peers, and their significant others. An example of subjective norm question is "My [name of significant other, e.g. supervisor] thinks I should use [technology name]." In line with previous studies, we hypothesize that: *Hypothesis 3: Individuals' perceptions of subjective norms will positively influence adoption intent.*

However, some of the studies included subjective norm in their models but did not find a significant prediction (direct effect) of subjective norm on adoption intention (e.g. Chau & Hu, 2002; Lewis, Agarwal, & Sambamurthy, 2003). Nonetheless, these studies only examined the direct effect of subjective norm. We expect that subjective norm or social influence perhaps buffers the impact of attitude/perceived behavioral on adoption intent, especially in our Chinese sample. The next section (section 3) will discuss the potential buffering effect of subjective norm/social influence on Chinese IT users.

3. Social influence and Chinese IT users

Individuals with collectivistic values possess more collective-self cognition, compared to persons with individualistic values (Trafimow, Triandis, & Goto, 1991). Chinese people tend to focus on the goals of the group to which one belongs, attention to fitting in with others, and appreciation of commonalities with others (Bagozzi, Wong, Abe, & Bergami, 2000). Especially for young Chinese individuals, such as university students, social influence has

become a significant factor driving their adoptive behavior as with online gaming (Hsu & Lu, 2004), mobile banking (Luarn & Lin, 2005) and social networking (Hsu & Lin, 2008).

Based on social identity theory, individuals are motivated to achieve and maintain positive concepts of themselves (Brown, 2000). Thus, individuals adopt a new learning technology in order to comply with group norms or to enhance their image within the group (Bock, Zmud, Kim, & Lee, 2005). Social norms play stronger behavioral roles in collectivistic societies. China is a primarily collectivistic society, with emphasis on the group and on authority. The Chinese culture is derived from Confucian thinking, which emphasizes harmony and individual responsibility to groups (Triandis, 1995).Thus, most Chinese individuals avoid separating or disconnecting from the group (Markus & Kitayama, 1994).

The important virtue in China is to maintain balance and harmony with the group (Fan, 2000). While social norms can be experienced as social pressure on one's behavior, in China social norms are not pressure to conform but rather a deliberation to conform in the sense of being connected to others (Suh, Diener, Oishi, & Triandis, 1998). This concept is also akin to social compliance, which refers to conformity to social and normative reference group influence (Escalas & Bettman, 2003). The collective values can influence individuals' needs to identify with others or to enhance their image by showing a willingness to conform to others' expectations regarding the use of a technology. For instance, Park, Yang, and Lehto (2007) examined mobile technology adoption among Chinese users. They found that social influence is the strongest influential factor on attitude and adoption intent. Park et al.'s study shed important light on social influence and attitude. Social influence can be viewed as acquisitive self-presentation to try to avoid disapproval from others (Arkin, 1981).

Relevant to our research context, we argue that when individuals perceive low levels of control over a new technology, high levels of social influence can buffer the relationship

between low levels of perceived control and adoption intent. As we discussed previously, the need for self-presentation behavior among collectivistic individuals such as the Chinese is intended to maximize the approval and minimize the disapproval of both one's contemporaries and one's reference groups (Heine, Takata, & Lehman, 2000). Thus, individuals' low perceived control over a new technology can be overcome by the need for social approval. We further argue that the role of social influence will play a role above and beyond the role of perceived control among Chinese users. The young Chinese generation is somewhat different from their traditional parents' generations as they are more open-minded and eager to learn (Schewe & Meredith, 2004). Thus, this young generation tries to conform to others' expectations regarding new technology adoption and thus are not afraid to try a new technology, even though they may not be fully confident with their technology controllability (Escalas & Bettman, 2003).

