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# Why mobile users trust smartphone social networking services? A PLS-SEM approach<sup>☆</sup>

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## ABSTRACT

Through advanced mobile technologies, mobile users can access updated information and adjust plans during travel accordingly. Such mobile services can integrate with social networking services (SNS) to share and access information on the go. Not much research exists on mobile social commerce, specifically about users' trust in travel information and advice from smartphone SNS. This study presents a quantitative survey to explore what influences users' trust in travel advice acquired from smartphone SNS (TTASS). The findings show that (1) mobile users' trust in travel advice acquired from smartphone SNS significantly associates with their perceived value of smartphone SNS (PVSS) and enjoyment of SNS activity (ESA); (2) ESA significantly associates with mobile users' privacy concerns (PC) and perceived risk (PR), and such PR significantly associates with PC; and (3) PVSS significantly associates with ESA and PR. These findings can help managers and decision makers in the tourism industry keep pace with research on consumer attitudes and innovations in smartphone SNS, and make favorable tactics to benefit from mobile social commerce in the ubiquitous commerce environment.

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## 1. Introduction

Smartphones may provide people with not only voice communications but various innovative and exciting smartphone applications (apps) to fulfill important requirements of personal information services (Pitt, Parent, Junglas, Chan, & Spyropoulou, 2011). In addition to more timely content and speedy response, accessing the Internet through smartphones allows users to extend their mobile activities to social networking services (SNS; e.g., Facebook) to access and share information on the go (Pitt et al., 2011). Many mobile users would like to use smartphone SNS that specifically offer access to travel websites that give updated location-based information and advices regarding scenic spots, transportation, accommodation, events and activities, dining and so on (Lyu & Hwang, 2015).

Online social services require users to provide personal information such as names, pictures, personal interests, and personal contact details (Gunawan & Huang, 2015). Users may share private information intensively to maintain social relationships, find users with similar interests, and acquire knowledge through SNS. This situation may result in security issues regarding trust and privacy concerns. Prior research studies user behavior regarding new technology to understand users' intention

and acceptance of social media. In terms of trust-based issues and adopters' privacy concerns, the potential influencing factors in user behavior still deserve further investigation (Al-Debei, Al-Lozi, & Papazafeiropoulou, 2013). Thus, investigating critical factors that affect mobile users' perceptions of smartphone SNS from the perspectives of privacy concerns, perceived risk, and trust is very valuable.

Following this introduction, Section 2 contains the theoretical framework. Section 3 describes methodology. Section 4 presents the findings. Section 5 offers discussions with limitations and suggestions for future research.

## 2. Literature review

### 2.1. Trust and risk

Trust refers to an individual's belief or an expectation of others' ethical behaviors under various influential factors such as subjective norms, risk, confidence, and security (Grandison & Soman, 2000). Researchers use these influential factors to determine the tendency of trust (Riegelsberger, Sasse, & McCarthy, 2005), and construct trust as a central aspect in all types of relationships (Gefen, Karahanna, & Straub, 2003). Prior research shows that risk associates with trust (Doney, Cannon, & Mullen, 1998). Human relationships involve various risks that may paralyze actions or lead to feelings of engulfment, dread, or anxiety (Sheppard & Sherman, 1998).

Trust, which helps in reducing social uncertainty and risk, and which individuals can learn from social interaction, is a vital element in virtual contexts. Trust is also a positive predictor for other people's interaction

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and behavior (Gefen et al., 2003). Trust also refers to a user's belief in the security, dependability, and competence of a system the user is working with, especially under conditions of risk (Doney et al., 1998; Jang, Chang, & Tsai, 2014). When lacking trust, users tend to have less interaction with the service and relating parties (Gefen et al., 2003; Nofer, Hinz, Muntermann, & Roßnagel, 2014).

## 2.2. Enjoyment and perceived value

People usually interact with friends in the physical world; however, when they observe many friends joining and enjoying SNS activities in the cyberspace, they will attempt to use SNS too (Cheng & Ho, 2015). SNS provide users an effective method of communication that views computers and the Internet as a collaborative instrument to accelerate group formation and expand group scope and influence (Ainin, Parveen, Moghavvemi, Jaafar, & Shuib, 2014; Kane, Fichman, Gallagher, & Glaser, 2009). SNS users believe that SNS cannot only help them know more people and develop relationships with others but also improve their efficiency in interacting and sharing information with friends (Kane et al., 2009; Wang & Clay, 2012). SNS turns out to be the world's rapidest evolving tool of personal networking. In terms of the influence on users' intention toward joining SNS activity, perceived enjoyment is an important factor affecting the behavior of SNS users; users may continue to join SNS activities and trust the information and advice resulting from SNS activities because of their perceived enjoyment of SNS activities (Ernst, Pfeiffer, & Rothlauf, 2013; Sledgianowski & Kulviwat, 2009).

