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Exploring the Personal Innovativeness Construct: The Roles of Ease of Use, Satisfaction and Attitudes

Donald L. Amoroso[a,*], Ricardo A. Lim[b]

[a] *Professor, Lowder-Weil Endowed Chair, Auburn University Montgomery, USA*
[b] *Professor, Asian Institute of Management, Philippines*

A B S T R A C T

The use of global mobile technology has increased exponentially. In particular, a survey of consumers in the Philippines showed that 83% "could not live" without their mobile phones. We investigated factors, such as ease of use and personal innovativeness, to elucidate the consumer adoption of mobile technologies in the Philippines, to integrate existing adoption theories for academics and provide recommendations to practitioners based on our findings. Our research questions are as follows: (1) What key factors drive adoption of mobile technologies by Filipino consumers?; (2) Are Filipino consumers innovative in their use of mobile technologies?; And (3) How can telecom companies retain their customers? A structural equation model, which was built from a survey of 528 mobile Filipino consumers, showed support for repurchase intention to use mobile technologies. The hypotheses were generally supported by variables related to mobile phone usage with the Philippine consumer sample. Results support all of the hypothesized relationships for consumers using mobile technologies. Personal innovativeness did load on both attitude and repurchase intention for mobile applications as originally hypothesized but was strongly loaded for attitude toward using. This research is a first step in understanding the adoption of mobile applications by Filipino consumers. We initially hypothesized that consumer behavior toward mobile applications would involve constructs of innovativeness, ease of use, and satisfaction; however, we found that ease of use was less significant in understanding repurchase intention to use mobile technologies. Personal innovativeness was more important in explaining satisfaction with mobile application attitudes and repurchase intention. The Filipino context of this study also provides other interesting implications. As the Philippines transitions into a more international market, western products start to guide market behavior, particularly consumer adoption.

Keywords: Mobile Applications, Adoption, Personal Innovativeness, Ease of Use, Satisfaction, Purchase Intention

Ⅰ. Introduction

Global mobile technology use has grown exponentially. A survey of Philippine consumers showed that more than 83% couldn't live without their mobile phone (Ipsos, 2013). Some drivers of mobile phone adoption can be attributed to common themes: affordability, accessibility, compatibility, effort or ease of use, experience, perceived playfulness, perceived usefulness, service quality, safety concerns,

*Corresponding Author. E-mail: damoroso@aim.edu Tel: 013342443308

social influences and technical support. Each of these themes describes different adoption motivations, and appears in multiple studies examining the Internet and mobile technology research (Venkatesh et al., 2003; Ipsos, 2013). In addition to the common drivers of mobile applications usage, several applications drive the success of mobile applications including mobile web surfing, mobile learning, gaming and entertainment, mobile banking or mobile reservations, not to mention making a phone call or texting (Wang et al., 2009). Finally, mobile phones might be considered not mere "technology," but also as fashion items (Watchravesringkan et al., 2010), or as necessary everyday tools for life.

Consumer interest in Southeast Asia of mobile phone has been high. In the Philippines in particular, because of poor landline infrastructure, mobile phone adoption has been rapid, even saturated. The latest industry statistics indicate almost 107 phones per 100 people, i.e. people own multiple handsets with multiple SIM cards (Greene, 2013). Despite the penetration most postpaid plans are still too expensive for the majority of the population. About 95% of all phones still operate on prepaid basis. Because of geographical diversity and diffusion of populations, mobile coverage quality also varies widely. While access to mobile signals is relatively consistent in urban areas, provincial access has been spotty (Asian Mobile Market Forecast, 2012).

Because of often-limited services and peculiarities in market pricing, short message service (SMS) was initially offered as a cheaper service than voice or data services. Filipino users were therefore heavily subscribed on SMS versus voice. Filipinos used SM5 at more than twice to thrice the rate of neighbors such as Indonesia and Japan (Ipsos, 2013). A large portion of the population is employed abroad as overseas workers, in the Middle East, Europe, and North Asia; these overseas workers remit funds home and communicate heavily through mobile technologies. With the advent of smartphones Filipinos also now access social media like Facebook or Twitter through mobile. Despite the higher cost of data access versus SMS, Filipinos in 2013 spent an average of 8.7 hours online per month (Philippines Facebook page statistics, 2014).

To encourage the consumption of more profitable data services, and to mitigate churn (while two in the Philippines dominate share of market-SMART and GLOBE-there is nevertheless high churn of customers from one telecom to another) the telecoms supply users with a broad array of weekly-prepaid offers. One telecom reportedly offers an average of 200 new bundles per week. Users receive daily offers, for example, that charge less than USD dollar for unlimited Internet for one day, or unlimited SMS for three days, etc. (Interviews with marketing and analytics officers, 2014). The offers themselves could be combined in many ways. But to use the promos, the combinations were cognitively demanding, often involving the keying of long promo codes and keywords. Nevertheless churn has continued, because customer switching-costs between telecom providers have remained low.

The combination of high handset penetration, emigration, wide variation of service quality, relatively expensive voice and data access, limited user resources and high churn combine into what Drucker calls an incongruity of economic realities (Drucker, 1985). Incongruities drive innovation by exploiting gaps between the economic situations of customers and advances in mobile technologies. Heavy users such as the Filipino youth market, for example, are known to squeeze maximum use of limited budgets by creative manipulation of multiple SIM cards and bundled plans. We therefore decided to test for the

innovativeness, not so much of Philippine telecom providers, but from Filipino users themselves.

In this study, we attempt to address two research questions:

- What key factors drive the adoption of mobile technologies by the Filipino consumer?
- Are Filipino mobile consumers innovative in the personal use of mobile technologies?

This research is a first step in understanding the adoption and use of mobile-based applications in the Philippines. From a technology perspective, it is important to understand how specific factors influence the use of mobile technologies, and ultimately the consumers' decisions and business planning resulting from such an analysis. From a consumer perspective, it is important to ascertain the specification of consumer factors related to adoption of mobile applications.

Ⅱ. Literature Review

Our model employs six constructs: consumer innovativeness, perceived usefulness, ease of use, attitude, satisfaction, and repurchase intention. These constructs seem to iteratively and separately serve as independent, moderating, or dependent variables in numerous studies (see <Appendix A>). While we may never achieve finality about which variables are antecedents of others, the literature has clearly established these constructs as independent but strongly related.

