Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 2012 Proceedings | Proceedings

The Influence of Technology Characteristics on Privacy Calculus: A Theoretical Framework

Mohammad Najjar
University of Memphis, Memphis, TN, United States., msnajjar@memphis.edu

Son Bui
University of Memphis, Memphis, TN, United States., snbui@memphis.edu

The Influence of Technology Characteristics on Privacy Calculus: A Theoretical Framework

Mohammad Said Najjar
University of Memphis
msnajjar@memphis.edu

Son Ngoc Bui
University of Memphis
snbui@memphis.edu

ABSTRACT

The notion of privacy calculus has been used to explain the risk-benefit analysis information technology users perform when asked to provide personal information. This study extends the privacy calculus model by proposing a theoretical framework in which technology characteristics (radicalness and complexity) have moderating effects on the benefit-value and risk-value relationships. The framework also suggests that perceive benefit is a multidimensional construct formed by utilitarian, hedonic, and social benefits. This study is contextualized for smartphone users who are faced with the decision to allow access to their personal information in order to use mobile applications. Propositions to guide future research are developed and implications of the proposed framework are discussed.

Keywords

Information privacy, privacy calculus, technology characteristics, radicalness, complexity, utilitarian, hedonic, social, perceived benefit, perceived risk, perceived value, intention to allow access, smartphone, mobile applications.

INTRODUCTION

The widespread of smartphones as a result of the advances in mobile communication technologies has raised a number of privacy related issues. Smartphone users rely heavily on mobile applications (apps) to perform tasks on their mobile devices. These apps can provide useful information and services as well as entertainment to their users. Gartner, a market-research firm, predicts 17.7 mobile app downloads in 2011, a number up 116% from 2010 (Anthes, 2011). Mobile apps may pose a threat to users' privacy, especially when users allow these apps to access their information residing on their smartphones.

The notion of privacy calculus has been used to explain the process where access to personal information and location data is granted in return for a perceived value (Xu, Teo, Tan, and Agarwal, 2009; Xu, Luo, Carroll, and Rosson, 2011). According to this notion, users would weigh the perceived benefit of allowing mobile apps to access their personal information against the perceived risk of granting such access. This is essentially a risk-benefit analysis to assess privacy concerns before revealing private information (Xu et al. 2009).

Research has identified different technology characteristics that can be used to compare and contrast technologies. Aiman-Smith and Green (2002) suggest that technology radicalness (the degree of newness of an innovation) and technology complexity (the extent to which a new technology is more complicated for its user than the previous technology used for the same purpose) both compose technology characteristics. Other research has investigated technology characteristics from a group collaborative point of view. Sarker, Valacich, and Sarker (2005) suggest that complexity, transferability, utility, maintainability, and group supportability are technology characteristics relevant to understand technology adoption by groups. Brown, Dennis, and Venkatesh (2010) identify social presence, immediacy, and concurrency as derived technology characteristics of collaboration technology. While all of these technology characteristics can be used to differentiate technologies, only radicalness and complexity are suggested to be relevant to the context under investigation because 1) the study is not specific to collaborative technologies; therefore, technology characteristics of collaborative technologies may not be relevant, 2) the study focuses on technology characteristics relevant to individual context, rather than technology characteristics that influence technology adoption at an organizational level, and 3) the phenomenon under investigation is technology characteristics that influence privacy calculus, which require the concentration on only those technology characteristics that come to play when making a privacy calculus related decisions.

This paper explores the role of two technology characteristics (i.e. radicalness and complexity) in privacy calculus. The purpose of this study is to better understand how characteristics of technology influence users' intention to allow access to personal information. The study suggests that technology radicalness and technology complexity moderate the effect of privacy calculus on users' intention to allow access to personal information. The smartphone users' installation of mobile apps and allowing them to access personal information is the phenomenon under investigation.

PROPOSED THEORETICAL FRAMEWORK

The proposed theoretical framework (Figure 1) integrates past research (discussed below) that has linked perceived benefit and perceived risk to perceived value, resulting in an intention to allow access to personal information. Individual characteristics of previous privacy experience and personal innovativeness are included. The framework also depicts the moderating role of technology radicalness on the relationship between perceived benefit and perceived value and technology complexity on the relationship between perceived risk and perceived value. The framework illustrates a proposed multidimensional nature of perceived benefit being formed by utilitarian, hedonic, and social benefits.