Perceived value depends on two aspects: benefits customers receive and sacrifices customers make (Dodds, Monroe, & Grewal, 1991; Teas & Agarwal, 2000; Zeithaml, 1988). The benefits customers receive are the perceived quality of service and psychological (i.e., economic, social and relational) benefits; the sacrifices customers make include monetary and non-monetary terms such as time, money, effort, risk, and convenience (Dodds et al., 1991; Zeithaml, 1988). Perceived value is a group of conceptions consisting of five dimensions: social value, emotional value, functional value, epistemic value, and conditional value (Sheth, Newman, & Gross, 1991).

## 2.3. Privacy concerns and perceived risk

Privacy concerns (PC) associate with the collection, unauthorized access, errors, usage, control, and awareness of sensitive or privacy data (Malhotra, Kim, & Agarwal, 2004). PC reflect users' feeling about collection and preservation of personal information (Chang, Liu, & Lin, 2015; Nofer et al., 2014). Prior studies show that SNS users' perceptions regarding privacy protection may influence their trust, attitudes, and use intention (Nofer et al., 2014; Shin, 2010).

Perceived risk (PR) is the consumer's perception of uncertainty and adverse consequences of conducting an activity or behavior (Dowling & Staelin, 1994). PR, which comprises various dimensions (e.g., economic, performance, social, time, psychological, and privacy), may negatively affect users' behavior in adopting a technology (Crespo, del Bosque, & Sánchez, 2009; McKnight, Choudhury, & Kacmar, 2002). Prior studies show that economic and performance dimensions of PR have greater negative impact on e-commerce adoption than social and time dimensions (Crespo et al., 2009). Drawing on prior research results, exploring how PC and PR would influence mobile users' trust in smartphone SNS is very valuable for the purpose of this study.

## 3. Method

When utilizing SNS in the mobile-web space, adopters can use the co-construction approach or the social graph approach to search for new contacts with similar interests and to share knowledge with a virtual community (Hsu, Chang, & Yen, 2011). SNS adopters may discover the advantages of SNS such as idea creation, social support, knowledge

enhancement, and diffusion of innovations. In contrast, SNS adopters may also perceive threats, unsafety, and a loss of control over personal information (Gunawan & Huarng, 2015). Therefore, this study aims to explore how the perceptions (including advantages and disadvantages) of using smartphone SNS will influence adopters' trust; this study specifically investigates how critical factors (including PC, PR, perceived value, and enjoyment) affect mobile users' trust in travel advice acquired from smartphone SNS.

A review of the SNS literature on theory foundations, model applications, and adopter intentions (Ainin et al., 2014; Al-Debei et al., 2013; Cheng & Ho, 2015; Ernst et al., 2013; Sheth et al., 1991; Sledgianowski & Kulviwat, 2009; Wang & Clay, 2012; Zeithaml, 1988) shows that (1) prior studies primarily work on understanding behavior intentions, (2) past studies of trust address SNS generally, and (3) few studies explore the antecedents of trust to better understand how the threats (e.g., privacy concerns and perceived risk) and the driving forces (e.g., enjoyment and perceived value) affect trust. This study proposes a different approach by presenting 10 research hypotheses together with a research framework detailed as follows.

### 3.1. Research background and hypotheses

Privacy concerns (PC) in the smartphone SNS environment relate to trustworthiness and protection of users' personal information; users fear the loss of privacy, unauthorized access, and loss of data control (Lankton & McKnight, 2011). Prior research finds that Facebook users' PC do not directly affect users' acceptance, but they do mediate the perceived usefulness and perceived ease of use (Tan & Qin, 2012). Facebook collects personal information (e.g., profile data, information about one's current location, and social graph) from its users, and such tasks may raise users' PC. Users worry about the use and misuse of their data without their agreement. This issue can be a root cause of perceived risk (PR) for Facebook adopters, similar to the concerns that affect trust in travel advice acquired from smartphone SNS (TTASS) and PR in the context of location-based services (Zhou, 2011). Some smartphone SNS adopters have not only become reluctant to revealing personal information on Facebook but also close their accounts as a protest against the ways Facebook handle personal information. With the negative effects of PC and PR, smartphone SNS users may very likely no longer enjoy using smartphone SNS.

Privacy management strategies may help SNS adopters protect their privacy through various methods such as hiding contact information and limiting the visibility of personal profiles (Young & Quan-Haase, 2013). Nofer et al. (2014) suggest that PC may vary across societies and different levels of PC may result from different culture values. For example, Asia users have less PC on the Internet than users in western countries. A recent study on mobile SNS reveals that PC significantly influence PR, and PC affect users' intention to use SNS (Zhou & Li, 2014). In the context of Facebook, PR relates to the sharing of names, pictures, contact addresses, and current statuses. Users may raise questions about whether Facebook is able to protect user information from improper access, misuse, and disclosure. In sum, increased risk perceptions may reduce adopters' likelihood of trusting Facebook, thus affecting negatively mobile users' TTASS.