2.1 Consumer Innovativeness, Ease of Use and Perceived Usefulness

Innovativeness is defined differently across multiple disciplines. A widely accepted definition among researchers was the degree of early acceptance of innovation (Agarwal and Prasad, 1999). Rogers (1995) defined innovativeness as the degree to which an individual adopted innovation before others did. Kim et al. (2013) presented two dimensions of consumer innovativeness: product-specific innovativeness, where consumer innovativeness varied from one product category to another, and life innovativeness, the innate predisposition of innovativeness from a socio-psychological perspective, including cognitive and sensory traits. Agarwal and Prasad (1999) developed a modified technology acceptance model finding that personal innovativeness positively moderated the relationship between the perceptions of relative advantage, ease of use, compatibility and the decision to adopt an innovation. They found a moderating influence on repurchase intention and that communications channels played a significant role in innovation adoption. Their results indicated that user experiences of innovation might affect attitude or repurchase intention via perceived ease of use or perceived usefulness. Lu et al. (2005) found that while perceived usefulness and perceived ease of use were strong variables in consumer willingness to adopt mobile technology, they concluded that variables such as personal innovativeness and social influence must also be considered in determining consumer acceptance. Innovativeness showed a direct effect on ease of use and usefulness, which in turn impacted the consumer's repurchase intention to adopt wireless Internet services via mobile technology.

Agarwal and Karahanna (2000) proposed a new mediating variable, cognitive absorption. Absorption is defined as a state of mindfulness and flexibility (Csikszentmihalyi, 1975) and is created influenced by playfulness and personal innovation. Absorption in turn influences adoption – Venkatesh et al. (2003), Nicola et al. (2005) and Park et al. (2005) explored how social influence and usage experience drove atti-

tude and intention. Lu et al. (2005) found that while PU and PEOU were strong variables in consumer willingness to adopt mobile technology, they concluded that variables such as personal innovativeness and social influence must also be considered in determining consumer acceptance. Innovativeness showed a direct effect on ease of use and usefulness, which in turn impacted the consumer's behavioral intention to adopt wireless Internet services via mobile technology.

Within the context of online shopping, an individual's innovative personality was explored as a concept of risk-taking tendencies, since innovative behaviors such as online shopping involve unavoidable risk and uncertainty (Lee et al., 2007). Specifically, online shoppers cannot ensure the degree of service quality when they make a purchase online. They tend to perceive online shopping to be more risky compared to offline purchasing. Online shopping is more prone to be adopted by highly innovative shoppers, who have high levels of self-confidence about their online purchase behaviors. High personal innovativeness might allow consumers to take risks and to accept new information technologies or services more easily than others. Lian et al. (2012) found personal innovativeness to have a strong moderating effect on attitude and intention to purchase. Ho and Wu (2011) defined personal innovativeness as a concept related to individual attitude toward new ideas and innovative decisions of other people's experience. They found that personal innovativeness moderated customer satisfaction and e-store loyalty.

With respect to attitude, Amoroso and Lim (2014) and Hill and Troshani (2009) found that consumer innovativeness and image or self-efficacy were significant in understanding online shopping behavior. Lian et al. (2012) also found that personal innovativeness in the use of information technologies was strongly related to a positive attitude toward online shopping, and ultimately increased behavioral intent to use an online store.

Several studies found a strong and direct relationship between consumer innovativeness and consumer loyalty and repurchase intention. Chen (2008) found that innovativeness had a positive relationship to customer satisfaction and repurchase intention with self-service technologies. In the Jayasingh and Eze (2009) study conducted with respondents in Malaysia, the findings verified that consumer use of mobile coupons showed a direct relationship to consumer's innovativeness and repurchase intention to adopt mobile coupons. Zhang et al. (2011) found a direct relationship between personal innovativeness and attitude toward using information technologies. Chen (2008) also found that personal innovativeness directly impacted a consumer's repurchase intention to use self-service technologies and as well their satisfaction with the applications related to online satisfaction.

In sum, the literature presents consumer innovativeness to be a rich and multifaceted construct, where innovativeness could be defined as the innate tendency to early adopt, or to have self-confidence and self-efficacy, or to be risk-taking. More, the literature shows that innovativeness has a positive effect on PU, PEOU, attitudes, intentions, and satisfaction.

2.2. Consumer Attitude

Attitude refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question (Cohen et al., 1986). Attitude toward using is defined as the consumer's evaluation of the desirability of his or her using the system or application. The attitude toward using construct involves individuals' positive or negative feelings about performing the target behavior (Davis

et al., 1989). Davis et al. (1989) found that user's attitudes significantly affected repurchase intention, although many previous studies focused on behavior rather than attitude as an indicator of user acceptance. Mathieson (1991) found that the attitude construct was statistically valid for explaining repurchase intention to use, comparing the theory of planned behavior with the technology acceptance model.

With respect to online shopping, studies have linked attitude to online behavior. For example, Wu (2003) found that consumers who shopped online had higher attitude scores, which were directly related to online purchase decisions. Athiyaman (2002) found that consumers avoided online purchasing items such as airline tickets because of their attitudes concerning the security of the Internet. Liljander et al. (2007) investigated the impacts of new mobile services to airline customers and concluded that customer attitudes were key to explaining loyalty and repurchase intention. They also found that the adopters had a more positive attitude than non-adopters towards many of the services. Likewise, Lee at al. (2007) found a significant relationship of consumer attitudes on both repurchase intention and loyalty toward purchasing online. For smart devices, Kim et al. (2012) found a strong relationship between attitude and intention to adopt mobile services, comparing Korea with the United States. They found that attitudes had a strong impact on the propensity of consumers to adopt mobile data services, comparing equivalency of measurement between the two countries.

Several studies found statistical relationships between attitudes and repurchase intention. Shih (2011) and Amoroso and Ogawa (2012) found relationships between attitude and loyalty and between repurchase intention and loyalty, and concluded that the behavioral loyalty model was slightly superior to the attitudinal loyalty model. Marshall (2010) found that affective commitment, a type of consumer attitude or willingness of relational continuity to the online store, was related to loyalty to purchase from the same vendor. This relationship showed a predecessor relationship between one or more consumer attitudes and loyalty as an outcome variable. Zhang et al. (2013) also found a strong relationship between consumer attitudes and repurchase intention.

