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Effects of innovativeness and trust on web survey participation

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ABSTRACT

Responding to suggestions of prior research for examining the psychological constructs involved in a decision for or against participation in web surveys, this paper investigated the effects of trust in sponsor and personal innovativeness on potential respondents' participation intention. Based on the theory of planned behavior (TPB), two alternative models were empirically tested in which the roles of trust and innovativeness were theorized differently—either as moderators of the effects which perceived behavioral control and attitude have on participation intention (moderator model) or as direct determinants of the attitude, perceived behavioral control and intention (direct effects model). Data was collected from a sample of 131 university students enrolled in a computer course. The results of our study indicated that: (1) TPB could satisfactorily predict the behavioral intention with up to 44% variation of the intention being predicted by the model; (2) trust in sponsor and personal web innovativeness exerted direct determinant effects rather than moderate effects on participation attitude and perceived behavioral control, which in turn significantly affected participation intention; and (3) integrating the variables of trust and personal innovativeness into TPB model enhanced the prediction effect.

1. Introduction

As an emerging survey mode, web-based or web survey is more and more frequently used in such fields as commercial, government, and academic research. Web survey enables substantial time and costs savings (Cobanoglu, Warde, & Moreo, 2001; Davison, Li, & Kam, 2006; Umbach, 2004). However, like any other traditional survey mode, web survey also encounters many challenges, among which is nonresponse error (Couper, 2000). Nonresponse is particularly important as it can lead to potential inaccuracies and bias in the results of the study (Bosnjak, Tuten, & Wittmann, 2005). Most previous studies examining the determinants of unit nonresponse in web survey, have manipulated either one or a few response-enhancing survey design factors; they do not identify the psychological constructs involved in a decision for participation and thus provide only a limited theoretical understanding of the psychological process involved in complying with a survey request (Bosnjak et al., 2005). According to Helgeson, Voss, and Terpening (2002) there is a need to move beyond the manipulation of one or a few response-enhancing survey design factors and to focus more on respondent behavior and the reasons for it. Along the same line, other researchers have suggested that a better understanding of response behavior can be obtained by studying the respondent's psychological factors such as perceptions and attitudes that underlie survey response (Groves & Couper, 1998; Wijnen, Vermeir, & Kenhove, 2007).

Little research has been conducted to identify the psychological constructs involved in a decision whether or not to participate in a survey request. Such research can lead to a better theoretical understanding of the psychological process in compliance to survey requests. Responding to the suggestions of prior studies, this paper examined the effects of personal web innovativeness and trust on the potential respondents' web survey participation decision.

The important role of web trust has been documented in prior research, particularly in the field of online shopping. Trust results in a greater perceived behavioral controllability by reducing social uncertainty (Pavlou & Fygenson, 2006). Within the context of online environment, the role of trust is more important compared with traditional situations as there are increasing uncertainties caused by the distance and other impersonal factors. We anticipate that if the potential respondents have trust in the sponsor of a web survey, nonresponse will decrease. Likewise, a number of studies have revealed that personal innovativeness on IT (PIIT), a personal characteristic of willingness to try out a new information technology, is significantly related to the behavioral intention (Agarwal & Prasad, 1998a; Hung & Chang, 2005; Lu, Yao, & Yu, 2005). In the present research, we employed PWI (personal web innovativeness) to describe a characteristic of willingness to try out any new web service. We expect a positive relationship exists between the

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personal web innovativeness and the intention to participate in web surveys. In our review of literature, previous studies have examined the effects of trust and innovativeness within the context of web surveys.

Since Bosnjak et al. (2005) indicated that the theory of planned behavior (TPB) had a satisfactory effect in predicting web survey participation intention, we utilized it as our basic model. In addition, we integrated online trust and personal web innovativeness to form an extended model for examining the roles of online trust and personal web innovativeness in the decision process to respond to a request for web survey participation. If the two added variables indeed affect participation intention, the extended model should explain significantly more of the variation of participation intention when compared with the basic model. To investigate the roles of the new added variables, two competing models were developed in which the role of trust and innovativeness were theorized differently—either as moderators or as direct determinants.

This paper is organized into six sections. In Section 2, we begin by reviewing the theory of planned behavior as well as relevant research pertaining to trust and innovativeness. In Section 3, we propose ten hypotheses and the research model. Sections 4 and 5 present the research methodology and results of data analysis, respectively. In Section 6, we conclude with the theoretical and practical implications of the findings, limitations and recommendations for further research.

2. Theory and past research

2.1. Theory of planned behavior

The theory of planned behavior (TPB) is useful for understanding the decision whether to participate or not in a survey request. TPB was proposed by Ajzen (1991) who extended of the theory of reason action (TRA). It encompasses four psychological constructs i.e. attitudes, subjective norm, intention, and perceived behavioral control. TPB posits that the behavior of an individual is driven by behavioral intention, which is itself determined by the attitude toward the behavior, subjective norm and perceptions about whether the individual will be able to successfully engage in the target behavior, respectively (George, 2004).