Enjoyment may play an important role in a pleasure-oriented information system environment, and perceived enjoyment associates with perceived value in a pleasure-oriented environment (Lee, Chung, & Lee, 2013; Venkatesh, Thong, & Xu, 2012). In accordance with pleasure-oriented SNS, developing an enjoyable environment for social interaction is valuable in terms of increasing users' intention to post, share, and use information on SNS. Smartphone users may have an interest in and enjoy SNS activities, and consequently users may desire to join SNS activities via their smartphones. During travel, mobile users may also join SNS activities via smartphones in a ubiquitous way, thus becoming more willing to engage in SNS activity and enjoy

**Table 1**  
Ten hypotheses postulated in this study.

H1	A significant relationship exists between privacy concerns and perceived risk.
H2	A significant relationship exists between privacy concerns and enjoyment of smartphone SNS activity.
H3	A significant relationship exists between privacy concerns and perceived value of smartphone SNS.
H4	A significant relationship exists between privacy concerns and trust in travel advice acquired from smartphone SNS.
H5	A significant relationship exists between perceived risk and enjoyment of smartphone SNS activity.
H6	A significant relationship exists between perceived risk and perceived value of smartphone SNS.
H7	A significant relationship exists between perceived risk and trust in travel advice acquired from smartphone SNS.
H8	A significant relationship exists between enjoyment of SNS activity and perceived value of smartphone SNS.
H9	A significant relationship exists between enjoyment of SNS activity and trust in travel advice acquired from smartphone SNS.
H10	A significant relationship exists between perceived value of smartphone SNS and trust in travel advice acquired from smartphone SNS.

SNS activity as a part of their daily life (Yang, Cheng, Hu, & Zhang, 2012). In sum, mobile users' ESA may affect their PVSS and their TTASS.

Perceived value, which associates with the price, brand, and quality of products or services, may not only influence customers' attitude or purchase intention (Gefen, 2000; Moon & Kim, 2001). In this study, the concept of PVSS may facilitate people to appreciate and adopt smartphone SNS and get benefits from various dimensions, thus enhancing users' TTASS.

This information allows postulating relationships between the five key constructs of this research: PC, PR, ESA, PVSS, and TTASS. In fact, because only 10 bilateral relationships can exist in this study with 5 constructs, the research postulates 10 hypotheses (see Table 1) to cover all possible relationships between any two constructs for exploring two main concepts: (1) ESA and PVSS would positively affect users' TTASS in conducting technology specific behavior, and (2) PC and PR would negatively affect such TTASS.

### 3.2. Research model

As Fig. 1 shows, the research framework incorporates positive influential factors (i.e., ESA and PVSS) and negative factors (i.e., PC and PR) to investigate the TTASS concept in a comprehensive way by considering all relationships between any two constructs.

### 3.3. Questionnaire design, pretest, and sampling procedure

Drawing on the research framework and the study's hypotheses, this study developed a questionnaire as the survey instrument to investigate

mobile users' TTASS. To ensure content validity, the study drew the questionnaire items from literature reviews and modified the items to fit the context of smartphone SNS research. In addition, the study measured each questionnaire item on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

The research conducted a pretest in a small group to ensure that respondents could understand the questionnaire items. Building on the findings from the pretest, the research further modified the questionnaire to improve its readability and reliability before its use in the formal survey. Specifically, the research tried to purify the instrument by removing items with low corrected item-to-total correlation values, and conducting exploratory factor analysis to delete items that did not load on a factor appropriately. The finalized version of questionnaire consisted of 20 items (see Table 2), which correspond to five constructs including PC (4 items), PR (3 items), ESA (3 items), PVSS (5 items), and TTASS (5 items).

After describing the characteristics of respondents with descriptive statistics methods, the study analyzed the collected questionnaires by using the partial least square-structural equation modeling (PLS-SEM) approach, which is a multivariate analysis technique gaining interest and popularity among researchers in recent years (Hair, Ringle, & Sarstedt, 2011; Toe, Tan, Ooi, & Lin, 2015). PLS-SEM is a powerful tool requiring minimum restrictions on measure scales, and which is useful to model latent constructs under conditions of non-normality (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005).

In conducting PLS-SEM, the study had to ensure the reliability and validity of the measurement model, and then perform a non-iterative application of ordinary least squares regression to obtain outer weights, loadings, and structure model relationships for the latent and the manifest variables. Finally, the study applied the bootstrap re-sampling procedure to evaluate the statistical significance of structural paths.