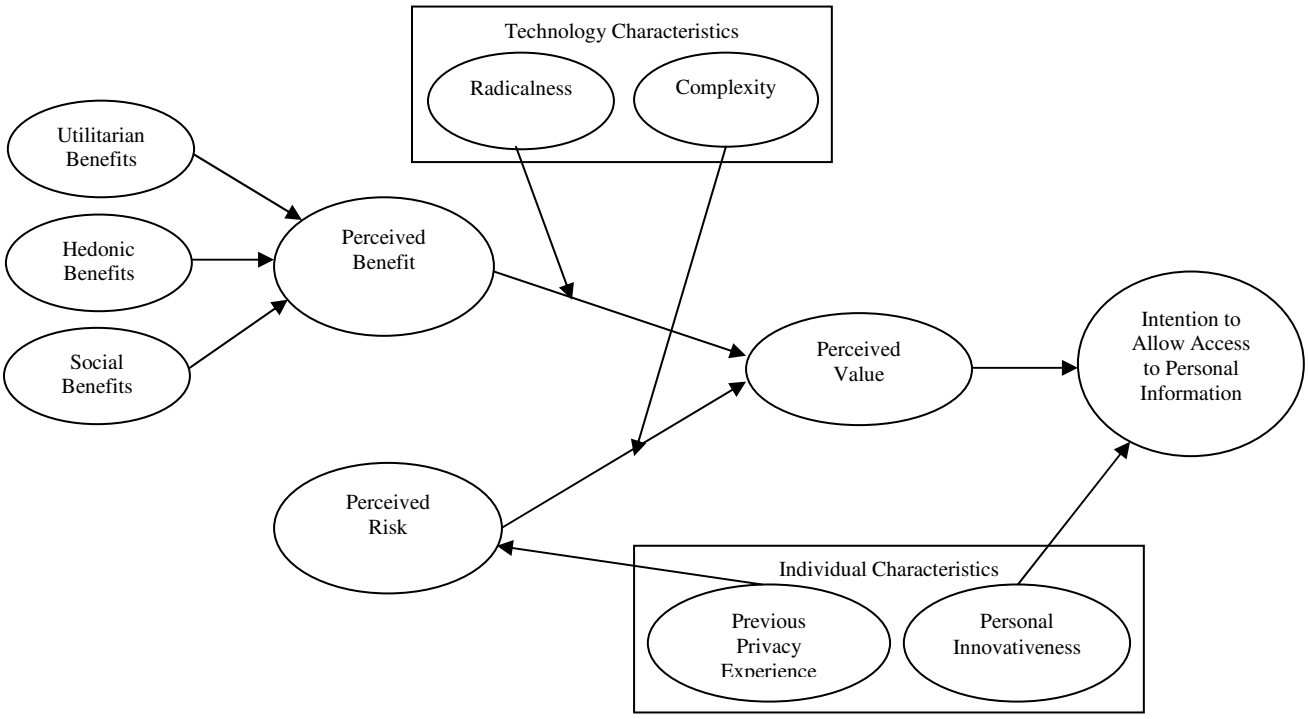

Figure 1. Proposed Theoretical Framework

UTILITARIAN, HEDONIC, AND SOCIAL DIMENSIONS OF PECEIVED BENEFIT

With every new technology introduced, users may perceive benefit from utilizing this technology. The value can be extracted by identifying the user needs and matching them with the functionalities of a certain technology. Hausman, Johnston, and Oyedele (2005) define perceived benefit of an innovation as the prospective adopters' belief in the probability that the new innovation will be beneficial. Kim, Ferrin, and Rao (2008) define perceived benefit of an online transaction with a certain Website as a consumer's belief about the extent to which he or she will become better off from that transaction. Drawing on these two definitions, perceived benefit of an action can be defined as the user's belief of the advantageous outcomes resulting from performing this action; perceived benefit of a technology can be thought of in terms of user's perception of the outcomes of using this technology.