2.3. Consumer Satisfaction

Satisfaction is the state where consumers measure their outcomes against a standard of pleasure versus displeasure. It is considered a vital construct that affects customer behavior and loyalty. Satisfaction is generally an antecedent of loyalty. Satisfaction with e-stores, like satisfaction with traditional retailers, is not derived solely from the customer's satisfaction with the product purchased (Wu and Qi 2010 but also convenience, site design, and financial security, which reflect the characteristics of the web site itself. As the performance of the e-store rises, the customers will have higher levels of satisfaction levels and tend to repeat purchase, thus leading to higher levels of loyalty. Ho and Wu (2010) found that personal innovativeness moderated customer satisfaction and e-store loyalty. Amoroso and Lim (2014) found a relationship between customer satisfaction and both loyalty and repurchase intention, dividing loyalty into the components of behavioral loyalty and attitudinal loyalty. He found that attitudinal components had a strong impact on loyalty. Wixom and Todd (2005) stated that, "when one considers the general attitude literature, the equivocal relationship between user satisfaction and usage can be understood." They further found that satisfaction affected usefulness and ease of use, which in turn, affected attitude. They found a relationship between satisfaction and attitude

on purchasing intent with culture as a moderating variable using measures for satisfaction as "meets expectations" and "feeling state" for attitude.

Anderson and Srinivasan (2003) studied the influence of loyalty on e-satisfaction and found that trust and perceived value and three individual level factors (purchase size, inertia, and convenience motivation) moderated the relationship between e-satisfaction and e-loyalty. Thorbjornsen and Supphellen (2004) found that brand loyalty was a stronger determinant of website usage than experience and type of motivation (information or entertainment purposes). Bauer and Grether (2002) found that customers who trusted a Web-based company felt more committed to it, thereby increasing customer satisfaction levels. Chen (2008) examined the antecedents and consequences of trust in online purchase decisions and found that prior satisfaction and familiarity with e-commerce were strongly correlated with website satisfaction and trust; website awareness, trust, and satisfaction also influenced the repurchase intention to purchase online. Ho and Wu (2012) found a statistically significant relationship between consumer satisfaction and loyalty toward using online products and services over alternatives. Most of the newer studies looked at the relationship between consumer satisfaction and loyalty. Anderson and Swaminathan (2011) found a direct relationship between consumer satisfaction and loyalty: trust and inertia were instrumental in understanding the loyalty construct.

2.4. Repurchase Intention

Behavioral intention is defined as a measure of the strength of one's intention to perform a specified behavior. It precedes the actual use of an information system or technology. It has been reported that behavioral intention predicts actual usage of a technology (Davis et al., 1989; Taylor and Todd, 1995; Venkatesh and Davis, 2000; Sun and Zhang, 2003). The results of Taylor and Todd's study (1995) of inexperienced and experienced users confirmed a stronger correlation between behavioral intention and behavior (usage) for experienced users. Barnes and Hinton (2012) found that behavioral intention was related to actual use in a study of corporate intranet quality and concluded that behavioral intention predicted actual use. Therefore, factors that influence behavior acted as indirect influences through the behavioral intention construct.

After an extensive review of the literature, many studies found evidence to show a strong relationship between attitudes and repurchase intention, and were found to be important in many technology adoption contexts. They provided evidence of technology acceptance at the individual level. Repurchase intention was found to be a strong surrogate and measure of satisfaction, finding a strong reciprocal relationship between both satisfaction and repurchase intention. Wu and Wang (2005) found that all of the variables, with the exception of perceived ease of use, significantly affected repurchase intention to use mobile commerce applications. Compatibility emerged as the most important determinant for intention to use. Cost exhibited a significant negative direct effect on repurchase intention, but showed less influence on intention than perceived risk, perceived usefulness, and compatibility. Chen (2009) found a strong positive relationship between consumer satisfaction and their repurchase intention to continue to use self-service technologies. Wang (2012) found in a study of online, retail shops that satisfaction using self-service technologies was directly related to consumers' continued repurchase intention to use those technologies in the future. Lien (2012) found a strong relationship between consumer satisfaction and re-

purchase intention for online shopping in the Taiwanese market. They found a strong relationship of consumer satisfaction to both repurchase intention to adopt and consumer attitudes toward adoption for e-service web sites. Xu et al. (2012) found that access to social web sites has a positive impact on intention to use social networks. Access and coordination were found to have the highest impact on repurchase intention.

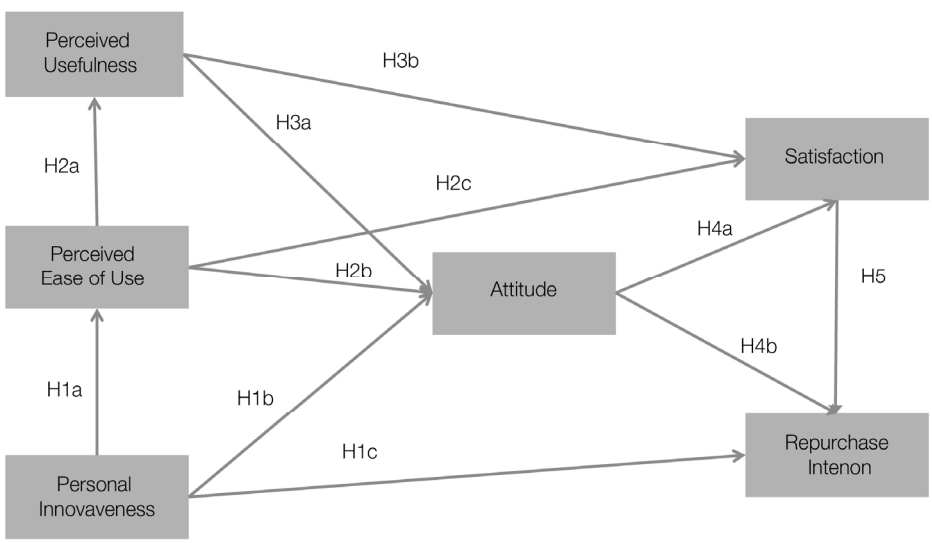
Ⅲ. Research Model

The research model is presented below in <Figure 1>. The model is a composition of variables that will be discussed in order to understand the theoretical underpinnings of the research.

3.1. Personal Innovativeness

Personal innovativeness is defined as the risk-taking of the consumer ability to deal with complexity and to adopt new technologies (Agarwal and Prasad, 1999). Perceived innovativeness, or "possession of newness," is the degree to which consumers believe that the product possesses important attributes of innovation such as newness and uniqueness. The definition of perceived innovativeness is related to the product itself and consumers' perception of a product: it reflects the newness of the technology and/or its uniqueness in the marketplace (Watchravesringkan et al., 2010). In addition, perceived innovativeness conveys excitement and Interest; therefore consumers can be intrinsically motivated to exhibit tendencies to consume such products as well. Watchravesringkan, et al. found a strong relationship between perceived innovativeness and both utilitarian attitudes and hedonic attitudes.