An attitude toward a behavior is a favorable or unfavorable feeling toward performing the behavior; it is formed by an individual's beliefs regarding the consequences resulting from the behavior and an evaluation of the desirability of these consequences. Normative beliefs and motivation to comply with relevant referent groups or people important to an individual lead to the formation of a subjective norm—the perceived social pressure to perform or not to perform the behavior. Perceived behavioral control is informed by an individual's perception of possessing the opportunities and resources needed to engage in the behavior, which indicates the perceived ease or difficulty of performing the behavior (Ajzen, 1991; Bosnjak et al., 2005; George, 2004). Generally speaking, the more positive the attitude and the subjective norm with respect to a behavior are, the stronger will be an individual's intention to perform the behavior under consideration. Similarly, a greater perceived behavioral control will increase the individual's intention to perform the behavior (Bosnjak et al., 2005).

In web surveys, Bosnjak et al. (2005) used the TPB to explain survey participation for the first time. They incorporated the variable of moral obligation into the model to predict the behavior of participation. Moral obligation was perceived as a reflection of internalized moral rules while subjective norm was regarded as a perception of external social pressure. They found that all coefficients of the four variables i.e. attitude, subjective norm, perceived behavioral control, and moral obligation were significant. Approximately 69% of the variation of participation intention could be predicted by the model. Because of the satisfactory predictive power of the model, it was employed as the basic model in the present research.

2.2. Personal Innovativeness

According to the innovation diffusion theory (Rogers, 2003), people react differently to a new idea, practice, or object because of their differences in individual innovativeness, a predisposed tendency toward adopting an innovation. Individual innovativeness is a persistent trait that is reflective of an individual's underlying nature when exposed to an innovation (Yi, Fiedler, & Park, 2006). Agarwal and Prasad (1998a) had proposed a new metric for the measurement of domain-specific individual innovativeness. They created a scale named *personal innovativeness in the domain of IT* (PIIT), which was used to describe a personal characteristic of willingness to try out a new information technology (Agarwal & Karahanna, 2000; Lu et al., 2005). Agarwal and Prasad (1998a) showed that PIIT could affect the decision whether or not to adopt a certain technology in the domain of IT. A number of empirical studies have found a significant relationship between PIIT and behavioral intention (e.g. Hung & Chang, 2005; Lian & Lin, 2008; Lu et al., 2005; Thompson, Compeau, & Higgins, 2006) and the attitude toward behavior or act (Hung & Chang, 2005; Hung, Ku, & Chang, 2003; Limayem & Khalifa, 2000).

Relatively little research has been carried out regarding the potential effects of differences in individual innovativeness on the decision to participate or not in web survey. In the present research, we use the term personal web innovativeness (PWI) to describe a person's predisposed willingness to try out any new web service. Because of predisposed individual differences which can be invariant across multiple technologies, some individuals are by their nature more willing to participate while others are more hesitant (Yi et al., 2006). We therefore, in the current research, investigated the effects of web innovativeness on participation intention.

2.3. Trust in sponsor

In prior research, trust has been viewed through diverse disciplinary lenses and filters (Kim, Ferrin, & Rao, 2008). Trust is the belief that the trustee will act cooperatively to fulfill the expectations of the trustor without exploiting its vulnerabilities (Pavlou & Fygenson, 2006). It is a key element of social capital which is the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit (Nahapiet & Ghoshal, 1997). Mayer, Davis, and Schoorman (1995) differentiated the characteristics of trustor and trustee for the first time. Although various definitions exist, some common characteristics are shared (Lee, Ahn, & Han, 2006): Trust is one party's confident belief in another party's specified action (Gefen, 2000); it is the expectation that the promise of the trustee can be depended upon and it is based on previous interactions. From the perspective of social capital, trust is a key element of social capital (Preston, 2004). Prior studies also revealed that the variable of trust has three primary dimensions: ability, benevolence, and integrity (Gefen, 2002). And according to Lee et al. (2006), within the online context, trust is considered as a belief with two dimensions: ability and benevolence/integrity.

To our best knowledge, there is little published research investigating the effects of trust in web survey participation. There exists, however, much research regarding the roles of sponsorship. The sponsor who administered a survey was believed to act as a shield between the client and individual respondents (Faria & Dickinson, 1996). Results of empirical studies demonstrated that

the role of sponsorship in traditional survey modes were mixed; some studies showed a higher return rate for university sponsor than for government or commercial sponsor (e.g. Faria & Dickinson, 1992; Greer & Lohtia, 1994) while others reported the opposite effect (e.g. Albaum, 1987; Bachmann, 1987). Essentially, we assume that sponsorship cannot be considered as having a direct causal effect on response behavior; rather, it is more properly considered as an indirect measure of trust exerting influence on the decision to participate.

In this study, trust in the sponsor of a survey refers to the belief which potential respondents hold that the sponsor of the web survey is benevolent, honest and has competence to protect information offered by the respondents. Few researchers have investigated the role of trust within the context of web surveys. Trust is valuable and even more important in web surveys compared with traditional paper-based surveys because in an online environment, potential respondents are more in a position of initiative and suffer from less social stress (Bosnjak et al., 2005; George, 2004). The uncertainties also will increase because of the distance and other impersonal factors within the context of online environment. If the potential respondents distrust the sponsor they would straightforwardly click away. Hence, it is rational to add trust in sponsor of web surveys as a variable to predict participation intention.