In line with our justification, the role of social influence can then also influence the relationship between attitude and adoption intent, similarly to perceived controllability and adoption intent. According to self-control theory (Geertz, 1975; Singelis & Brown, 1995), in the Chinese culture, individuals view themselves as interdependent with significant others. Thus, individuals are motivated to find a way to fit in with relevant others, to become part of various interpersonal relationships (Markus & Kitayama, 1991). As a result, individuals' attitudes and needs are assigned as secondary and interdependent others' opinions and needs are primary. For example, Chinese people tend to act primarily in line with the anticipated expectations of others and social norms, rather than their internal wishes (Yang, 1981) . Chinese virtue (*jen-ai)* especially emphasizes maintaining balance and harmony with the group (Fan, 2000). Therefore, personal attitudes can be moderated by social influence, in the Chinese users' context. We thus expect that with a low positive attitude toward a new

technology, high levels of social influence will enhance the relationship between that attitude and adoption intent.

Chinese has a very unique culture and social context. Our study thus aims to elaborate the role of social influence, which plays a major role among Chinese consumers. Therefore, we argue that, in the Chinese context, social norms will not only have a direct impact on behavioral intention, but also strong social norms will buffer the relationships between attitude, perceived control, and behavioral intention as well. Our study thus aims to examine the proposed model as in Figure 1.

Hypothesis 4: The positive effects of attitude and adoption intent would be more marked when individuals perceive high levels of subjective norm.

Hypothesis 5: The positive effects of perceived behavioral control and adoption intent would be more marked when individuals perceive high levels of subjective norm.

Insert Figure 1 here

4. Method

To test the research model, we gathered data from students' voluntary usage of the Blackboard course management system at a Chinese university. Data were collected through a questionnaire approximately three months after the introduction of the system to ensure the users had adequate experience of the system. We collected 132 useful respondents' data after excluding the surveys due to missing data. The questions for measuring the constructs (see appendix), including attitude, perceived behavioral control, subjective norm, and intention to adopt/continue use, were adapted from previously-validated studies and modified to fit the research context for the Blackboard system (e.g., Taylor & Todd, 1995; Venkatesh, Morris, Gordon, & Davis, 2003). Previous literature suggests that gender and age may affect users' behavioral intentions towards the information system (Venkatesh et al.

2003). Besides, since non-adopters and adopters belong to the same context, we set up a dichotomous variable named UserType to indicate whether the respondent was an adopter (1) or a non-adopter (0). Hence, we considered gender, age, and UserType as control variables in our research model.

5. Data analysis and results

5.1. Reliability and validity

Descriptive statistics, correlations, and reliability coefficients for focal variables of this study are displayed in Table 1. The mean and standard deviation were calculated based on the average of the respective three items for all multi-item constructs. Then Cronbach's alpha was used to assess for reliability (Cronbach, 1951). The results indicated that the Cronbach's alpha value of all constructs was higher than 0.70, shown in Table 1, suggesting adequate reliability (Nunnally, 1978).

Insert Table 1 here

We further conducted confirmatory factor analysis to test the composite reliability, convergent validity, and discriminant validity of the measurement model. All of our hypothesized constructs were modeled as reflective measures of their respective indicators. The four-factor model fitted the data well ($\chi 2 = 78.89$, df = 48, NFI = 0.96, NNFI = 0.98, CFI = 0.98, RMSEA = 0.070, SRMR=0.078). As shown in Table 1, each of our four scales had composite reliability exceeding 0.70, assuring adequate reliability for our measurement scales.

For convergent validity, all item loadings were significant and larger than 0.5. Furthermore, from principal diagonal elements of Table 1, we can see that the square root of AVE values exceeded 0.71 for all constructs, i.e., their average variance extracted (AVE)

values exceeded 0.50. Hence, each of our measurement scales showed strong evidence for convergent validity (Fornell & Larcker, 1981).

Discriminant validity between constructs was assessed following Fornell and Larcker's (1981) recommendation that the square root of AVE for each construct should exceed the bivariate correlations between that construct and all other constructs. The inter-construct correlation matrix in Table 1 shows that the principal diagonal elements (square roots of AVE) exceeded all of the non-diagonal elements in that same row or column (bivariate correlations), demonstrating that the discriminant validity of all scales was adequate. Our preliminary analyses suggested adequate reliability, convergent validity, and discriminant validity.