Lu et al. (2005) found that while perceived usefulness and perceived ease of use were strong variables in consumer willingness to adopt mobile technology, variables such as innovativeness and social influence must also be considered in determining consumer acceptance, showing a direct effect on ease of use and usefulness, which in turn impacted consumer



<Figure 1> Research Model for Investigation

intention to adopt wireless Internet services via mobile technology. Jayasingh and Eze (2009) studied 781 respondents in Malaysia and verified that customer use of mobile coupons was directly related to perceived usefulness, perceived ease of use, compatibility, perceived credibility, and social influence.

H1a: Innovativeness is positively and significantly correlated to Perceived Ease of Use.
H1b: Innovativeness is positively and significantly correlated to Attitude.
H1c: Innovativeness is positively and significantly correlated to Repurchase Intention.

3.2. Perceived Ease of Use

In Davis et al. (1989), the adoption construct is composed of perceived ease of use, perceived usefulness and attitude toward using technologies. Perceived ease of use is defined as the degree to which an individual believes that using a particular system would be free of physical and mental effort. Perceived ease of use deals with issues of application complexity, ability to understand the functionality of the technology. Lopez-Nicolas et al. (2008) found a strong relationship between perceived ease of use and perceived usefulness.

H2a: Perceived Ease of Use is positively and significantly correlated to Perceived Usefulness
H2b: Perceived Ease of Use is positively and significantly correlated to Attitude.
H2c: Perceived Ease of Use is positively and significantly correlated to Satisfaction.

3.3. Perceived Usefulness

Perceived usefulness is defined as the degree to which an individual believes that using a particular system would enhance his or her performance. Perceived usefulness, based on expectancy theory, is concerned with an individual's beliefs in the decision making process (Venkatesh and Davis, 2000). Perceived usefulness is defined as the degree to which an individual believes that using a particular system would enhance his or her performance. Watchravesringkan et al. (2010) found a strong relationship between perceived usefulness and utilitarian attitudes, leading to purchase intentions; and only a moderate relationship between perceived usefulness and hedonic attitudes. Lopez-Nicolas et al. (2008) found a strong relationship between perceived usefulness and behavioral intention.

H3a: Perceived Usefulness is positively and significantly correlated to Attitude.
H3b: Perceived Usefulness is positively and significantly correlated to Satisfaction.

3.4. Attitude

Attitude toward adopting a mobile application product is the consumer's evaluation of the desirability of his or her using the application. Attitude toward using is an individual's positive or negative feelings about performing the target behavior (Davis et al., 1989). Davis et al. (1989) found that users' attitudes significantly affected repurchase intention to adopt a technology. Chau and Hu (2001) reported perceived usefulness to be a significant determinant of attitude as well as repurchase intention. These findings show that users are likely to have a positive attitude if they believe that usage of a technology will increase their performance and productivity. Wu (2003) found that consumers who shop online have higher attitude scores, which are directly related to online purchase decisions. Athiyaman (2002) found

that consumers might avoid online purchasing items such as airline tickets because of their attitudes concerning the security of the Internet. Black (2005) found that attitude toward using was found to have a strong impact on repurchase intention. Park et al. (2007) found a strong relationships between attitude and repurchase / use intention of mobile applications. Lopez-Nicolas et al. (2008) found a strong relationship between attitude towards mobile innovations and both perceived usefulness ands behavioral intention.

H4a: Attitude is positively and significantly correlated to Satisfaction.

H4b: Attitude is positively and significantly correlated to Repurchase Intention.

3.5. Satisfaction

Thorbjornsen and Supphellen (2004) found that brand loyalty was a stronger determinant of website usage than Internet experience and type of motivation (information or entertainment purposes) for the visit. In our study, we determined brand loyalty to be related to the handset manufacturer (Apple or Samsung), carrier (e.g., Philippine mobile carriers like Globe, Smart, or Sun), and mobile application being used. Bauer et al. (2002) found that customers who trusted a Web-based company felt more committed to it. They also found that customer satisfaction had the strongest influence on commitment. Kim and Xu (2004) investigated the impact of satisfaction on loyalty in the context of electronic commerce, and hypothesized that the higher the level of e-satisfaction, the higher the level of e-loyalty.

H5: Satisfaction is positively and significantly correlated to Repurchase Intention.

3.6. Repurchase Intention

Repurchase intention measures the strength of one's intention to perform a specified behavior, such as use a mobile technology or application. Sun and Zhang (2003) reported that repurchase intention does well in predicting actual usage of a technology or application. Any factors that influence behavior act as indirect influences through repurchase intention. The results of a study of inexperienced and experienced users confirmed a stronger correlation between repurchase intention and behavior (usage) for experienced users, resulting in higher levels of satisfaction (Taylor and Todd, 1995).

Ⅳ. Method

4.1. Measurement Item Development

We operationalized theoretical constructs for the mobile technologies by using validated items from prior research (see <Appendix A>). Working from the previously published research of Amoroso and Ogawa (2013) and Amoroso and Lim (2014), we used common scales from that research (see articles for specific derivations of research constructs). We derived measures of attitude toward using primarily from the Agarwal and Karahanna (2000) study that looked at how fun and enjoyment interacted with mobile technologies. We examined the repurchase intention to use mobile technologies as a combination of using applications and planned utilization in the future.

4.2. Questionnaire Design and Data Collection

We developed a survey instrument to measure

the adoption factors of mobile technologies by Filipino consumers (see <Appendix B>). We ensured content validity of the scales by having the items selected represent the construct about which generalizations are to be made. All items identified in existing instruments were categorized according to the various scales published in the literature. This generated an initial item pool for each construct. To keep the length of the instrument reasonable, we selected three to five scales for the measurement of each of the constructs, keeping the wording similar to the original studies. The typical item in previous instruments tended to ask respondents to indicate a degree of agreement. After creating the item pools for each construct, we reevaluated these items to eliminate those that appeared redundant or ambiguous, which might load on more than one factor in subsequent analysis.

Data was collected from undergraduate and graduate students by posting the survey link on their Facebook account asking potential respondents to complete the survey completely. After scrubbing the data and deleting incomplete surveys and those with response bias, 726 mobile consumers in the Philippines completed the online survey, from which 27% were students. After deleting the student responses from the data pool, the final sample yielded 528 Filipino consumer respondents.