3. Research method and hypotheses

In this study we measured participation intention rather than actual participation behavior, which is a limitation future research should address. However, considering that the technology acceptance model (TAM), the theory of reasoned action (TRA), and the TPB all concur that behavioral intention, the extent to which an individual intends to perform a specific behavior, is a key variable in determining future behavior, we assume that the intention of potential respondents to participate in web surveys should lead to a subsequent action and that a positive correlation exists between the intention and actual behavior. This relationship has also been confirmed by many prior studies (e.g. Bosnjak et al., 2005; Pavlou & Fygenson, 2006). Therefore, we focus on investigating the effects of trust in sponsor and innovativeness on potential respondents' intention to participate in web surveys.

Agarwal and Prasad (1998a) initially theorized PIIT as a moderator of the effects of innovation characteristics on usage intention. A few subsequent studies (e.g. Lee, Qu, & Kim, 2007) viewed PIIT as a moderator as well. They held that PIIT captured the individual's risk-taking propensity and that the person with the higher PIIT was more liable to have a stronger usage intention (Yi et al., 2006). In recent studies, however, many researchers reconceptualized PIIT as a direct factor (Hung & Chang, 2005; Hung et al., 2003; Lu et al., 2005) exerting effect on intention. The direct effects model considers individual innovativeness to be an intrinsic propensity exerting direct effect on intention. Yi et al. (2006) compared the role of individual innovativeness as a direct determinant of the innovativeness characteristics versus as a moderator of the relationship between the innovation characteristics and usage intention, and they concluded that it was appropriate to regard individual innovativeness as a direct determinant. Similarly, in this study, we assume that personal web innovativeness, which was adapted from PIIT, exerts a direct effect on participation intention.

Researchers have consistently positioned the trust in sponsor as an antecedent variable of intention in their model on consumer online behavior (e.g., Gefen, Karahanna, & Straub, 2003; Kim et al., 2008; Lee et al., 2006; Pavlou, 2003; Suh & Han, 2002). Trust creates a positive expectation about the outcomes of the actions of the trustee and reduces the trustor's perceived potential risks and, in addition, leads to a great perceived behavioral control. Accordingly, trust directly exerts influence on intention. By contrast, there is little prior research which regards trust as a moderator. On the other hand, propensity to trust, which is viewed as a stable personality trait, and leads to a generalized expectation about the trustworthiness of others is always regarded as a moderator of the effect of trustworthiness attributes on the formation of trust (Lee & Turban, 2001). In the current study, however, we presume that high levels of trust in sponsor will mitigate the impact of attitude and perceived behavioral control on the participation intention whereas low levels of trust in sponsor will necessitate higher levels of favorable attitude and perceived behavioral control for the respondents to intend to participate. That is to say, trust in sponsor may exert negative moderate effects on the relationships between attitude and intention as well as between perceived behavioral control and intention.

Fig. 1 illustrates the differences between the direct effects model and the moderator model. In the direct effects model, trust and personal web innovativeness were treated as antecedent variables, and exerted direct impacts on the attitude, PBC, and intention to participate. On the other hand, in the moderator model, trust in sponsor and web innovativeness served as moderators of the effects which perceived behavioral control and attitude had on the participation intention.

Based on the above discussion of prior studies and relevant theories, we propose ten hypotheses. The first hypothesis tests

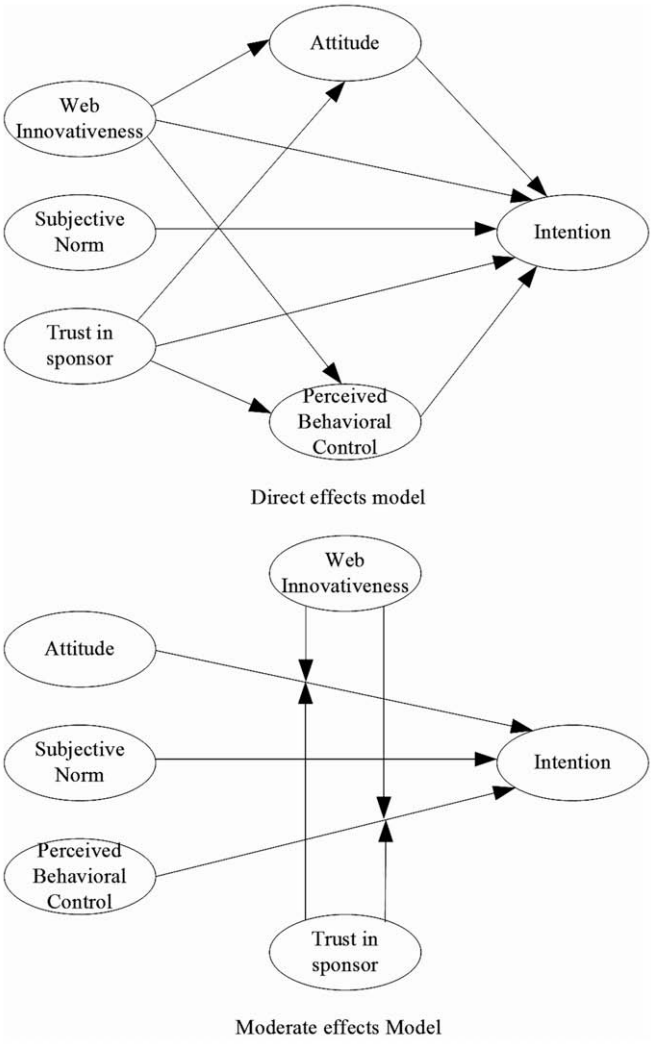

Fig. 1. The proposed research models.

whether the direct effects model is superior to the moderator model and is as follows:

- H1: The direct effects model is superior to the moderator model

We define attitude as the positive or negative feelings toward participating in a specific web survey. Numerous empirical studies have documented that attitude could affect the intention significantly (e.g.: Ajzen & Madden, 1986; Groves, Singer, & Corning, 2000; Rogelberg, Fisher, Maynard, Hakel, & Horvath, 2001). It is reasonable to argue that a positive correlation between the attitude toward participation and intention to participate in a web survey exists. In a recent study, Shao, Fang, and Decou J. (2005) obtained evidence about this relationship. We therefore propose the following hypothesis 2:

- H2: Attitude of the potential respondent toward participating in a web survey positively affects participation intention.