A study on technology adoption shows that adopters are driven by the utilitarian outcomes, hedonic outcomes, and social outcomes of the technology (Venkatesh and Brown, 2001). Drawing on this categorization, the perceived benefit of technology can be divided into utilitarian benefits, hedonic benefits, and social benefits. Chitturi, Raghunathan, and Mahajan (2008) refer to utilitarian benefits as the functional, instrumental, and practical benefits, while hedonic benefits refer to aesthetic, experiential, and enjoyment-related benefits. Social benefits can be thought of as the "public" recognition that would be achieved as a result of adopting a technology (Fisher and Price, 1992). Brown and Venkatesh (2005) refer to social benefits as status gains, which is the increase in prestige that coincides with the adoption of a technology.

Products that meet or exceed customers' utilitarian needs and hedonic wants increase customers' satisfaction and delight with the product (Chitturi et al., 2008). Van der Heijden (2004) suggests that hedonic benefits can play an important role in increasing acceptance of technologies that only has utilitarian benefits. Social benefits and the desire to gain status is an important reason for the adoption of an innovation. Venkatesh and Davis (2000) demonstrate the importance of social outcomes, driven by referent power, in providing actors performing a behavior with power within a social group. Social image is particularly important in the case of interactive systems that act as the media for communication and social interaction (Venkatesh, Morris, Davis, and Davis, 2003; Hsu and Lu, 2004).

In smartphones, for example, processing power, memory size, and information capabilities are utilitarian benefits; the color, shape, and enjoyment of the smartphone are hedonic benefits; while the prestige, high profile, and the status symbol accompanying the use of a smartphone are social benefits. In general, users satisfied with their mobile device services perceive a stronger contribution of these services to their overall quality of life (Choi, Lee, Im, and Kim, 2007).

A multidimensional, second-order construct of perceived benefit is proposed. This construct has a formative relationship with the utilitarian, hedonic, and social dimensions of benefit. Multidimensional constructs are constructs with more than one dimension (Petter, Straub, and Rai, 2007). MacKenzie, Podsakoff, and Podsakoff (2011) suggest that if the dimensions of a multidimensional construct are defining the construct and a change in only one of the dimensions could be associated with a change in the focal construct, then the dimensions should be modeled as formative indicators of the second-order focal construct. Perceived benefit is the user's perception of all the outcomes gained and needs fulfilled by a product or a service. Each dimension of perceived benefit captures differing aspect of the user's perception of benefit; these dimensions are viewed as defining characteristics of perceived benefit, perceived benefit is a function of its dimensions, and a change in only one of the dimensions of perceived benefit could be associated with a change in perceived benefit.

Benefit Dimension	Definition	Source
Utilitarian	the functional, instrumental, and practical benefits	Chitturi et al. (2008)
Hedonic	aesthetic, experiential, and enjoyment-related benefits	Chitturi et al. (2008)
Social	public recognition benefits	Fisher and Price (1992)

Table 1. Dimensions of Perceived Benefit

PRIVACY CALCULUS

According to the privacy calculus, users would perform risk-benefit analysis when they are asked to allow access to personal information. The result of this calculation would drive or inhibit allowing such an access (Awad and Krishnan, 2006). The perceived value of allowing access to personal information can be defined as the individual's overall assessment of the utility of allowing access to personal information (Xu et al., 2011); this assessment is based on the individual's perceptions of the benefit to be gained and risk to be incurred. Technology users are more likely to allow access to personal information if they perceived some kind of benefit from such a decision. The more the expected benefit to be received the more the overall assessment of the utility of from access to personal information. Smartphone users use mobile apps and agree to allow access to personal information because of the potential benefit of using these apps on their smartphones. Using a smartphone through mobile apps provide the user with utilitarian benefits (information access), hedonic benefits (games), and social benefits (status gains). The perceived benefit of allowing access to personal information in order to use a mobile app will influence the smartphone user's perception of value:

Proposition 1. The perceived benefit of allowing access to personal information will have a positive effect on the perceived value of allowing such an access.