## 4. Empirical analysis and results

During the period from 26 June 2015 to 17 July 2015, the study distributed the questionnaire using Google forms and posting the link to the public on various Facebook Fans Pages so as to invite any Facebook user who sees the questionnaire link to participate in this study. The study collects 156 responses and conducts initial screening for usability and reliability. After the screening, 136 responses are complete and valid for data analysis. Table 3 lists demographic information about these 136 respondents. In PLS-SEM, the sample size requirement must be at least ten times the largest number of structural paths directed at a particular latent construct in the structural model (Hair et al., 2011). As Fig. 1 shows, there are four paths (from PC, PR, ESA, and PVSS) directed at TTASS, so the sample size must be greater than 40. Therefore, the sample of 136 responses in this study satisfies the minimum size requirement for PLS-SEM.

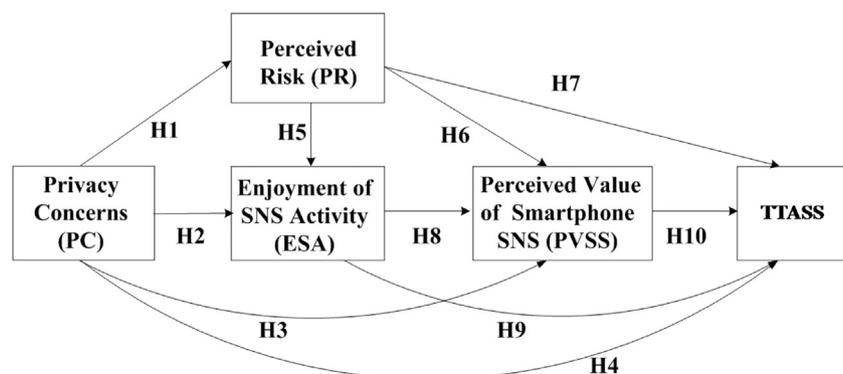


Fig. 1. Research framework.

**Table 2**  
Questionnaire items and their derivation sources.

Privacy concerns (PC): [source: Shin (2010); Tan and Qin (2012)]	
PC1	I am concerned that my personal data may be read by other people.
PC2	I am concerned that my personal data may be used by other people.
PC3	I am concerned that my personal information on the web will be accessed and used by other people without my consent.
PC4	I am concerned that using the Internet will reveal my privacy information.
Perceived risk (PR): [source: McKnight et al. (2002)]	
PR1	The security mechanism provided by the social networking services (SNS) is not enough to protect my privacy well.
PR2	Overall, I think it is more-or-less unsafe to use SNS.
PR3	I feel that using SNS sometimes may cause unexpected issues.
Enjoyment of SNS activity (ESA): [source: Moon and Kim (2001)]	
ESA1	I can get useful information I need from SNS activity.
ESA2	I like to use SNS activity to find the information I need.
ESA3	SNS activity is a convenient channel for me to collect information.
Perceived value of smartphone SNS (PVSS): [source: Teas and Agarwal (2000); Zeithaml (1988)]	
PVSS1	Using smartphone SNS can speed up the search of information.
PVSS2	I can easily get information from Smartphone SNS.
PVSS3	Using smartphone SNS can help me find the information I want.
PVSS4	During the travel, I can find appropriate products and services matching my needs by using smartphone SNS.
PVSS5	By using smartphone SNS, I can get promptly updated information about the products and services, and this is useful for me.
Trust in travel advice acquired from smartphone SNS (TTASS): [source: Hsu et al. (2011); Gefen (2000)]	
TTASS 1	I trust smartphone SNS in providing me with reliable travel advice for enhancing smartphone users' welfare.
TTASS 2	I trust travel advice acquired from smartphone SNS, because it is competent to help its users.
TTASS 3	I believe that the travel advice acquired from smartphone SNS is usually honest.
TTASS 4	I depend on smartphone SNS for the purpose of acquiring travel advice I need.
TTASS 5	I consider smartphone SNS as a trustworthy source for providing travel advice.

PLS-SEM analysis necessitates checking for unidimensionality of each block in the model. A block is unidimensional when its Cronbach's alpha ( $\alpha$ ) value and composite reliability (CR) value are greater than 0.7 (Tenenhaus et al., 2005). Table 4 shows that in this study's model the Cronbach's  $\alpha$  values range from 0.87 to 0.94 and the CR values range from 0.92 to 0.96, exceeding the threshold value (0.7).

Table 4 also lists the measurement model estimation results, including the outer weights, outer loadings, and average variance extracted (AVE) measures. The outer loadings, which represent the loadings of the reflective manifest variables with their respective latent variable, are useful to assess individual item reliability. A loading higher than 0.7 signals the item's reliability (Hulland, 1999). In this study, all outer loadings (ranging from 0.80 to 0.94) are higher than 0.7.

The average variance extracted (AVE) measures are useful to assess the convergent validity of the constructs. In this study, AVE measures vary from 0.73 to 0.82, passing the threshold value (0.5) that Fornell and Larcker (1981) suggest. To assess the discriminant validity, the square root of the AVE measure on each construct must exceed the estimated correlations between the construct and other constructs in the model (Fornell & Larcker, 1981). In this study, the square root of AVE on each construct (i.e., the diagonal elements in Table 5) is greater than the correlations of the construct with other constructs (i.e., those related off-diagonal elements in Table 5).