Subjective norm suggests that an individual's behavior is driven by an individual's desire to act according to how people important to that individual act or think the individual should act (Pavlou & Fygenson, 2006). Although a variety of empirical studies suggest that positive relationship exists between the constructs of subjective norm and intention (e.g. Groves et al., 2000; Liao, Chen, & Yen, 2007; Rogelberg et al., 2001), George (2002, 2004) and Pavlou and Fygenson (2006) revealed that subjective norm had less power in predicting intention and behavior on the web compared with other traditional modes.

Applied to the field of web surveys, subjective norm is interpreted as a potential respondent's perception of the likelihood of participation in a specified web survey is encouraged by others. Evidently, when the potential respondents believe that to participate in the web survey is encouraged by the referent others, they would be more willing to participate in the survey. Hence, the following hypothesis 3 is proposed:

- H3: Subjective norm positively affects the web survey participation intention.

Perceived behavioral control is defined as the person's perception of the difficulty of carrying out a behavior (Ajzen, 1991). PBC reflects a subjective degree of control over the performance of a behavior. Hence, PBC in this study denotes the degree of control the potential respondent has and the perception of the difficulty in participating in the web survey. Prior studies (Mathieson, 1991; Taylor & Todd, 1995) reveal that there exists a significant positive relationship between the PBC and intention. Higher PBC leads to higher intention to carry out a behavior. Therefore, it is reasonable to offer the following hypothesis 4:

- H4: Perceived behavioral control of the potential respondent positively affects the intention to participate in a web survey.

Several prior studies indicate that it is useful to add the variable of trust into the model to predict the behavior intention in an online environment (Lee et al., 2006; Mcknight & Chervany, 2002; Pavlou & Fygenson, 2006). Trust creates a positive expectation about the outcomes of the actions of the trustee, thus creating a positive attitude (Pavlou & Fygenson, 2006). Trust also could affect the intention of the trustor (Gefen et al., 2003; Lee et al., 2006) and the PBC on the potential respondent. The literature related to trust assumes that the trustor lacks control over the trustee's behavior, and trust builds the trustor's confidence to rely on the trustee (Fukuyama, 1995). Trust reduces the trustor's efforts to deal with potential contingencies (Gefen, 2002) as well as leads to a greater perceived controllability over the behavior. It is shaped by overcoming emotional barriers to engaging in a behavior (Pavlou & Fygenson, 2006).

Furthermore, as a reflection of social capital, a potential respondent's trust in sponsor increases the likelihood of his/her cooperation intention. Nahapiet and Ghoshal (1997, 1998) suggest that social capital should be considered in terms of three dimensions: structural, relational and cognitive. The relational dimension focuses on the characteristic of the connection between individuals. This is best characterized through the trust of others and their cooperation and the identification which an individual has within a network (Wikipedia, 2007a).

It is reasonable to expect that the potential respondent is more willing to participate in a web survey when trust in the sponsor of the survey exists. For the reasons mentioned above, the following three hypotheses are proposed:

- H5: Trust in the sponsor of a web survey positively affects the participation intention.
- H6: Trust in the sponsor of a web survey positively affects the attitude toward participating in a web survey.
- H7: Trust in the sponsor of a web survey could significantly affect perceived behavioral control.

Prior studies involved with personal innovativeness indicated that a positive relationship exists between personal innovativeness and behavioral intention (Hung & Chang, 2005; Lu et al., 2005; Thompson et al., 2006) and the attitude toward act or behavior(Hung & Chang, 2005; Hung et al., 2003; Lian & Lin, 2008; Limayem & Khalifa, 2000). In web surveys, potential respondents with high personal web innovativeness are more willing to try using new web services than those with low personal innovativeness. For a survey using the online mode, it is logical to expect that potential respondents having a trait of personal web innovativeness are more inclined to participate in the survey as well as possess a more positive attitude toward participating in the web survey compared with others who lack the trait of personal web innovativeness.

In addition, according to the theory of learning, learning is a process in which the learner actively constructs or builds new ideas or concepts based on current and past knowledge and general principles which may eventually be applied in a practical real-world context (Wikipedia, 2007b). Because of their significant previous knowledge related to the web, potential respondents possessing a trait of personal web innovativeness are expected to develop more positive perceived behavioral control with respect to the web survey. Thus, the following three hypotheses are presented:

- H8: Personal web innovativeness positively affects the intention to participate in a web survey.
- H9: Personal web innovativeness positively affects the attitudes to participate in a web survey.
- H10: Personal web innovativeness positively affects the perceived behavioral control.