Perceived risk is the individual's perception of the uncertain and adverse consequences of engaging in a certain activity (Dowling and Staelin, 1994). Privacy risk is the degree to which an individual believes that a high potential for loss is associated with allowing access to personal information (Malhotra, Kim, and Agarwal, 2004). Featherman, Miyazaki, and Sprott (2010) add to this definition and state that privacy risk also includes the assessment of potential misuse of information that may result in identity theft. Sources of risk that have been previously identified include unauthorized access to personal information and selling these personal information to or sharing them with other parties (Featherman and Pavlou, 2003; Malhotra et al., 2004). Schneier (2005) notes that individuals have no control over the security of third-party data (i.e. personal data being held by others), which poses another threat to privacy risk. Cazier, Jensen, and Dave (2008) claim that consumer's perceptions of privacy risk with a technology influence their intention to accept, adopt, and use this technology. Featherman et al. (2010) suggest that decreasing privacy risk associated with e-services will likely result in higher adoption intentions toward such services. The overall assessment of utility would be low if users feel that there is high risk of privacy invasion as a result of allowing access to personal information. Perceived risk was found to have a negative influence of the individual's perception of value (Sweeney, Soutar, and Johnson, 1999; Agarwal and Teas, 2001).

There are certain privacy risk issues associated with using mobile apps. By downloading, installing, and using a mobile app, smartphone users agree to allow this mobile app to access the information stored on the smartphone's memory card, phone calls, messages, contact list, user's accounts, location information, the smartphone's hardware and system tools, and personal information, just to mention a few. While an immediate negative effect of allowing such an access might not be witnessed, smartphone users might still be reluctant to allow the mobile app to access all these private information. The risk associated with allowing a mobile app to access personal information will influence the smartphone user's perception of perceived value:

Proposition 2. The perceived risk of allowing access to personal information will have a negative effect on the perceived value of allowing such an access.

Perceived value is an individual's overall assessment of the utility of a product or a service based on perceptions of what is received and what is given (Zeithaml, 1988); it is a subjective and individual judgment of the tradeoff between the perceived benefit and the perceived risk. Individuals would attempt to gain maximum utility through the choice object (Xu et al., 2011). Upon internalization of the value, intentions toward relevant objects are developed based on the perceived value. Behavioral intention is found to be mediated by perceived value (Grewal, Monroe, and Krishnan, 1998; Pihlström and Brush, 2008).

Using a mobile app introduces perceived benefit and perceived risk to a smartphone user. In order to take advantage of the previously discussed utilitarian, hedonic, and social benefit of using a mobile app, smartphone user has to allow this app to access the user's personal information. The decision to be made is whether the perceived value (benefit/risk ratio) is large enough to justify the behavioral intention of allowing access to personal information. The perceived value of allowing access to personal information to use a mobile app is expected to influence the intention to allow this access:

Proposition 3. The perceived value of allowing access to personal information will have a positive effect on the intention to allow such an access.

TECHNOLOGY CHARACTERISTICS

Technology Radicalness and Perceived Benefit

Technological innovations that improve customer benefits are called radical innovations (Zhou, 2005). Radical innovations are considered highly new technologies that highly fulfill customer needs; thus high on both the technology and the market dimension (Chandy and Tellis, 1998). Although Sääksjärvi and Samiee (2011) claim that product newness has effects on product adoption that is contingent rather than absolute; product acceptance has been found to be positively related to higher perceived advantage and product newness ((Dickerson and Gentry, 1983; Moreau, Lehmann, and Markman, 2001). This positive relationship between product radicalness (newness) and product adoption suggests that customers perceive more benefits in radical products, so that they are more inclined to adopt them. The more a technology is perceived to be radical, the more the benefits users perceive it can bring to them.

Smartphone is a radical technology that provides many benefits (utilitarian, hedonic, and social) to its user: information access, gaming, social interaction, mobility, prestige, and traditional phone services provided by a traditional feature phone are all included in a smartphone. The improved functionality, features, look, and profile of a smartphone makes it a radical technology compared to a traditional, feature phone, which further increases the user's perception of benefit a smartphone provides. Based on the preceding discussion, it is expected that technology radicalness will positively moderate the relationship between perceived benefit and perceived value:

Proposition 4. The positive relationship between perceived benefit and perceived value will be stronger when the technology is radical.

Technology Complexity and Perceived Risk

Technological advances may increase complexity and uncertainty of technology (Attewell, 1992). Technological complexity is different from technological sophistication; the versatility and capabilities of the technology (Shih and Venkatesh, 2004). Technology can be sophisticated without being difficult to use (Shih and Venkatesh, 2004). The more complex an innovation is the more likely it will perceived as being difficult to use by its users. Complex technologies frustrate users (Mick and Fournier, 1998) and involve significant risks (Ravichandran, 2005); users will perceive higher levels of technological complexity if they are not well-equipped with sufficient knowledge and know-how required to use this technology. The uncertainty regarding the knowledge that must be acquired for a technology to work is higher for complex technologies due to their difficulty of use, making them a 'risky' choice for users.

