The Integrated Model of Smartphone Adoption in Asia Pacific Market

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Abstract—This study aims to propose an integrated model of smartphone adoption that incorporates product benefit, technological capabilities, consumption pattern and word of mouth into the technology acceptance model. In this study, the author proposes a Structural Equation Model (SEM) which was empirically evaluated by using survey data collected from 1800 respondents with demographics in Asia Pacific to investigate their perception and attitudes toward smartphone adoption intention. The results reveal that product benefit, technological capabilities, consumption pattern change and word of mouth have all positive effect on the perception of innovativeness. In addition, the outcomes of this investigation indicated that there were no significant cultural differences between respondents in three different countries in regard to the adoption of a smartphone. The findings of this study are very important for smartphone adoption in Asia-Pacific market to have a better outcome and strategy to increase the penetration rate of smartphone users.

Keywords: Innovation, Smartphone adoption, Technology Evaluation, Structural Equation Model (SEM), Marketing Strategy

1. Introduction

Smartphone technology is revolutionizing the way we live. The number of smartphone users globally has already topped one billion. Emerging markets will be the driving force behind the global smartphone sales growth, with 70 percent of total smart sales originating in this part of the world in 2018 (Pyramid Research, 2015). While the mobile-cellular penetration rates stand at 96% globally, 128% in developing countries, and 89% in developing nations. Rapid penetration raises the question of why the growth rate of smartphone adoption has been so high and what features draw people to the new mobile devices. Thus, a study is needed to examine what factors have accelerated smartphone adoption among Asia Pacific consumers.

Consumers’ acceptance and intentions to adopt the new technology are crucial aspects of new product marketing. In most case, the successful diffusion of new technology is partially determined by whether potential users adopt the innovation. Past studies have presented several models of successful innovation adoption (Roger, 1983; Davis, 1986; Ram and Sheth, 1989).

The goal of this investigation was to identify the key factors that affect the adoption of smartphones in Asia-Pacific market. The author established the key factors that affect adoption of smartphones by examining research in the field of technology acceptance, including research by Chung and Chun (2011), Davis (1989), Davis et al. (1989), Kim and Garrison (2008), Putzer and Park (2010, 2012), Rogers (2003), Van Biljon and Kotz (2007), and Venkatesh et al. (2003), and by conducting survey research. Research related to diffusion of innovation has included the adoption of new high technology products and services such as PC (Anderson and Ortinau, 1988), next generation products (Huh and Kim, 2008). Moreover, to examine the acceptance of a product is evaluated as innovative on the consumer’s perspective and the product performance on the company’s perspective through these standards. Examining whether positive linear relationship is shown between consumer’s perception on innovativeness and product acceptance attitude is meaningful for generally, by perspective of the company, results show of a positive linear relationship (Henard and Szymanski 2001) between the innovative product and its performance.
This is because the performance (success or failure) of a product (evaluated as innovative and put out in the market), in strict sense, will eventually be evaluated in the process for its innovativeness and acceptance by the customers (Olshavsky & Spreng 1996; Winer 2007; Huh & Kim. 2008; Hoffman et al., 2005; Kotler et al. 2003).

Consequently, this study will be examined what factors influence consumers to perceive the innovativeness of a product released by a company and what influence this perception of innovativeness has on the attitude and intention to accept. This concept later found applications in studying the adoption of consumer products such as mobile phones (Guseo & Guidolin 2010). In this paper, the study has been made to understand the importance of user behavior and acceptance in determining one’s behavior to use indigenous technology. The conceptual model combined our proposed research which consists of product benefit, technology capability, consumption pattern change (Veryzer, 1998b), and word-of-mouth (Seema Pai, 2007).

The research in this paper has several objectives. First, this study is to explore cross-cultural differences on mobile technology in global business environments and to compare with different countries (Malaysia, Thailand and Philippine). Second, the author intends to take a consumer’s perspective in evaluating the product innovativeness and its performance. Third, this research is to understand the relationship between the perception of new product innovativeness and the consumer’s intention of adoption.

The results reveal that product benefit, technological capabilities, consumption pattern change and word of mouth have all positive effect on the perception of innovativeness. Attitude toward a product turned out to play mediating role between perceived innovativeness and intention of adoption. In addition, the outcome of this investigation indicated that there were no significant cultural differences between respondents in the Asia-Pacific market in regard to the adoption of a smartphone. The survey results that would provide insight into key factors that affect the evaluation of new products rather than to provide a comprehensive list of correlated with product success. The goal here is to provide insight into key factors that affect the evaluation of new products rather than to provide a comprehensive list of correlated with product success.

The paper is structured as follows. This study first reviews the literature on the consumer’s focus rather than the company’s perspective and introduce a set of research hypotheses based on this review. Next, the author outlines the research design, including data gathering and the measurement of research variables. After presenting the research results, the study summarizes its findings and draw conclusions and implications for successful management.

2. Literature Review

Innovation refers to the creation of a new product, service, or process. Innovation can be thought of as falling on a continuum from evolutionary or “continuous”, “dynamic continuous” to “discontinuous”. Discontinuous has been discussed in a variety of ways. Discontinuous innovation is generally used to refer to radically new products that involve dramatic leaps in terms of customer familiarity and use. Frequently these types of products involve the development or application of significant new technologies. Airplane, Automobile, PC, Mobile Phone were all discontinuous innovations that when they were first introduced in the market. As in the case of the first mobile phones which were based on a new technology and aimed at a market that was completely unfamiliar with product class, these discontinuous products actually defined a new industry.