4. Methodology

4.1. Survey instrument

Based on the proposed research models stated in the previous section, a questionnaire was developed. PLS-Graph 3.0 (Chin, 2001) and Stata 9.2 were used as the major statistical tools for

model testing. The Appendix presents a list of the measurement items used in this study.

To ensure the content validity of the scales, the measurement items were developed based on prior relevant studies. The formal questionnaire comprises 17 measurement items. According to the recommendations of Ajzen (2006), a multi-item approach was used and each item was measured on a 7-point bipolar Likert scale with the two end points being extremely agree and extremely disagree, respectively.

Since few scales exist in the research domain of web surveys, measurement items were adapted from scales which have already been used and validated by other researchers. Pretest was conducted according to the Cronbach's α. The variables of intention, PBC, subjective norm, and attitude were developed according to the recommendations of Ajzen (2006) and Francis et al. (2004). The items used for measuring the construct of trust in sponsor were adapted from Pavlou's scale (Pavlou & Fygenson, 2006) with appropriate modifications to relate them specifically to the web survey. The measurement of the components of personal web innovativeness was adapted from the PIIT scale developed by Agarwal and Prasad (1998a, 1998b).

Table 1
PLS Confirmatory factor analysis and construct reliability

Measurement items	Standardized factor loadings	*T* Value	Cronbach's reliability	Composite reliability
INT1	0.93	73.08	0.86	0.94
INT2	0.94	92.45		
ATT1	0.93	75.97	0.90	0.94
ATT2	0.94	72.18		
ATT3	0.88	41.39		
SN1	0.86	9.07	0.75	0.86
SN2	0.84	18.64		
SN3	0.77	5.91		
PBC1	0.89	23.23	0.81	0.89
PBC2	0.81	10.18		
PBC3	0.86	18.20		
TRU1	0.91	47.19	0.86	0.91
TRU2	0.87	24.15		
TRU3	0.87	35.15		
PWI1	0.82	15.91	0.81	0.89
PWI2	0.84	22.95		
PWI3	0.89	44.47		

4.2. Data collection

A self-administered questionnaire was used to collect the data. The questionnaire was divided into two sections. The first section of questionnaire assessed the main constructs in our proposed models (attitude, subjective norm, perceived behavioral control, trust in sponsor, personal innovativeness and participation intention), and the second section of questionnaire requests information about the demographic variables of the respondents, including gender and age and the amount of web experience of the respondents. The questionnaires were distributed to university students enrolled in a required computer practical course.

We showed a web survey questionnaire acquired from the internet in advance to the students using MS PowerPoint, and asked them to regard it as the web survey they came across while surfing the internet. The content of the web survey involved E-Home (a new network service supplied by China Telecom). We then distributed our questionnaires to the students. Extra course credit was offered if the participant completed the question. Of the 160 questionnaires distributed, 142 were returned. Of these, 11 questionnaires were dropped because of inconsistent answers and therefore, 131 were valid usable questionnaires, securing an effective return rate of 81.9%. Since we used Partial Least Square (PLS) to analyze our model, a small sample is allowed; a strong rule of thumb suggests that it be equal to the larger of the following: (1) ten times the largest number of formative indicators in a scale or (2) ten times the largest number of structural paths directed at a particular construct in the structural model (Gefen, Straub, & Boudreau, 2000). Since the largest number of structural paths directed at a particular construct (participation intention) in our model is five, therefore, 131 valid cases are adequate in our study.

The use of student participants as surrogates might raise the issue of external validity (Gordon, Slade, & Schmitt, 1986; Mcknight, Choudhury, & Kacmar, 2002). However, the suitability of students as surrogates depends on case-specific circumstances (Hughes & Gibson, 1991). There may not be a problem with external validity provided that the students' profiles and performances are similar to the studied population (Lassar, Manolis, & Lassar, 2005). In this case, the use of university students as surrogates does not present a significant threat to validity for the following reasons. First, the students' profiles and performance are similar to the studied population. Web users are generally younger and more educated than those who prefer conventional modes. Second, the respondents can access the internet and are familiar with the web, averaging four years of web experience. In addition, the decision to participate in a web survey is a "real word" behavior.

The participants consist of 84 (64.1%) males and 47 (35.9%) females. All of the subjects can access to the internet and 101 of the participants, constituting 77.1% of the sample, have experience with web survey participation.

4.3. Reliability and construct validity

The psychometric properties of the instrument were assessed in term of internal consistency, convergent and discriminant validity. The reliability coefficients of the questionnaire are listed in Table 1. Cronbach's reliability coefficients of all variables exceeded the recommended threshold of 0.70. As Cronbach's reliability coefficients assume that each item carries the same weight, we also employed composite reliability score[1] to measure the reliability; this relies on the actual loadings to construct the factor score and is thus a better measure of internal consistency (Fornell & Larcker, 1981;Kim et al., 2008). All variables' composite reliability scores exceed the lowest limit of 0.7.