5.2. Hypotheses testing

After ascertaining that the constructs could meet parametric requirements of the regression test, the hypotheses were tested using moderated multiple regression analysis as the established method for testing the interaction effects (Kankanhalli, Tan, & Wei, 2005). In moderated multiple regression, we controlled for possible confounding effects at Step 1. Then we tested the main effect of the predictors (i.e. attitude, subjective norm, and perceived behavioral control) on dependent variables after controlling for the influence of confounding variables at Step 2. Next, the two-way interaction terms between attitude x subjective norm, perceived behavioral control x subjective norm, and attitude x perceived behavioral control were entered at Step 3. Interaction terms were computed by multiplying two independent constructs. To alleviate possible collinearity problems, the values of independent constructs were centered before computing the interaction terms (Aiken & West, 1991).

A summary of our data analysis results is shown in Table 2. The third step in the regression equations explained 61.8% of the variance in adoption intent ($F(9,122) = 21.945$, $p < .001$). Table 2 (Step 2) demonstrated that attitude: Hypothesis 1 ($\beta = 0.223$, $t = 3.172$, p

< .01), and subjective norm: Hypothesis 3 (β = 0.546, *t* = 7.152, *p* < .001), but not for perceived behavioral control: Hypothesis 2 (β = 0.009, t = 0.135, *ns*), significantly influenced adoption intent.

Insert Table 2 here

Entry of the two-way interaction terms at Step 3 revealed a significant two-way interaction between perceived behavioral control and subjective norm: Hypothesis 5 (β = -0.179, *t* = 2.374, *p* < .05), but not for attitude and subjective norm: Hypothesis 4 (β = -0.036, *t* = -0.550, *ns*), on adoption intent. We also included the test of an interaction between attitude and perceived behavioral control as our ad hoc analysis. Although we do not hypothesize this relationship, we found a significant interaction between attitude and perceived behavioral control on adoption intent (β = -0.136, *t* = -1.994, *p* < .05). These interactions were plotted at one standard deviation above and below the mean (Aiken & West, 1991) as shown in Figures 2 and 3.

Insert Figure 2 here

Insert Figure 3 here

Visual inspection of Figure 2 shows that high levels of subjective norm were associated with higher adoption intent than those with perceived low levels of subjective norm, regardless of the level of perceived behavioral control. As shown in the figure, while there was a significant positive relationship between perceived behavioral control and intention to adopt/continue as high subjective norm, there was an insignificant negative relationship at low subjective norm. Simple slope analyses revealed that when subjective norm was high, the impact of perceived behavioral control on the intention to adopt/continue was significantly positive (slope = 0.305, t = 3.193, p < 0.01), and when subjective norm was low, the impact of perceived behavioral control on the intention to adopt/continue was

significantly positive (slope = -0.127, t = -0.987, n.s.). Hence, our hypothesis 5 was supported.

6. Discussion

Our paper aimed to extend our knowledge of the main effects of attitude, subjective norm, and perceived control over the individual's technology adoption. While past research mainly treated these three variables as being in parallel relationships, we found a moderating role for subjective norm on technology attitude and perceived control on adoption intent. Given the cultural context, collectivistic individuals give a priority to "in-group" relationships, such as the extended family and familiar acquaintances (Franke,Hofstede, & Bond, 1991). To maintain these relationships, collectivistic individuals tend to go along with the group's trend. As a result, we found that subjective norm was the strongest predictor of adoption intent among Chinese users. Our finding was also supported by previous IS literature such as Chiasson and Lovato's (2001) and Morris and Venkatesh's (2000) works. These authors illustrated that individuals were strongly influenced by subjective norm.