4.3. Demographic Profile

<Table 1> shows the demographic responses from the final sample. The gender breakdown showed very close to half men and women; a large group of the respondents came the age group ranging from 18-30 with almost 86%. The largest telecom carrier was

<Table 1> Demographics

Mobile Adoption		Filapinas Sample (n=528)	
Demographic	Item	Number	%
Gender	Women	231	43.8
	Men	297	56.3
Age	Under 18	31	5.9
	18-20	106	20.1
	21-25	175	33.1
	26-30	159	30.1
	31-35	37	7.0
	36-40	11	2.1
	Over 40	9	1.7
Carrier	Globe	270	51.1
	Smart	124	23.5
	Sun	85	16.1
	Other	167	31.6
Type of Plan	Postpaid	195	36.9
	Prepaid	333	63.1

reported to be Globe with 51%, followed by Smart and Sun (who was recently acquired by Smart) with 42%. There were a high percentage of prepaid customers at 63%, which is quite different than studies that we conducted in other countries.

Ⅴ. Data Analysis

5.1. Assessing the Measurement Model

We established construct validity and reliability by Cronbach and factor analysis. All measurement scales showed relatively high Cronbach alphas (see <Table 2>) at $a >= 0.70$ for all the measures, with the exception of personal innovativeness, which was slightly below the lower bounds set for this study, near the $a >= 0.70$ (Moore and Benbasat, 1991). This pattern of high scale reliability is consistent with prior research dealing with similar constructs.

Moore and Benbasat (1991) stated that, where possible, data analysis ought to be grounded in a strong a priori theory set. This research fit the approach where the constructs related to the acceptance of Internet technologies by consumers are based on a substantial body of prior research and where scales fit the construct's conceptual meaning as a method of ensuring construct validity. We did principal components analysis and found a six-factor solution with eigenvalues greater than 1.0, explaining 72.2% of the variance in the data set. All the items from the perceived usefulness construct loaded cleanly on a factor with all loadings > 0.683 (<Table 3>). We used the construct correlations to examine the relationships between the main constructs in the model. This provides an initial test for how well the hypotheses were supported. We investigated only those correlations > 0.251 for the sample (n = 528). We found strong support for all of the construct inter-correlations.

Discriminant validity analysis refers to testing statistically whether two constructs differ; convergent validity tests through measuring the internal consistency within one construct, as Cronbach's alpha does indicators for different constructs should not be so highly correlated as to lead one to conclude that they measure the same thing. This would happen if there were definitional overlaps between constructs. The average variance extracted (AVE) estimate, which measures the amount of variance captured by a construct in relation to the variance due to random measurement error, ranged from 0.617 to 0.731. Based on the results, convergent validity of innovativeness was slightly low at 0.626. Discriminant validity requires that the square roots of the AVE should be greater than correlation between two constructs. We calculated the square roots of the AVE and compared with each correlation scores (see <Table 3>).

5.2 Assessing the Predictive Model

The hypothesized model for mobile application adoption by Filipino respondents was tested using structural equation modeling. The hypothesized model was tested in multiple versions where non-significant paths were eliminated. The goodness-of-fit statistics (see <Table 4>) of the structural equation model showed good fit where GFI = 0.957, AGFI = 0.952, NFI = 0.947, CFI = 0.968, and RMSEA = 0.051. <Figure 2> illustrates the final structural equation model and <Table 5> shows the SEM construct loadings for the model. All the standard coefficients were greater than 0.724 and were statistically significant at < 0.01. We found that each of the constructs showed strong measurement and predictive model validity.

<Table 2> Measurement Model Statistics

Mobile Adoption				
Latent Construct	Observed Indicators	Factor Loadings	AVE	Cronbach alpha
Innovativeness	INN1	0.847	0.626	0.68
	INN2	0.805		
Ease of Use	EOU1	0.753	0.731	0.84
	EOU2	0.795		
	EOU3	0.797		
	EOU4	0.734		
Usefulness	USE1	0.640	0.703	0.85
	USE2	0.670		
	USE3	0.759		
	USE4	0.693		
	USE5	0.744		
	USE5	0.704		
Attitude	ATT1	0.770	0.678	0.91
	ATT2	0.811		
	ATT3	0.745		
	ATT4	0.771		
	ATT5	0.765		
Satisfaction	SAT1	0.735	0.659	0.90
	SAT2	0.675		
	SAT3	0.711		
	SAT4	0.702		
Repurchase Intention	BI1	0.720	0.617	0.89
	BI2	0.781		
	BI3	0.835		
	BI4	0.829		

<Table 3> Rotated Components

Mobile Adoption						
Component	1	2	3	4	5	6
2.1M	0.282	0.182	0.195	0.073	0.640	0.053
2.2M	0.260	0.103	0.181	0.215	0.670	0.034
2.3M	0.098	0.106	0.097	0.045	0.759	0.986
2.4M	0.025	0.089	0.130	0.005	0.693	0.121
2.5M	0.097	0.114	0.134	0.164	0.744	0.008
2.6M	0.229	1.360	0.217	0.250	0.704	0.037
3.3M	0.139	0.202	0.753	0.090	0.109	0.017
3.4M	0.174	0.096	0.795	0.055	0.081	0.172
3.5M	0152	0.151	0.797	0.055	0.081	0.172
3.6M	0.197	0.286	0.734	0.141	0.093	-0.002
4.1M	0.770	0.157	0.226	0.224	0.095	0.095
4.2M	0.811	0.138	0.191	0.218	0.032	0.162
4.3M	0.754	0.133	0.119	0.298	0.130	0.072
4.4M	0.771	0.131	0.152	0.230	0.001	0.216
4.5M	0.765	0.188	0.167	0.295	0.033	0.105
5.1M	0.334	0.116	0.134	0.735	0.032	0.167
5.2M	0.449	0.185	0.218	0.675	0.063	0.213
5.3M	0.395	0.160	0.074	0.711	0.138	0.184
5.4M	0.451	0.175	0.123	0.702	0.164	0.152
6.3M	0.217	0.038	0.104	0.177	0.051	0.847
6.4M	0.228	0.071	0.146	0.265	0.084	0.805
8.1M	0.199	0.720	0.221	0.159	0.208	0.039
8.3M	0.254	0.781	0.172	0.040	0.218	0.008
8.5M	0.095	0.835	0.186	0.180	0.124	0.046
8.6M	0.109	0.829	0.201	0.112	0.157	0.093