To ensure the construct validity of the questionnaire, convergent and discriminant validity of the scale were tested as well. The technique for assessing the construct validity can be classified into two categories: classical and contemporary (Chau, 1998; Lee et al., 2006). The classical approach comprises multitrait-multimethod (MTMM) and exploratory factor analysis (EFA), whereas the contemporary method includes confirmatory factor analysis (CFA) and structural equation modeling (SEM). Since the contemporary approach provides some advantages over the classical approach (Lee et al., 2006; Smith, Milberg, & Burke, 1996), we employed the contemporary approach of SEM in this paper. Convergent and discriminant validity are demonstrated when: (1) indicators load much higher on their hypothesized factor than on other factors (own-loadings are higher than cross-loadings), and (2) when the square root of each construct's average variance extracted (AVE) is larger than its correlations with other constructs (Chin, 1998; Gefen, 2005; Pavlou & Fygenson, 2006). Tables 2 and 3 demonstrate the acceptable convergent and discriminant validity of the questionnaire.

[1] Composite Reliability = $(\sum \lambda_t)^2/[(\sum \lambda_t)^2 + \sum_t \mathrm{Var}(\varepsilon_1)]$, where λ_t is the indicator loading and $\mathrm{Var}(\varepsilon_I) = 1 - \lambda_t^2$.

Table 2
Loadings and cross-loadings for measures

	Intention	Attitude	PBC	SN	Trust	PWI	Eigenvalue and explained variance	
INT1	**.934**	.467	.367	.408	.458	.365	1.760	87.996
INT2	**.942**	.539	.301	.460	.497	.391		
ATT1	.522	**.933**	.057	.399	.356	.234	2.533	84.441
ATT2	.492	**.943**	.061	.394	.356	.299		
ATT3	.467	**.879**	.034	.368	.372	.290		
PBC1	.303	.059	**.894**	.227	.192	.297	2.180	72.681
PBC2	.321	.081	**.805**	.112	.193	.128		
PBC3	.288	.005	**.855**	.154	.069	.325		
SN1	.391	.380	.141	**.856**	.395	.201	2.025	67.513
SN2	.423	.445	.145	**.837**	.286	.239		
SN3	.316	.175	.212	**.766**	.297	.288		
TRU1	.465	.336	.179	.377	**.905**	.191	2.330	77.651
TRU2	.402	.378	.098	.243	**.865**	.171		
TRU3	.477	.328	.183	.421	**.872**	.260		
PWI1	.323	.249	.174	.285	.333	**.818**	2.173	72.423
PWI2	.299	.240	.196	.268	.127	**.835**		
PWI3	.393	.270	.362	.208	.160	**.894**		

Note. The elements on the diagonal (in bold) are own-loading of the constructs. If the convergent validity demonstrates, loadings of the measurement items on their assigned latent variables should larger than any other loading.

Table 3
Correlation matrix and average variance extracted

	Intention	Attitude	PBC	SN	Trust	PWI	Mean	SD
Intention	**0.94**						4.31	1.45
Attitude	0.54	**0.92**					4.48	1.16
PBC	0.36	0.06	**0.85**				5.38	1.33
SN	0.46	0.42	0.20	**0.82**			3.96	1.12
Trust	0.51	0.39	0.18	0.40	**0.88**		4.15	1.29
PWI	0.40	0.30	0.30	0.29	0.24	**0.85**	4.27	1.13

Note. The elements on the diagonal (in bold) are the square root of average variance extracted ($\sqrt{AVE}$), off diagonal elements present the correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements (Chau, 1998; Fornell & Larcker, 1981).

5. Results

We used partial least square (PLS) to analyze our model. Partial Least Squares can be a powerful method of analysis because of the minimal demands on measurement scales, sample size, and residual distributions. Compared to the better known factor-based covariance fitting approach for latent structural modeling, the component-based PLS avoids two serious problems: inadmissible solutions and factor indeterminacy (Fornell & Bookstein, 1982).

5.1. Moderator model

We adopted the product indicator approach proposed by Chin, Marcolin, and Newsted (2003) to measure moderate effects model. Because in this study Likert scales were employed and indicators were believed to be theoretically parallel, standardization was conducted before developing product indicators. To assess whether the moderate effects were significant, a bootstrap resampling procedure was performed. The results of 500 resamples indicated that the moderate effects were insignificant at the level of 0.05 and the interaction effect sizes f^2 was trivial[2] (Cohen et al., 2003).

[2] $f^2 = [R^2$ (interaction model)$-R^2$ (main effects model)$]/[1-R^2$ (main effects model)$]$. In this study, R^2 (interaction model) = 0.514, while R^2 (main effects model) = 0.506, thus $f^2 = 0.016$, smaller than the small interaction effects sizes (0.02) brought forwards by Cohen, Cohen, West, and Aiken (2003).

The standardized coefficients of the moderator model are illustrated in Fig. 2. The path coefficients of moderators imply the extent by which an increase in one standard deviation in the moderator will decrease or increase the impact of the corresponding dependent variable (attitude or perceived behavioral control) on participation intention. For instance, one standard deviation increase in personal web innovativeness will decrease the impact of perceived behavioral control on participation intention from 0.23 to 0.20 and it would decrease the impact of attitude on participation intention from 0.30 to about 0.20. However, Fig. 2 shows that all of the four moderator paths are insignificant. Consequently, trust in sponsor and personal innovativeness seldom moderate the relationship between the attitude and participation and the relationship between perceived behavioral control and participation. The moderate effects model seems inappropriate.