After validating the measurement model, the research then estimates the structural model which specifies the relationships between latent variables. See Fig. 2 for the path coefficients for the endogenous latent variables together with the R-squares.

**Table 3**  
Demographics of respondents.

Demographics		Number of responses	Percentage of responses (%)
Gender	Male	66	48.53
	Female	70	51.57
Age	<21 years old	6	4.41
	21–30 years old	36	26.47
	31–40 years old	41	30.15
	41–50 years old	42	30.88
	>51 years old	11	8.09
Education	Middle school or below	12	8.82
	High school	22	16.18
	College/university	62	45.59
	Postgraduate	40	29.41
Occupation	Manufacturing industry	56	41.18
	Service sector	29	21.32
	Information technology	17	12.50
	Student	10	7.35
	Education	9	6.62
	Health care	8	5.88
	Financial services	4	2.94
	Construction industry	2	1.47
	Media/press	1	0.74
	Facebook experience	<1 year	7
	1–2 years	12	8.82
	2–3 years	22	16.18
	>3 years	95	69.85
Daily Facebook usage	<1 h	31	22.79
	1–3 h	67	49.26
	3–5 h	25	18.38
	>5 h	13	9.56

The empirical results show that (1) mobile users' TTASS associates significantly with PVSS ( $\beta = 0.45, p = 0.0000$ ) and ESA ( $\beta = 0.27, p = 0.0053$ ), but does not significantly associate with PC ( $\beta = -0.10, p = 0.1579$ ) and PR ( $\beta = 0.10, p = 0.1867$ ); (2) mobile users' PVSS significantly associates with PR ( $\beta = 0.16, p = 0.0158$ ) and ESA ( $\beta = 0.72, p = 0.0000$ ), but does not significantly associate with PC ( $\beta = -0.05, p = 0.4409$ ); (3) mobile users' ESA significantly associates with PC ( $\beta = -0.21, p = 0.0409$ ) and PR ( $\beta = 0.23, p = 0.0233$ ); and (4) mobile users' PR significantly associates with PC ( $\beta = 0.57, p = 0.0000$ ). The empirical results support hypotheses H1, H2, H5, H6, H8, H9 and H10, whereas the results do not support hypotheses H3, H4, and H7.

**Table 4**  
The results from the measurement model estimation (weight, loading, CR value, Cronbach's  $\alpha$ , and AVE).

Latent variable	Manifest variable	Outer weight	Outer loading	CR value	Cronbach's alpha ( $\alpha$ )	AVE
Privacy concerns (PC)	PC1	0.30	0.88	0.94	0.91	0.79
	PC2	0.28	0.92			
	PC3	0.27	0.89			
	PC4	0.28	0.85			
Perceived risk (PR)	PR1	0.39	0.89	0.92	0.87	0.79
	PR2	0.38	0.94			
	PR3	0.35	0.85			
Enjoyment of SNS activity (ESA)	ESA1	0.33	0.84	0.93	0.88	0.81
	ESA2	0.39	0.94			
	ESA3	0.39	0.92			
Perceived value of smartphone SNS (PVSS)	PVSS1	0.20	0.90	0.96	0.94	0.82
	PVSS2	0.21	0.92			
	PVSS3	0.23	0.91			
	PVSS4	0.23	0.90			
	PVSS5	0.23	0.89			
Trust in travel advice acquired from smartphone SNS (TTASS)	TTASS 1	0.24	0.80	0.93	0.91	0.73
	TTASS 2	0.22	0.83			
	TTASS 3	0.23	0.86			
	TTASS 4	0.26	0.89			
	TTASS 5	0.23	0.87			

**Table 5**  
Inter-construct correlations and square root of AVE measure.

	PC	PR	ESA	PVSS	TTASS
PC	<i>0.89</i>				
PR	0.57	<i>0.89</i>			
ESA	-0.08	0.11	<i>0.90</i>		
PVSS	-0.01	0.21	0.74	<i>0.90</i>	
TTASS	-0.07	0.17	0.62	0.67	<i>0.85</i>

Notes: PC: privacy concerns; PR: perceived risk; ESA: enjoyment of SNS activity; PVSS: perceived value of smartphone SNS; TTASS: trust in travel advice acquired from smartphone SNS. The diagonal element, which shows the square root of AVE on each construct, is in *Italics font*.