Perceived behavioral control correlated to adoption intent but was a non-significant predictor in our sample. The weak role of perceived behavioral control has also been found in other disciplines such as health sciences and social psychology as well as in IS literature. For example Godin, Valois, and Lepage (1993) concluded that perceived behavioral control did not impact on physical exercise behavior. Nonetheless, our results extend this knowledge by illustrating the interaction between perceived behavioral control and subjective norm. When individuals, who feel less control over the technology, are convinced that technology adoption can be personally rewarding (especially through the sense of group belonging and group harmony), they are more likely to adopt it voluntarily (Lee & Allaway, 2002).

Likewise, Venkatesh and colleagues (2003) also found that facilitating conditions were found to be non-significant predictors of IT adoption.

Our study found main effect of attitude and subjective norm significantly predicted adoption intent. Drawing from IS and social science literatures, attitude has been the strongest predictor for behavioral adoption among others (i.e., subjective norm and perceived behavioral control) (Armitage & Conner, 2001; Cooke & French, 2008). Attitude can be viewed as either affective or cognitive (Crites, Fabrigar, & Petty, 1994). The affective attitude defines how much the person likes the object of thought, while the cognitive attitude (which was used in our study) captures an individual's specific beliefs related to the object (Yang & Yoo, 2004). Unlike previous Western bases studies that noted attitude as the strongest predictor, our study, which employed Chinese IT users, found that subjective norm is the strongest predictor for adoption intent. This means among Chinese IT users, they are more concerned about other people's opinion, which is aligned with the traditional Chinese face value. The action of adopting innovations ahead of peers could be perceived by the Chinese consumer as a means to gain face or to increase their social status (Zhu & He, 2002). As a result, subjective norm appears to be the strongest predictor of adoption intent in our study.

It is important to evaluate our study in light of its limitations. First, our sample consisted of college students. Therefore, no organizational setting is considered in our data set. However, we expect this problem to be minimal since previous studies that used student samples yielded results similar to those that used organizational employees (Bhattacherjee & Premkumar, 2004). Second, attitude and perception may change over time. Our study aims to explore the moderating role of subjective norm, thus cross-sectional design is deemed to be sufficient. Nonetheless, future research can replicate our model using longitudinal design to examine the attitudinal changes over time.

7. Conclusion

Our findings have important practical implications for promoting IT adoption in collectivistic societies. Our study has provided some preliminary evidence demonstrating the important role of social norms among Chinese adopters. This is an important factor in designing a campaign to promote technology adoption in a specific context as social norm is deemed to be the most influential factor for collectivistic society such as China. Chinese IT users see technology adoption as a social status gain and social status loss avoidance. To promote the adoption rate among Chinese users, we should position the technology in ways that can provide their potential users with positive experiences. This is because Chinese users are heavily influenced by interpersonal social network (e.g. peers, supervisors, family, media etc). Therefore, 'word of mouth' can affect their adoption decisions and Chinese users may follow others to take up innovations. Future research can further examine and unpack the role of social media and social networks on adoption decision among Chinese users, especially for the young user group, such as Generation Y.

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Appendix A. Measurement Items

Attitude	Using the Blackboard system is a good idea. The Blackboard system makes work interesting. The Blackboard system is fun to use.
Perceived Behavioral Control /Facilitating conditions	I have the resources necessary to use the Blackboard system. I think my teacher or peer students can assist me if I have trouble with the Blackboard system. I possess the knowledge necessary to use the Blackboard system.
Subjective Norm/Social influence	My peer students think I should use the Blackboard system. Peer students who collaborate with me think I should use the Blackboard system. My teachers think I should use the Blackboard system.
Intention to adopt (for non-adopters)	I intend to use the Blackboard system in the near future. I predict I would use the Blackboard system in the near future. I plan to use the Blackboard system in the near future.
Intention to continue use (for adopters)	I intend to continue using the Blackboard system in the near future. I predict I would continue to use the Blackboard system in the near future. I plan to continue using the Blackboard system in the near future.