<Table 4> Structural Equation Model Goodness-of-Fit Indicators

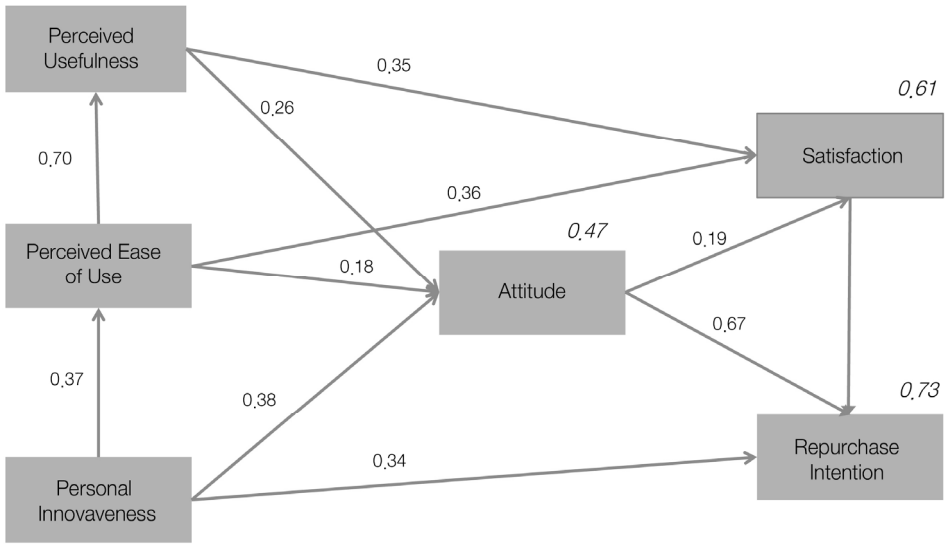
Mobile Adoption	
Test	Measure
CMIN	641.82
df	264
p value	0.000
NFI	0.922
RFI	0.904
CFI	0.952
RMSEA	0.049

<Table 5> SEM Construct Loadings

Mobile Adoption		
Construct		Standardized Coefficients
Innovativeness	6.3	0.756**
	6.4	0.776**
Ease of Use	3.3	0.723**
	3.4	0.761**
	3.5	0.729**
	2.1	0.573**
Usefulness	2.2	0.478**
	2.3	0.552**
	2.4	0.708**
	2.5	0.562**
	2.6	0.652**
	3.6	0.784**
Attitude	4.1	0.670**
	4.2	0.727**
	4.3	0.621**
	4.4	0.753**
Satisfaction	8.1	0.606**
	8.3	0.651**
	8.5	0.703**
	8.6	0.701**
Repurchase Intention	5.1	0.551**
	5.2	0.653**
	5.3	0.721**
	5.4	0.769**

Note: **: $p < 0.01$, *: $p < 0.05$, +: $p < 0.10$

<Figure 2> is the final structural equation model after a number of model iterations. Personal innovativeness was a strong construct affecting perceived ease ($r = .37$), attitude toward using ($r = .38$), and repurchase intention to use ($r = .34$). There was a strong path coefficient with the satisfaction construct ($r = .57$) and to a lesser extent with attitude toward using (0.26). The satisfaction construct had a good variance explained ($R^2 = 0.61$), with relatively strong correlations with perceived usefulness and ease of use. More interesting was the construct variance explained with attitude toward using mobile technologies ($R^2 = 0.47$). Personal innovativeness was extremely strong. Repurchase intention showed a strong variance explained ($R^2 = 0.73$) with both attitude toward using and personal innovativeness showing paths, with coefficients of $r = .67$ and $r = .34$, respectively. Satisfaction, on the other hand, had rela-



<Figure 2> Final Structural Equation Model

tively weak repurchase intention to use. However, we should note that attitude was the most important construct determining repurchase intention. However, we are surprised that ease of use was relatively unimportant in explaining the variance in attitude. We predicted in our model and confirmed that perceived ease of use would be more related to attitude.

Ⅵ. Discussion and Implications

6.1 Hypotheses Support

Based upon existing theory and the findings from those studies, we developed a model to explain the factors influencing the behavior of Philippine mobile consumers. In this model, we analyzed the constructs and their underlying theory including relevant findings as well as relationships between these constructs as related to the Internet- and mobile-based applications. We validated many of the originally hypothesized relationships related to personal innovativeness, ease of use, satisfaction, attitude toward using, and repurchase intention to use. This research purported a set of hypotheses resulting from established theory. The development process also helped to clarify and refine some of the definitions used by a variety of researchers using the technology acceptance model.

<Table 6> breaks down each of the hypotheses and the results of each based on the regression analyses for the Internet and mobile research models. In general, all the hypotheses were supported by variables related to mobile phone usage with the Philippine consumer sample. We found strong support for the hypothesized relationships for consumers using mobile technologies. We found that innovativeness did load on both attitude and repurchase intention for mobile applications as originally hypothesized, but was strongly loaded for attitude toward using.

The model on repurchase intention to use had two significant findings: first, the relationship of the attitude toward using construct was strong, especially

<Table 6> Hypotheses Support

Mobile Adoption	
Hypothesis	Type of Support
H1a: Innovativeness will positively effect on perceived ease of use	Strong
H1b: Innovativeness will positively effect on attitude	Strong
H1c: Innovativeness will positively effect on repurchase intention	Strong
H2a: Perceived esse of use will positively effect on perceived usefulness	Very strong
H2b: Perceived esse of use will positively effect on attitude	Weak
H2c: Perceived esse of use will positively effect on satisfaction	Strong
H3a: Perceived usefulness will positively effect on attitude	Strong
H3b: Perceived usefulness will positively effect on satisfaction	Weak
H4a: Attitude will positively effect on satisfaction	Weak
H4b: Attitude will positively effect on repurchase intention	Very strong
H5: Satisfaction will positively effect on repurchase intention	Weak

with personal innovativeness and satisfaction. The strength of personal innovativeness in predicting attitude toward repurchase intention was pronounced. Second, the more unexpected finding in this paper was the mixed results for ease of use (perceived effort) and satisfaction from attitude. They seemed to play only a peripheral role in explaining customer attitude to technology, and subsequently, to the variation in repurchase intentions.