**5. Discussion**

This study demonstrates that one can build the trust mechanisms of smartphone SNS by enhancing users' ESA and PVSS, and the influences of ESA and PVSS (in terms of path coefficients and statistics significance) are much greater than the influences of PC and PR. This particular finding is in line with prior research findings arguing that positive influences (e.g., value and enjoyment) on accepting a technology outrun the negative influences (e.g., concerns and risk), which explains why adopters continue to use Facebook even with perceived potential risks in Facebook usage (Lankton & McKnight, 2011; Tan & Qin, 2012). Smartphone SNS offer an innovative channel for users to publish and receive promptly updated information and advice anytime and anywhere, and such added value enhances mobile users' TTASS. By using a smartphone, people can link to SNS without space and time limit. This smartphone SNS advantage can apply in diverse domains that bring up niche values to mobile users, which may be the reason why mobile users who enjoy SNS activity and perceive smartphone SNS as a valuable channel tend to trust the travel advice acquired from smartphone SNS. In terms of the negative influence of PC on users' TTASS, the findings are consistent with prior research results which suggest that PC not only increase risk but also reduce trust in the context of mobile advertising (Okazaki, Navarro-Bailon, & Molina-Castillo, 2012), although the relationship between PC and TTASS in this study is statistically insignificant. The findings also show that the influence of PR on TTASS is insignificant. The reason of these insignificant relationships might be that users who enjoy their valuable smartphone SNS activities a lot may ignore potential negative effects of PC and PR. When balancing the positive and negative influences of trust mechanisms, service designers and researchers should still pay attentions to Okazaki et al. (2012), who argue that when the level of PC is high, consumers' attitude to maximize the utility of the technology may be blocked, no longer willing to further explore the technology.

This research also confirms that mobile users' PVSS is significantly associated with PR and ESA, whereas PVSS does not significantly associate with PC. This information indicates that even with PR, mobile users

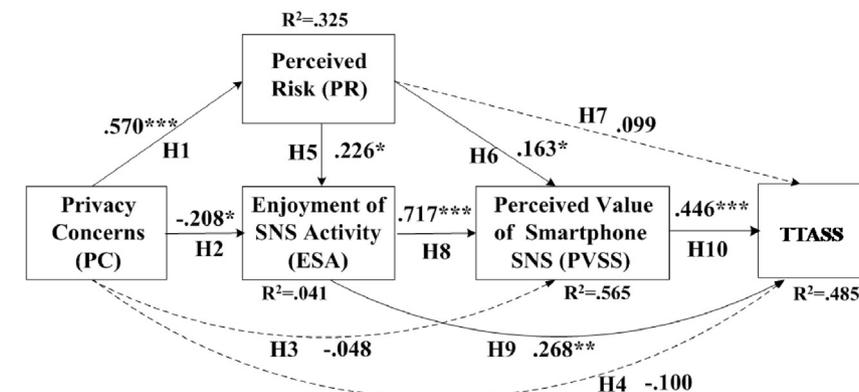
may still enjoy smartphone SNS activities and perceive smartphone SNS as valuable. Because of the emergence of app stores, smartphone users can easily download and use diverse smartphone apps, and enjoy the value that smartphone apps provide (Costa-Montenegro, Barragáns-Martínez, & Rey-López, 2012). The effect of PC on PVSS may not be significant because smartphone SNS users always share their personal information to increase their sociability with other people, which could be the reason explaining our finding about the insignificant relationship between PC and PVSS. With the characteristics of light weight, small size and high portability, mobile users can use smartphones as yet another channel to connect and interact with significant others (relatives, friends, classmates, colleagues, etc.) via smartphone SNS, anytime and anywhere. Indeed, people who enjoy SNS activity may become even better satisfied by utilizing smartphone SNS as an alternative valuable choice. These facts could explain why ESA significantly associates with PVSS. Service providers should pay attention to dynamic changes in trust mechanisms of smartphone SNS in terms of enjoyment, value/benefit, privacy concerns, and PR.

In addition, the balance that Facebook users perceive between values/benefit and concerns/risk should encourage service providers to pursue the creation of useful and reliable social functions within their services via technological innovation. Jøsang, Ismail, and Boyd's (2007) study provides a comprehensive list of literature about trust and reputation systems in successful commercial online services and such list is definitely a useful reference point here.

Prior research shows that most users prefer using personal computers, rather than using mobile devices (e.g., smartphones) for SNS activity because personal computers are easier to use to search information and advice before traveling. Smartphones, however, have more constraints such as small screens and so on (Pitt et al., 2011). Smartphone constraints could be the main reason why smartphones cannot replace personal computers. However, in reality, mobile users may encounter unexpected situations such as traveling without computers. Under this circumstance, mobile users holding smartphones can connect to the Internet without time and space limit. That is why users, especially travelers, will gradually accept smartphone apps. From the results of this study, one can infer that smartphone SNS will gradually turn out to be an important segment of mobile commerce.