5.2. Direct effects model

The path coefficients and standardized path coefficients of the direct effects model are illustrated in Fig. 3. Paths except dotted lines are significant. The significant paths linking web innovativeness and intention as well as trust in sponsor and intention demonstrate that the direct effects method is superior to the moderate effects model, thus supporting H1. Fig. 3 demonstrates that the attitudes which a potential respondent holds significantly affects the behavioral intention (H2, $p < 0.001$); the relationship between the subjective norm and intention is insignificant at the level of 0.05 (H3, $p = 0.056$). The result is consistent with previous research findings. Compared with the traditional behavioral intention prediction, subjective norm has less power in intention and actual behavior prediction within an online environment (Bosnjak et al., 2005; George, 2004; Pavlou & Fygenson, 2006). The correlation between PBC and intention is significant (H4, $p < 0.001$). Trust in the sponsor of the survey can significantly influence the potential respondents' participation intention (H5, $p < 0.01$) and the attitude toward the survey (H6, $p < 0.001$), while the path from trust in sponsor to perceived behavior control is insignificant (H7, t-statistic = 1.29). Personal web innovativeness can significantly affect attitude (H8, $p < 0.01$), PBC (H9, $p < 0.01$), and intention to participate (H10, $p < 0.01$), respectively.

To examine to the necessity to incorporate trust in web survey sponsor and personal innovativeness into the original TPB model in order to predict participation intention, hierarchical regression analysis was carried out. In step 1, the components of TPB (atti-

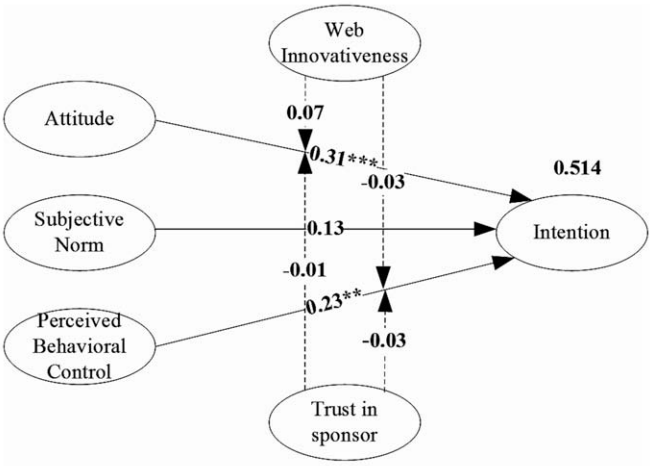

Fig. 2. Path coefficients of the moderator model.

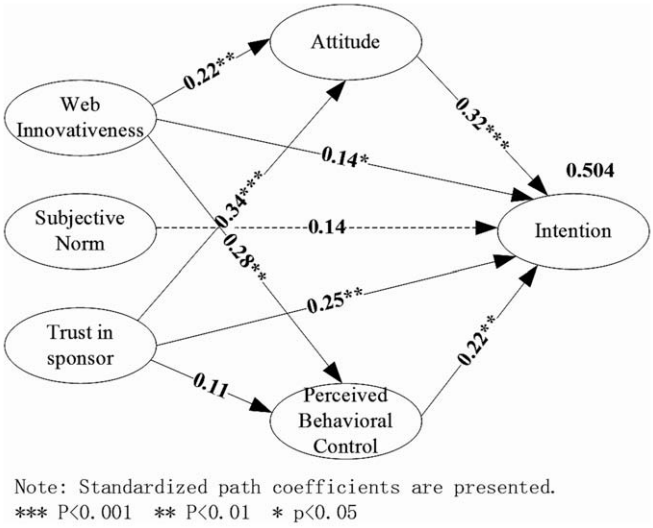

Fig. 3. The path coefficients of direct effects model.

tude, social norm, perceived behavioral control) were entered as the model 1. In step 2, trust in sponsor and personal innovativeness were included into the model 1, which thus formed model 2. With the integration of the two new variables, the variance of participation intention explained by the model increased from 43.6% to 50.4%. The change of $F(2, 125) = 8.61$ is significant at the level of 0.01. Thus, integrating trust and innovativeness into the model yields an improved model.

6. Conclusions and implications

6.1. Discussions and conclusions

The primary objective of this paper is to investigate the roles of trust in sponsor and personal innovativeness in web surveys. We compared two alternative models in which the two new variables were theorized differently: either as moderators of the effects perceived behavioral control and attitude have on participation intention (moderator model) or as direct determinants of the attitude, perceived behavioral control and intention (direct effects model). The two models were examined empirically with data collected from a sample of 131 respondents. The results indicated that neither the trust in sponsor nor personal innovativeness moderated the relationships, whereas these two variables actually exerted direct effects on attitude and participation intention. An important contribution is the placement of personal web innovativeness and trust in the nomological network of TPB to predict the participation intention. The results also confirm that the theory of planned behavior can satisfactorily predict the behavioral intention. In our study up to 44% variation of the participation intention could be predicted by TPB model, which is consistent with the research by Bosnjak et al. (2005). Furthermore, the results demonstrate that it is necessary and reasonable to integrate the variables of trust and personal innovativeness into the TPB model to obtain a better prediction effect.

The effects on perceived behavioral control are mixed; personal web innovativeness had exerted a significant effect on it, while trust in sponsor of the web survey did not affect it. The reason probably lies in the fact that PBC is a complicated construct, as reflected by recent studies, which is formed by two distinct dimensions: self-efficacy and controllability (Ajzen, 2002; Pavlou & Fygenson, 2006). Self-efficacy is associated with an individual's perception of the ability to carry out a specified behavior, while controllability refers to an individual's judgments about the availability of resources and opportunities to carry out a certain behavior (Pavlou & Fygenson, 2006). The main effect of trust in sponsor of web survey may be only to increase the perceived controllability to some extent rather than self-efficacy. Obviously, personal web innovativeness can increase the perceived behavioral control.