Why would a technology of low perceived effort and high general customer satisfaction only weakly correlate with positive customer attitudes, and subsequently intention to repurchase? It might be that telecoms companies' offerings were largely undifferentiated: in spite of seemingly differentiated marketing, on the contrary, consumers might feel that Telco's essentially offer the same combination plans, same fees, same offerings, and same general systems, and thus the same effort, utility, and satisfaction. User intention to repurchase a mobile technology might therefore be more triggered by other factors such as social influence ("I will buy what my friends buy") and customer inertia ("I am too lazy to switch services" or "I will not change my number."). More radically, we might posit that effort, performance, and satisfaction might only be hygiene factors for intention. Mobile technology might be more a necessity, or fashion, or even a luxury good than it is a "technology," which may mean that acceptance might be preceded by social influence ("What will my friends say if I bought this?"), accumulation of past experiences about the product, inertial factors ("I am used to the codes and keywords, why learn new ones"). (Park et al., 2007; Watchravesringkan et al., 2010)

6.2. Theoretical Contribution

Despite their recency it might be argued that the classic technology acceptance models (e.g., TAM and UTAUT) come from a differentiated technology era (e.g., hardware products like laptops and tablets, or software apps like MS-Office) where products demonstrated distinctive features against their counterparts.

In today's era of ubiquitous, fast-moving technologies such as "internet of things," mobile phones, and phone apps, technological differentiation has been leveled. Differentiation might likely come from the social interaction, total consumer experience offered, and other factors such as controversy, hedonism, materialism, qualities more akin to fashion goods (Kim and Ko, 2010; Summers et al., 2006).

Customers in the Philippines might therefore generally accept that basically all telecom offerings are generally equally usable, equally effortless, and equally satisfying, and therefore undifferentiated. Perhaps customers were likely to have a more positive attitude, given more opportunities to improvise their own set of services as a precursor to purchase, or that the attitude of innovativeness be as strong as any inertial or social factors in technology acceptance. While we expected to find a strong relationship between personal innovativeness and ease of use, due to the degree of complexity that can be built into mobile applications, the relationship between personal innovativeness and both attitude and intention is a significant finding resulting from this study.

The Philippine context of this study also provides other interesting implications. As the Philippines transitions into a more international market, western products are starting to guide market behaviors, particularly consumer adoption. The Philippine business thinking is significantly influenced by two kinds of cultural flavors – Eastern and Western. The Philippines is literally the only Asian country to have a strong Catholic religion, coupled with a focus on American media and culture. This implies that the telecom company's identity in a Filipino business environment is largely based on the business' social network, while a firm's identity in a western business network is mainly dependent on new mobile products, coming in from the Western market and Eastern Asia.

By conducting surveys, managers can know if personal innovativeness leads to attitudinal and psychological influences on their consumers and regular measurement of perceived product complexity can reveal the effectiveness of corporate marketing efforts. Predicting buying behaviors in the mobile market space is more complex, because the purchasing behavior can be influenced by friends rather than by individual consumers.

6.3. Practical Contribution

This research is a first step in understanding the adoption of mobile applications by Philippine consumers. Although we initially hypothesized that consumer behavior towards mobile applications would involve constructs of innovativeness, ease of use, and satisfaction, we found that ease of use was less significant in understanding repurchase intention to use mobile technologies. In fact, personal innovativeness was more critical in explaining satisfaction with mobile application attitudes and repurchase intention. This factor is important for online retailers who count on repeat sales as a major part of their revenue, e.g., that applications availability, complexity of features, and encouragement to consumers to self-innovate may sell better than ease of use and simplicity. Likewise, being able to shape consumer attitudes is important in order to build repurchase intention to use. Online retailers may likewise build factors that encourage consumer innovation, such as product co-creation through user participation in forums. This study provides managers with a framework for understanding personal innovativeness with respect to mobile applications which areas they need to focus upon when launching new online products, such as shaping and/or changing their consumers' attitudes toward using the mo-

bile applications, making products and services more innovative (and potentially complex), and enhancing the perceived usefulness of the technologies that allow consumers to access their products online.

Our model serves as an important step toward subsequent predictive modeling of consumer repurchase intention with critical marketing variables. The value of our study moves beyond standard technology acceptance models. Lu et al. (2005) admonished that social factors must be included in future studies. Fashion and brand behavior (Summers et al., 2006) may provide clues to adoption. Likewise, new technology factors such as dominance of platforms (IOS vs. Android), social networking (Facebook, Twitter), push technologies, and P2P sharing (Bluetooth) might be considered newer differentiating factors when developing consumer adoption models. Given the highly personalized nature of mobile technology use—as opposed to the more traditional technology enterprise settings—users seem to be more influenced by innovativeness and other social factors. Consumers who are willing to try out newer applications (personal innovativeness) without understanding how they will work also have difficulty to applying the usefulness of those technologies.

Ⅶ. Limitations and Future Research

Although all of our hypotheses are supported, this study has a few limitations that present opportunities for future research. First, we did not examine other possible individual and environmental factors that influence a consumer's cognitive and emotional responses to purchasing through the Internet or mobile phone, such as physical stimuli (Koufaris, 2002). Second, neither did our study compare the specific variables in each of the models to address differences in consumer responses related to Internet and mobile phone applications. The purchasing patterns of the consumers might also be significantly different, based on demographics such as socio-economic status and age. Third, we also did not account for the mobile application types, product prices, and consumers' own research. Different product types might lead the online consumer to use alternative technologies. Such choices might also depend on the degree of product research conduct by the consumers themselves. Fourth, Internet and Wi-Fi access fees can also limit use of mobile devices for emerging applications. The Philippines' high underemployment rate implies that many people do not work, and therefore have different usage of technologies. Future studies might delve deeper into price points that certain Filipino consumers are willing to pay for products and services. Fifth, other antecedents and consequences of the impact of personal innovativeness can be included in future studies to form a more comprehensive framework, and provide additional insights into the development of products with a high degree of personal innovativeness.

Future researchers may want to examine the mobile usage characteristics of other age groups and/or look at mobile purchasing in countries outside the Philippines. One might hypothesize that younger consumers or male consumers might have more innovativeness to use the new technology in trial and error, even increases in attitude toward using. Consumers might typically be non-technical persons, who are unfamiliar with new technology capabilities. Some people do not have the time to learn about newer technology features or functions. We need to consider collecting data in different age groups. Expanding the number of constructs measured, and expanding sample size may provide researchers with new insights on consumers' usage of e-commerce

sites. Adding other variables could increase the predictive power of the model. Researchers could also look at the correlation between the type of product purchased and the type of mobile technology used to buy it.