**6. Conclusions and future work**

This study highlights important concepts relating to the trust mechanisms of smartphone SNS by developing a research framework with 10 hypotheses to explore the influences of ESA, PVSS, PC and PR on mobile users' TTASS. This analysis' results show that ESA and PVSS would significantly affect TTASS, and their influences (in terms of path coefficients and statistics significance) are much stronger than the influences of PC



Note: \*: p<0.05, \*\*: p<0.01, \*\*\*: p<0.001

Fig. 2. Empirical study results.

and PR. This specific finding may explain why smartphone SNS adopters continue to use Facebook for their social activities even when they perceive such services to be unsafe in privacy protection. Trust affects different types of social activities (e.g., sharing information, searching/using advice, spreading word-of-mouth, use/purchase behavior). In turn, positive influencing factors (e.g., ESA and PVSS) and negative influencing factors (e.g., PR) in using smartphone SNS may affect TTASS. The empirical results of this study imply that when the positive influences are greater than the negative influence, adopters will continue to trust smartphone SNS.

This study does not address the issues of the design and implementation of various types of smartphone SNS (e.g., the smartphone SNS based marketing service), but different services with various design philosophies and implementation approaches might influence users' perception, attitude, trust, and behavior on the whole process of using smartphone SNS. Therefore, to study various design and implementation issues in follow-up research efforts would be interesting. For example, marketing tourism services via smartphone SNS is a new business arena with many exciting technologies and vast application potentials. Research into various designs of commercially useable smartphone SNS is likely not only to widen the scope of its practical applications but also to contribute to developing a design theory for using smartphone SNS to enhance commercial services and relating business benefits.

This study inevitably suffers from difficulties owing to time and budget limits. All the data in this empirical study comes from participants in Taiwan, so the results might not be directly applicable to other contexts since the culture, custom, lifestyle, and habit in other region/country might not be the same. Different cultures and different regions/countries may play an important role spelling out the difference in the decision of trusting contents of apps and services via smartphone SNS. Another topic for future investigation is to explore how to build user trust in smartphone SNS or similar smartphone apps for various segmentations of users with necessary modifications. A wider research scope of exploration can make design principles and specific application guidelines that this study identifies and suggests more generalizable.