There is a diversity of advanced functionalities and features in a smartphone compared to a traditional, feature phone. If a smartphone user does not feel comfortable dealing with the wide range functionalities and features of his/her smartphone and does not believe to have the necessary skills to adequately operate a smartphone, he/she is more likely to perceive more risk when using a smartphone. Therefore, the complexity of the technology will positively moderate the relationship between perceived risk and perceived value:

Proposition 5. The negative relationship between perceived risk and perceived value will be stronger when the technology is complex.

INDIVIDUAL CHARACTERISTICS

Previous Privacy Experience and Perceived Risk

Research has highlighted the influence of the individual's previous privacy experience on his/her evaluation of the perceived risk. If an individual has been exposed to or has been the victim of personal information abuses he/she could have stronger concerns regarding information privacy (Smith, Milberg, and Burke, 1996). Xu et al. (2009) find that individuals who have encountered privacy invasions are more aware of undesirable consequences of using a service based on previous privacy experience.

A smartphone user who believes his/her privacy has been invaded in the past is more likely to perceive more risk in allowing a mobile app to access his/her personal information:

Proposition 6. Previous privacy risk experience will have positive effect on perceived risk of allowing access to personal information.

Personal Innovativeness and Intention to Allow Access to Personal Information

Personal innovativeness is the willingness of an individual to try out new technology (Agarwal and Prasad, 1998). Individuals with higher innovativeness are more likely to experience with innovations because of this personal trait. Personal innovativeness was found to have a significant effect on behavioral intention (Yi, Fiedler, and Park, 2006)

The intention to allow access to personal information can be influenced by personal innovativeness. Smartphone users who are more innovative are more likely to allow a mobile app to access personal information to try it out:

Proposition 7. Personal innovativeness will have positive effect on intention to allow access to personal information.

DISCUSSION

There are many factors that affect individual's decision making process. According to the notion of privacy calculus, an individual will be engaged in a risk-benefit analysis to determine the value of allowing access to personal information, and based on the result of this analysis, a decision is made whether to allow the access or not. Smartphone users rely on mobile apps when using their smartphones; installing a mobile app requires allowing this app to access smartphone user's information stored on the smartphone. This paper explains why smartphone users may allow mobile apps to access their personal information using privacy calculus lens. In addition, technology characteristics are suggested to play a role in strengthening or weakening the smartphone user's perception of perceived value. The concept of privacy calculus is extended by adding important aspects of the technology itself (radicalness and complexity) as moderators that will influence both the

perceived benefit and the perceived risk of allowing access to personal information. Another contribution of this study is to explore the construct of perceived benefit as a multidimensional construct, where utilitarian, hedonic, and social benefits form an overall perception of benefit. Conceptualizing perceived benefit as a multidimensional construct can lead to a new insight regarding the nature of this construct. The perception of benefit is a result of evaluating the utilitarian, hedonic, and social dimensions of a technology.

By better understanding the process users go through when evaluating the benefit and risk associated with disclosing or allowing access to personal information, technology manufacturers, marketers and managers can concentrate on enhancing the radical capabilities of the technology to increase the perception of perceived value; by making the technology look "new" to users, practitioners can expect users to find allowing access to personal information in order to use the technology more beneficial and thus increase the perceived value of the allowing such an access. Also by introducing a technology that appears less complex to users, the influence of perceived risk of allowing access to personal information to use this technology will be decreased, which will in turn influence the perceived value of allowing access to personal information and ultimately the willingness to allow this access. Paying attention to the utilitarian, hedonic, and social dimensions of perceived benefit can be important in introducing a technology that will rate high on an overall perception of benefit a certain technology offers.