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<Appendix A> Literature Review Summary for Constructs

Table A: Literature Review Summary for Constructs

Authors	Independent Variables (M=moderating IV)	Dependent Variables
Consumer innovation		
Lu et al. (2005)	Innovativeness	Ease of use
Lee, Qu, and Kim (2007)	Innovativeness (M)	Intent to purchase
	Attitude	
Wu and Qi (2010)	Customer satisfaction	Loyalty
	Innovativeness (M)	
Hill and Troshani (2009)	Consumer innovativeness	Attitude to online shopping
	Self-efficacy	
Lian, et al. (2012), Agarwal and Prasad (1996), Watchravesringkan, et al.(2010)	Consumer innovativeness	Attitude
		Intent to purchase
Chen (2009)	Consumer innovativeness	Satisfaction
		Intent to use
Consumer attitude		
Davis et al (1989); Mathieson (1991); Shih (2011), Lopez-Nicolas (2008)	Attitude	Intention to use
Wu (2003); Athiyaman (2002)	Attitude	Intent to purchase
Liljander et al. (2007); Lee, at al. (2007);	Attitude	Loyalty
		Behavioral intention
Shin and Choo (2012); Yang and Jolly (2009)	Attitude	Intent to adopt
		Intent to use
Shih (2011)	Attitude	loyalty
	Intent to use	
Marshall (2010)	Affective commitment	loyalty
Consumer satisfaction		
Wu and Qi (2010)	Personal innovativeness (M)	Loyalty
	Customer satisfaction	
Ho and Wu (2011)	Customer satisfaction	Loyalty
		Behavioral intention
Wixom and Todd (2005)	Customer satisfaction	Ease of use
		Usefulness
		Attitude
Ross et al (2008)	Customer satisfaction	Intent to purchase
	Culture (M)	
Amoroso and Ogawa (2013)	Loyalty	Satisfaction
Anderson and Srinivasan (2003)	Customer satisfaction	Loyalty
	Trust (M)	
	Perceived value (M)	
Thorbjornsen and Supphellen (2004)	Loyalty	Intent to use
Bauer and Grether (2002)	Trust	Customer satisfaction
Yoon (2002)	Prior satisfaction and familiarity	Satisfaction
Ho and Wu (2011)	Satisfaction	Loyalty
Anderson and Swaminathan (2011)	Satisfaction	Loyalty
	Trust	
	Inertia	
Repurchase intention		
Taylor and Todd, 1995; Barnes and Vidgen (2012)	Behavioral intent to use	Usage
Jiang and Lai (2010)	Attitude	Intention to use
Bokhari (2005)	Consumer satisfaction	Intention to use
Xu et al. (2012)	Access	Intention to use
Chen (2009); Lien (2012); Wang (2012); Carlson and O¡Cass	Consumer satisfaction	Intention to use
Wu (2003) and Wang (2012)	Compatibility	Intention to use

<Appendix B> Measurement Items

Table B: Measurement Items

Sources	Items
Consumer innovation	
Lian, et al. (2012), Agarwal and Prasad (1996), Watchravesringkan, et al.(2010)	When I hear about a new Web site for financial applications, I often find an excuse to go visit it.
	Among my peers, I am usually the first to try out new Sinternet sites for financial appliactions.
	In general, I am interested in trying out new Web sites for financial applications.
Consumer attitude	
Davis et al (1989), Mathieson (1991), Shih (2011), Lopez-Nicolas (2008)	The idea of using the mobile wallet to conduct financial transactions is appealing.
	I like the idea of conducting financial transactions via the mobile wallet.
	Using the mobile wallet for financial transactions rather than from a physical store is a good idea.
	I have fun conducting financials transactions using the mobile wallet.
Consumer satisfaction	
Wu and Qi (2010), Anderson and Swaminathan (2011), Ho and Wu (2011)	I am satified with my decision to use the mobile wallet.
	If I had to decide again, I would feel differently about using the mobile wallet for certain financial applications
	My choice to use the mobile wallet for certain financial applications was a good one.
	I feel badly regarding my decision to use the mobile wallet for certain financnial applications.
	I think I did the right thing to use the mobile wallet for financial applications.
Repurchase intention	
Taylor and Todd (1995), Barnes and Vidgen (2012), Agarwal and Karahana (2000), Xu et al. (2012)	I am satisfied with my decision to use the mobile wallet.
	If I had to decide again, I would feel differently about using the mobile wallet.
	My choice to use the mobile wallet for certain financial apps was a good one.
	I feel badly about my decision to use the mobile wallet for certain apps.
	I think I did the right thing to use the mobile wallet for finincial applications.
Perceived Usefulness	
Venkatash and Davis (2000), Agarwal and Karahana (2000), Watchravesringkan, Hodges, and Kim (2010)	It is easy to conduct financial transaction with the mobile walet.
	The Internet is useful to using financial applications with the mobile wallet.
	Mobile wallet applications gives me a greater degree of product choices.
	Mobile wallet applications enables me to purchase at lower prices.
	Mobile wallet financial applications provides me with more product comarisons.
Perceived Ease of Use	
Davis (1999), Agarwal and Prasah (1999), Kim, et al. (2013)	Using the mobile wallet can take up too much of my time when performing many complex financial applications.
	Working with the mobile wallet is so complicated at times, it is difficult to understand what is going on.
	Learning to use the mobile wallet for financial transactions is easy.
	It is easy to navigate around financial Web sites using the mobile wallet.
	My interactions with financial Web sites using the mobile wallet are clear and understandable.

◆ About the Authors ◆

Donald L. Amoroso

Dr. Donald L. Amoroso is the Lowder Weill Endowed Chair of Innovation and Strategy and Professor of Information Systems at Auburn University Montgomery, Founder of Axcell LLC Consulting Group (focusing on innovation in strategy), and Research Fellow and Adjunct Professor at Asian Institute of Management in Manila, Philippines. He has published 57 journal articles and 60 conference papers on strategy and innovation journals such as Journal of MIS, Information & Management, Journal of Electronic Commerce in Organizations, International Journal of Technology Diffusion, for example. Dr. Amoroso received his MBA and Ph.D. from the University of Georgia in 1984 and 1986, respectively, and has spent more than twenty-five years in higher education and industry.

Ricardo A. Lim

Dr. Ricardo A. Lim is Professor of Information Systems and former Dean of the Asian Institute of Management, Philippines. He is also the Chair of the Philippine Academy of Management. He was past President of the Association of Asia-Pacific Business Schools, a group of 110 business schools in Asia, and is a member of the Asia-Pacific Advisory Board of the AACSB. His research interests are in team dynamics, innovation, and entrepreneurship. He also consults for the banking, telecom, and logistics industries.

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