## References

- Ainin, S., Parveen, F., Moghavvemi, S., Jaafar, N. I., & Shuib, N. L. M. (2014). Determinants of user behaviour and recommendation in social networks. *Industrial Management & Data Systems*, 114(9), 1477–1498.
- Al-Debei, M. M., Al-Lozi, E., & Papazafeiropoulou, A. (2013). Why people keep coming back to Facebook: Explaining and predicting continuance participation from an extended theory of planned behaviour perspective. *Decision Support Systems*, 55(1), 43–54.
- Chang, S. E., Liu, Y. A., & Lin, S. (2015). Exploring privacy and trust for employee monitoring. *Industrial Management & Data Systems*, 115(12), 88–106.
- Cheng, Y. -H., & Ho, H. -Y. (2015). Social influence's impact on reader perceptions of online reviews. *Journal of Business Research*, 68(4), 883–887.
- Costa-Montenegro, E., Barragáns-Martínez, A. B., & Rey-López, M. (2012). Which app? A recommender system of applications in markets: Implementation of the service for monitoring users' interaction. *Expert Systems with Applications*, 39(10), 9367–9375.
- Crespo, A. H., del Bosque, I. R., & Sánchez, M. M. (2009). The influence of perceived risk on internet shopping behavior: A multidimensional perspective. *Journal of Risk Research*, 12(2), 259–277.
- Dodds, W. B., Monroe, K. B., & Grewal, D. (1991). Effects of price, brand, and store information on buyers' product evaluations. *Journal of Marketing Research*, 28(3), 307–319.
- Doney, P. M., Cannon, J. P., & Mullen, M. R. (1998). Understanding the influence of national culture on the development of trust. *The Academy of Management Review*, 23(3), 601–620.
- Dowling, G. R., & Staelin, R. (1994). A model of perceived risk and intended risk-handling activity. *Journal of Consumer Research*, 21(1), 119–134.
- Ernst, C. P. H., Pfeiffer, J., & Rothlauf, F. (2013). *The influence of perceived belonging on social network site adoption* AMCIS 2013, 19th Americas Conference on Information Systems, Chicago, Illinois, August 15–17.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Gefen, D. (2000). E-commerce: The role of familiarity and trust. *Omega – The International Journal of Management Science*, 28(6), 725–737.
- Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly*, 27(1), 51–90.
- Grandison, T., & Sloman, M. (2000). A survey of trust in internet applications. *IEEE Communication Surveys and Tutorials*, 3(4), 2–16.
- Gunawan, D. D., & Huang, K. -H. (2015). Viral effects of social network and media on consumers' purchase intention. *Journal of Business Research*, 68(11), 2237–2241.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–152.
- Hsu, M. H., Chang, C. M., & Yen, C. H. (2011). Exploring the antecedents of trust in virtual communities. *Behaviour & Information Technology*, 30(5), 587–601.
- Hulland, J. S. (1999). Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strategic Management Journal*, 20(2), 195–204.
- Jang, Y. T., Chang, S. E., & Tsai, Y. J. (2014). Smartphone security: Understanding smartphone users' trust in information security management. *Security and Communication Networks*, 7(9), 1313–1321.
- Jøsang, A., Ismail, R., & Boyd, C. (2007). A survey of trust and reputation systems for online service provision. *Decision Support Systems*, 43(2), 618–644.
- Kane, G. C., Fichman, R. G., Gallagher, J., & Glaser, J. (2009). Community relations 2.0. *Harvard Business Review*, 87(11), 45–50.
- Lankton, N. K., & McKnight, D. H. (2011). What does it mean to trust Facebook? Examining technology and interpersonal trust beliefs. *ACM SIGMIS Database*, 42(2), 32–54.
- Lee, H. -G., Chung, S., & Lee, W. -H. (2013). Presence in virtual golf simulators: The effects of presence on perceived enjoyment, perceived value, and behavioral intention. *New Media & Society*, 15(6), 930–946.
- Lyu, S. O., & Hwang, J. (2015). Are the days of tourist information centers gone? Effects of the ubiquitous information environment. *Tourism Management*, 48, 54–63.
- Malhotra, N. K., Kim, S. S., & Agarwal, J. (2004). Internet users' information privacy concerns (IUIPC): The construct, the scale, and a causal model. *Information Systems Research*, 15(4), 336–355.
- McKnight, D. H., Choudhury, V., & Kacmar, C. (2002). Developing and validating trust measures for e-commerce: An integrative typology. *Information Systems Research*, 13(3), 334–359.
- Moon, J. W., & Kim, Y. G. (2001). Extending the TAM for a World-Wide-Web context. *Information Management*, 38(4), 217–230.
- Nofer, M., Hinz, O., Muntermann, J., & Roßnagel, H. (2014). The economic impact of privacy violations and security breaches. *Business & Information Systems Engineering*, 6(6), 339–348.
- Okazaki, S., Navarro-Bailon, M. A., & Molina-Castillo, F. J. (2012). Privacy concerns in quick response code mobile promotion: The role of social anxiety and situational involvement. *International Journal of Electronic Commerce*, 16(4), 91–120.
- Pitt, L. F., Parent, M., Junglas, L., Chan, A., & Spyropoulou, S. (2011). Integrating the smartphone into a sound environmental information systems strategy: Principles, practices and a research agenda. *Journal of Strategic Information Systems*, 20(1), 27–37.
- Riegelsberger, J., Sasse, M. A., & McCarthy, J. D. (2005). The mechanics of trust: A framework for research and design. *International Journal of Human-Computer Studies*, 62(3), 381–422.
- Sheppard, B. H., & Sherman, D. M. (1998). The grammars of trust: A model and general implications. *The Academy of Management Review*, 23(3), 422–437.
- Sheth, J. N., Newman, B. I., & Gross, B. L. (1991). Why we buy what we buy: A theory of consumption values. *Journal of Business Research*, 22(2), 159–170.
- Shin, D. H. (2010). The effects of trust, security and privacy in social networking: A security-based approach to understand the pattern of adoption. *Interacting with Computers*, 22(5), 428–438.
- Sledgianowski, D., & Kulviwat, S. (2009). Using social network sites: The effects of playfulness, critical mass and trust in a hedonic context. *The Journal of Computer Information Systems*, 49(4), 74–83.
- Tan, X., & Qin, L. (2012). Impact of privacy concern in social networking web sites. *Internet Research*, 22(2), 211–233.
- Teas, R. K., & Agarwal, S. (2000). The effects of extrinsic product cues on consumers' perceptions of quality, sacrifice and value. *Journal of the Academy of Marketing Science*, 28(2), 278–290.
- Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics and Data Analysis*, 48(1), 159–205.
- Toe, A. C., Tan, G. W. H., Ooi, K. B., & Lin, B. (2015). Why consumers adopt mobile payment? A partial least squares structural equation modeling (PLS-SEM) approach. *International Journal of Mobile Communications*, 13(5), 478–497.
- Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36(1), 157–178.
- Wang, X., & Clay, P. F. (2012). Beyond adoption intention: Online communities and member motivation to contribute longitudinally. *Journal of Organizational Computing and Electronic Commerce*, 22(3), 215–236.
- Yang, K., Cheng, X., Hu, L., & Zhang, J. (2012). Mobile social networks: State-of-the-art and a new vision. *International Journal of Communication Systems*, 25(10), 1245–1259.
- Young, A. L., & Quan-Haase, A. (2013). Privacy protection strategies on Facebook. *Information, Communication & Society*, 16(4), 479–500.
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing*, 52(3), 2–22.
- Zhou, T. (2011). The impact of privacy concern on user adoption of location-based services. *Industrial Management & Data Systems*, 111(2), 212–226.
- Zhou, T., & Li, H. (2014). Understanding mobile SNS continuance usage in China from the perspectives of social influence and privacy concern. *Computers in Human Behavior*, 37, 283–289.