Table 1. Descriptive statistics and correlations

Variable		**α**	**Composite Reliability**	**Mean (SD)**	**ATT**	**PBC**	**SN**	**INT**
Attitude	ATT	0.88	0.89	4.69 (0.95)	0.85			
Perceived behavioral control	PBC	0.88	0.88	5.10 (0.99)	0.38	0.85		
Subjective norm	SN	0.76	0.81	4.52 (0.92)	0.55	0.41	0.78	
Intention to adopt/continue	INT	0.93	0.94	4.71 (1.06)	0.57	0.34	0.73	0.91

[a] N=132; All correlations in tables above are significant at the 0.01 level; SD = standard deviation

[b] Diagonal elements represent the square root of AVE for that construct.

Table 2. Moderated multiple regression analysis

Variables and statistics	β		
	Model 1	**Model 2**	**Model 3**
	Step 1: Controls		
Gender	-.027	-.101	-.107
Age	.048	-.003	.026
UserType	.495***	.129	.136**
	Step 2: Main Effects		
Attitude (ATT)		.223***	.188***
Perceived behavioral control (PBC)		.009	.083
Subjective norm (SN)		.546***	.506***
	Step 3: Interaction Effects		
ATT*PBC			-.136**
ATT*SN			-.036
PBC*SN			.179**
Model R^2	.242	.596	.618
Model F	13.618**	30.679***	21.945***