CONCLUSION

The recent advances in mobile technology provide users with new benefit and risk. It is important for researchers, practitioners, and policymakers to understand how technology users analyze the benefit and risk of a certain technology to determine value and, consequently, decide whether to allow access to personal information. A proposed model that extends privacy calculus is offered that theoretically suggests a role of technology characteristics in privacy calculus. This model also conceptualizes perceived benefit as a multidimensional construct form by utilitarian, hedonic, and social dimensions. It is hoped that this proposed framework will provide an opportunity for future research to empirically test and validate the proposed relationships and establish an avenue for practice to better understand this phenomenon.

REFERENCES

1. Agarwal, R. and Prasad, J. (1998) A conceptual and operational definition of personal innovativeness in the domain of information technology, *Information Systems Research*, 9, 2, 204–215.
2. Agarwal, S. and Teas, R. K. (2001) Perceived value: Mediating role of perceived risk, *Journal of Marketing Theory and Practice*, 9, 4, 1-14.
3. Aiman-Smith, L. and Green, S. G. (2002) Implementing new manufacturing technology: The related effects of technology, *Academy of Management Journal*, 45, 2, 421-430.
4. Anthes, G. (2011) Invasion of the mobile apps, *Communications of the ACM*, 54, 9, 16-18.
5. Attewell, P. (1992) Technology diffusion and organizational learning: The case of business computing, *Organization Science*, 3, 1, 1-19.
6. Awad, N. F. and Krishnan, M. S. (2006) The personalization privacy paradox: An empirical evaluation of information transparency and the willingness to be profiled online for personalization, *MIS Quarterly*, 30, 1, 13-28.
7. Brown, S. A., Dennis, A. R., and Venkatesh, V. (2010) Predicting collaboration technology use: Integrating technology adoption and collaboration research, *Journal of Management Information Systems*, 27, 2, 9-53.
8. Brown, S. A. and Venkatesh, V. (2005) Model of adoption of technology in household: A baseline model test and extension incorporating household life cycle, *MIS Quarterly*, 29, 3, 399-426.
9. Cazier, J. A., Jensen, A. S., and Dave, D. S. (2008) The impact of consumer perceptions of information privacy and security risks on the adoption of residual RFID technologies, *Communications of AIS*, 23, 14, 235-256.
10. International Journal of Information Security and Privacy, 1, 2,
11. Chandy, R. K. and Tellis, G. J. (1998) Organizing for radical product innovation: The overlooked role of willingness to cannibalize, *Journal of Marketing Research*, 35, 4, 474-487.
12. Chitturi, R., Raghunathan, R., and Mahajan, V. (2008) Delight by design: The role of hedonic versus utilitarian benefits, *Journal of Marketing*, 72, 3, 48-63.