The results also indicate that subjective norm has less power in predicting intention. This result is consistent with prior research. Compared with traditional behavioral intention prediction has less power in intention and actual behavior prediction within an online environment (Bosnjak et al., 2005; George, 2004; Pavlou & Fygenson, 2006). The reason may lie in the social anonymity of web surveys. It has been suggested that there are two broad categories of anonymity: technical anonymity and social anonymity (Hayne & Rice, 1997). Technical anonymity refers to the removal of all meaningful identifying information about others in the exchange of material, whereas social anonymity refers to the perception of others and/or of oneself as unidentifiable because of a lack of cues to use to attribute an identity to that individual. However, web surveys may not be truly anonymous (Christopherson, 2007). In a web survey, using computer technologies such as cookies, the sponsor can identify the respondent, although the potential respondent may perceive more anonymity to participate in a web survey than in a traditional survey. The behaviors of potential respondents online are more inclined to be affected by the internal moral rules rather than the external social pressure. Within an online environment, the role of self-perception can be considered as dominant.

6.2. Practical implications

Some practical implications can be obtained from the results. First, trust is important in the decision process of potential respondents whether or not to participate in a web survey as it is believed that a reputable or trustworthy sponsor will guarantee anonymity to the respondents. The sponsor administering the survey actually acts as a shield between the client and individual respondents (Faria & Dickinson, 1996). A trustworthy sponsor can generate participation intention and a positive attitude toward the survey, and thus to reduce the unit nonresponse problem associated with web surveys. However, trustworthiness comes from the sponsor's social capital (Wiedmann & Hennigs, 2006). According to Talmud (1999), social capital will be accumulated over time and like material and human capital, social capital tends to depreciate with lack of proper maintenance and may even turn from capital to liability. Therefore, from the perspective of social capital, a high response rate is the result of social capital accumulation which is a long term process. Researchers of web surveys should devote more attention on constructing their own social capital.

Second, the results show that personal web innovativeness can significantly affect attitude, PBC while the relationship between personal web innovativeness and intention is marginally significant. PWI influences the intention through three paths, namely, the indirect effects mediated by PBC and attitude and a direct effect. Attitude and PBC mediate most of the relationship between web innovativeness and intention. The direct effect of web innovativeness on intention is weak whereas the indirect effects (mediated by attitude and PBC) are much stronger. The results suggest that potential respondents who exhibit a high PWI are more likely to participate in web surveys that those who do not.

6.3. Limitations and suggestions

Several limitations of this work should be noted. First, in this study we emphasized participation intention and did not measure participation behavior. Although prior studies indicated that intention had a significant positive effect on actual behavior (Ajzen, 1991; Bosnjak et al., 2005), it is necessary to consider

this variable in future research. Second, we used three-item scales to measure each construct except for intention to participate, where we had only two. Although this is common in the similar research (e.g. Pavlou & Fygenson, 2006) and we had designed the questionnaire according to suggestions proposed by Ajzen (2006) and Francis et al. (2004), and pretested it before it was formally used, the risk of only capturing subsets of the underlying constructs' measurement properties might still exist. Therefore, future research might strive to increase the survey items for each construct. Third, student participants were used. Although student participants do not present a significant threat to validity in this research, students may not be fully representative of all potential web survey participants. For greater external validity, it is essential that in future research, non-student as well as student participants be included. In addition, self-reporting from the participants is used to collect data and this can lead to common method variance. We employed Harman's single factor method to test the possibility, and the result demonstrated that this research did not suffer from common method variance. Finally, in future research, we may be able to glean more insight by measuring the intention (dependent variable) separately from the other variables in this study (the independent variables).

Appendix. Measurement items for principle constructs

Intention to participate in a web survey

I intend to participate in this web survey if the sponsor sends me a participation request

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

I will try to participate in this web survey if the sponsor sends me a participation request

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

Attitudes towards participating in a web survey

To participate in this web survey is

Good 1 2 3 4 5 6 7 Bad

Pleasant (for me) 1 2 3 4 5 6 7 Unpleasant (for me)

Worthless 1 2 3 4 5 6 7 Useful

Subjective norm

Most people who are important to me think that

I should 1 2 3 4 5 6 7 I shouldn't Participate in this web survey

People who are important to me want me to participate in this web survey

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

I feel under pressure to participate in this web survey

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

Perceived behavior control

The decision to participate in this web survey is beyond my control

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

Whether I participate in this web survey or not is entirely up to me

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

I am confident that I could participate in this web survey if I wanted to

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

Appendix (*continued*)

Trust

In general, I cannot rely on sponsor of this web survey to keep their promises that they make

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

I think the sponsor of this web survey would keep their promises and won't abuse of my individual information offered to them

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

I believe that sponsor of this web survey would be competent in protecting my individual information from being abused

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

Personal web innovativeness

Generally, I spend little time in exploring how to use the new web services

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

In general, I am hesitant to try out the new web services

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

Among my peers, I am usually the first to try out the new web services

Extremely disagree 1 2 3 4 5 6 7 Extremely agree

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