N=125; *** p<0.001, ** p<0.01, * p<0.05

The betas reported are based on standardized coefficients

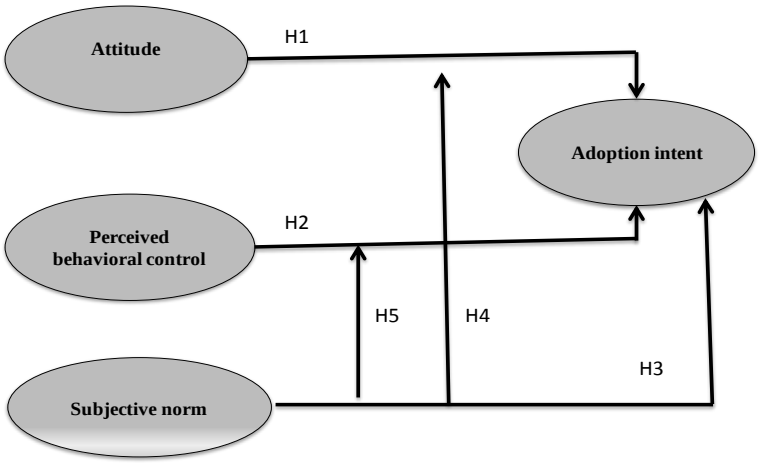

Figure 1: Research model

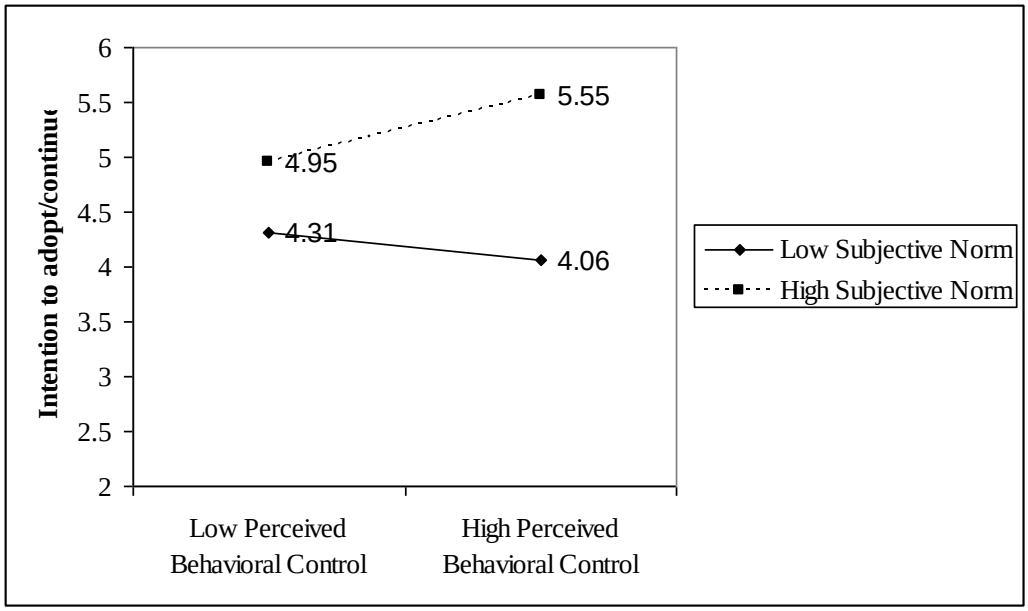

Figure 2. Moderating influence of subjective norm on the relationship between perceived behavioral control and intention to adopt/continue

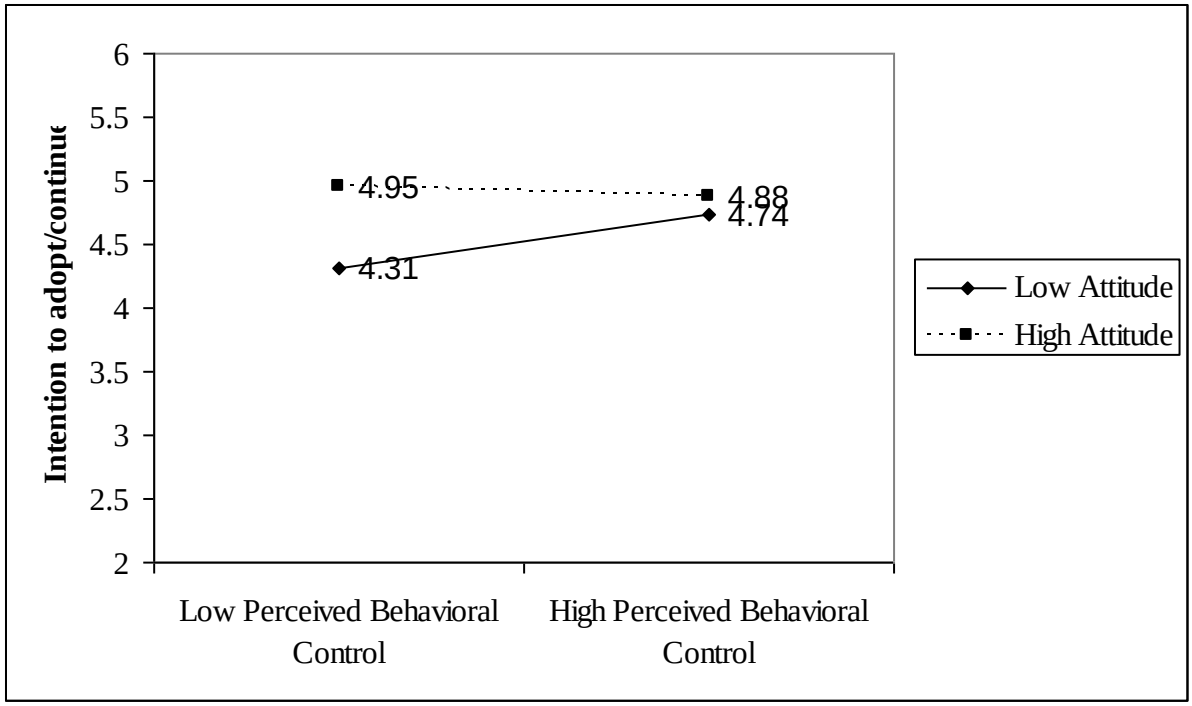

Figure 3. Moderating influence of attitude on the relationship between perceived behavioral control and intention to adopt/continue