13. Choi, H., Lee, M., Im, K. S., and Kim, J. (2007) Contribution to quality of life: A new outcome variable for mobile data services, *Journal of Association for Information Systems*, 12, 1, 598-618.
14. Dickerson, M. D. and Gentry, J. W. (1983) Characteristics of adopters and non-adopters of home computers, *Journal of Consumer Research*, 10, 2, 225–235.
15. Dowling, G. R. and Staelin, R. (1994) A model of perceived risk and intended risk-handling activity, *Journal of Consumer Research*, 21, 1, 119–134.
16. Featherman, M. S., Miyazaki, A. D., and Sprott, D. E. (2010) Reducing online privacy risk to facilitate e-service adoption: The influence of perceived ease of use and corporate credibility, *Journal of Services Marketing*, 24, 3, 219-229.
17. Featherman, M. S. and Pavlou, P. A. (2003) Predicting e-services adoption: a perceived risk facets perspective, *International Journal of Human-Computer Study*, 59, 4, 451-474.
18. Fisher, R. J. and Price, L. L. (1992) An investigation into the social context of early adoption behavior, *Journal of Consumer Research*, 19, 3, 477-486.
19. Grewal, D., Monroe, K. B., and Krishnan, R. (1998) The effects of price-comparison advertising on buyer's perceptions of acquisition value, transaction value, and behavioral intention, *Journal of Marketing*, 62, 2, 46-59.
20. Hausman, A., Johnston, W. J., and Oyedele, A. (2005) Cooperative adoption of complex systems: A comprehensive model within and across networks, *Journal of Business and Industrial Marketing*, 20, 4/5, 200-210.
21. Hsu, C. L. and Lu, H. P. (2004) Why do people play on-line games? An extended TAM with social influences and flow experience, *Information & Management*, 41, 7, 853–868.
22. Kim, D. J. Ferrin, D. L., and Rao, H. R. (2008) A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents, *Decision Support Systems*, 44, 2, 544-564.
23. MacKenzie, S. B., Podsakoff, P. M., and Podsakoff, N. P. (2011) Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques, *MIS Quarterly*, 35, 2, 293-334.
24. Malhotra, N. K., Kim, S. S., and Agarwal, J. (2004) Internet users' information privacy concerns (IUIPC): The construct, the scale, and a causal model, *Information Systems Research*, 15, 4, 336-355.
25. Mick, D. G. and Fournier S. (1998) Paradoxes of technology: Consumer cognizance, emotions, and coping strategies, *Journal of Consumer Research*, 25, 2, 123–143.
26. Moreau, C. P., Lehmann, D. R., and Markman, A. B. (2001) Entrenched knowledge structures and consumer response to new products, *Journal of Marketing Research*, 38, 1, 14–29.
27. Petter, S, Straub, D., and Rai, A. (2007) Specifying formative constructs in information systems research, *MIS Quarterly*, 31, 4, 623-656.
28. Pihlström, M. and Brush, G. J. (2008) Comparing the perceived value of information and entertainment mobile services, *Psychology & Marketing*, 25, 8, 732-755.
29. Ravichandran, T. (2005) Organizational assimilation of complex technologies: An empirical study of component-based software development, *IEEE Transactions on Engineering Management*, 52, 2, 249-268.
30. Sääksjärvi, M. and Samiee, S. (2011) Assessing multifunctional innovation adoption via an integrative model, *Journal of the Academy of Marketing Science*, 39, 5, 717-735.
31. Sarker, S., Valacich, J. S., and Sarker, S. (2005) Technology adoption by groups: A valence perspective, *Journal of the Association for Information Systems*, 6, 2, 37-71.
32. Sarker, S. and Wells, J. D. (2003) Understanding mobile handheld device use and adoption, *Communications of the ACM*, 46, 12, 35-40.
33. Schneier, B. (2005) Risks of Third-Party Data, *Communications of the ACM*, 48, 5, 136.
34. Shih, C. and Venkatech, A. (2004) Beyond adoption: Development and application of a use-diffusion model, *Journal of Marketing*, 68, 1, 59-72.
35. Smith, H. J., Milberg, J. S., and Burke, J. S. (1996) Information privacy: Measuring individuals' concerns about organizational practices, *MIS Quarterly*, 20, 2, 167–196.
36. Sweeney, J. C., Soutar, G. N., and Johnson, L. W. (1999) The role of perceived risk in the quality-value relationship: A study in retail environment, *Journal of Retailing*, 75, 1, 77-105.

37. Van der Heijden, H. (2004) User acceptance of hedonic information systems, *MIS Quarterly*, 28, 4, 695-704.
38. Venkatesh, V. and Brown, S. A. (2001) A longitudinal investigation of personal computers in homes: Adoption determinants and emerging challenges, *MIS Quarterly*, 25, 1, 71-102.
39. Venkatesh, V. and Davis, F. D. (2000) A theoretical extension of the technology acceptance model: Four longitudinal field studies, *Management Science*, 46, 2, 186-204.
40. Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. (2003) User acceptance of information technology: Toward a unifying view, *MIS Quarterly*, 27, 3, 425–478.
41. Xu, H., Luo, X. R., Carroll, J. M., and Rosson, M. B. (2011) The personalization privacy paradox: An exploratory study of decision making process for location-aware marketing, *Decision Support Systems*, 51, 1, 42-52.
42. Xu, H., Teo, H., Tan, B. C. Y., and Agarwal, R. (2009) The Role of push–pull technology in privacy calculus: The case of location-based services, *Journal of Management Information Systems*, 26, 3, 135-173.
43. Yi, M. Y., Fiedler, K. D., and Park, J. S. (2008) Understanding the role of individual innovativeness in the acceptance of IT-based innovations: comparative analysis of models and measures, *Decision Sciences*, 37, 3, 393-426.
44. 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.
45. Zhou, K. Z., Yim, C. K. B., and Tse, D. K. (2005) The effects of strategic orientations on technology- and market-based breakthrough innovations, *Journal of Marketing*, 69, 2, 42-60.