2.1. Study of Product Innovativeness

Product innovation may be viewed a lying along dimension reflecting in: product benefits (Richard T et al), technology capabilities (Abdul et al), consumption pattern or usage patterns (Joe et al), and marketing mix variables (Gatignon and Robertson, 1991). The product benefit refers to the new capabilities of the product in terms of the needs that it satisfies as perceived and experienced by the customer or user. Products that offer customer benefits, are higher quality, reduce customer costs, are superior the eyes of customers, and
solve a customer problem. Technological capability refers to the degree to which the product involves expanding technological capabilities (i.e., the way functions are performed) beyond existing boundaries. The consumption pattern refers to the degree of change required in the thinking and behavior of the consumer in using the product. For example, the new benefits afforded by the advanced technology incorporated into mobile phones involved significant changes in thinking, usage patterns, and lifestyle. In some cases, products are perceived by customers as being really new even though they utilize little new technology (e.g., smartphone). In other cases, a product may be perceived as being essentially the same in performance and operation as previously existing products despite utilizing highly advanced technology.

In considering highly innovative products it is important to take customer’s perspective and experience of the product into consideration. A technology driven perspective of discontinuous innovation that does not consider the customer’s view might result in a product that is at odds with the market’s perception of it.

The nature of the change involved in a new product plays a role in product evaluation and adoption. New products that involve changes in technology may involve communicability, compatibility, and risk issues. Change in product capability may offer high relative advantage, but such advantage may be offset partly by increased product complexity. Products involving consumption pattern changes can require customers to alter their thinking and habits and lifestyle and this can result in resistance to the product. While it is helpful to recognize the different dimensions underlying innovation, there is also a need to identify and understand the factors that seem to most influence customers’ evaluation of really new products. Awareness of the factors that play an important role in the evaluation of new products can provide useful insights concerning how the chances for customer acceptance may be improved. In order to gain an understanding of these factors and how they operate, a study of three different regions involved in new products was conducted.

2.2. Determinants of Perceived Innovativeness

Veryzer (1998b) standard has been selected amongst various standards that classify product innovations for this study for the following reasons: 1) It is a standard which considers consumers’ perspectives. 2) It introduces concepts measurable from the consumers’ perspectives and corresponds to the study objectives. 3) It provides solutions to problems that occurred due to the differences in classification standards by assorting and using variables from previously conducted studies. In addition, although most of the previous studies have used innovativeness analysis standard as a structural concept of product innovativeness, this study has focused on using Veryzer (1998b) standard’s evaluation standards as an antecedent variable of product innovativeness to understand affect of variables on the level of innovativeness and to compare relative effects of different variables used for product innovativeness evaluations. Previous studies have also attempted to define product complexity and relative advantages as an antecedent variable which increases product innovativeness in order to explain the level of differences in product innovativeness. This study will therefore use these past studies as a reference to draw out detailed and practical implications by modeling evaluation standards to an antecedent variable of product innovativeness and also through finding the possibility of manipulating product perceived innovativeness from the business perspective.

Veryzer (1998b) defined product innovativeness as a form of continuum within continuous and discontinuous factors and explained the origin of innovativeness as 1) relative advantage over existing products 2) high technology and 3) required changes in usage behaviors where discontinuous changes are perceived in one or more of the above origins in cases of discontinuous innovativeness. In other words, to analyze innovativeness of a product used in this study, the author has evaluated the discontinuous factors (ex. Discontinuity of product benefit, technological capabilities and consumption pattern) to high-medium-low, summed up, and scored to classify every product according to their discontinuity level. Here, discontinuity defines product
innovativeness and higher score means higher product innovativeness.

Relative advantage refers to the degree to which an innovation is perceived as an advantage over an established solution (Rogers, 2003). The greater the relative advantage, the faster the adoption of a new innovation. Kim and Nam (2004) found that new products with a relative advantage can achieve the greatest market penetration (i.e., adoption). Overall, the Apple iPhone may be perceived to have a relative advantage based on design, feature, application, and service/contents in its position in the marketplace.

Research by Huh and Kim (2008) on mobile phone purchases in Korea found that if a product upgrade has innovative features, it will influence consumer adoption of a next-generation product. Apple has continued to strive to include product improvements with innovative features such as the introduction of the MobileMe feature as part of an iPhone upgrade (Wingfield, 2008a).

With the introduction of the new Apple iPhone 4, an upgrade was available for free to iPhone 3G owners for the new operating system iOS4 to enable better multitasking for running simultaneous apps (Mossberg, 2010). Apple iPhone4 has high quality video phone call capabilities using the new FaceTime software (initially available only between iPhone 4 users over WiFi (Mossberg, 2010).

Research by Kulviwat et.al. (2009) showed that technological innovations will be adopted more quickly due to the moderating effect of public/private consumption. This notion of social influence of users showing off or publicly consuming their product is highly applicable to the successful adoption of the Apple iPhone.

In conclusion, all the above details will be put together to establish a hypothesis on the determinants which consumers perceive the level of innovativeness of new products. This suggests the following hypothesis:

**H1-1**: The relative advantages of new products over existing products will have positive effects on the perception of product innovativeness.

**H1-2**: Absolute excellence in technology of new products will have positive effects on the perception of product innovativeness.

**H1-3**: The changes in usage behavior required for new products will have positive effects on the perception of product innovativeness.

More details of measurement variables about this model are displayed in Table 2. Next, the author tests the proposed model based on empirical data.

**2.3. Perceived Innovativeness and Product Acceptance**

The relationship between innovativeness and product acceptance has formerly been evaluated as linear and nonlinear in previous studies. Therefore, in establishing the hypothesis for product innovativeness and consumer attitude & intention of product acceptance, this research will establish its own hypothesis based on the positive (+) linear relationship (Henard & Szymanski 2001) between innovativeness and product acceptance indicated in previous researches as well as verifying the nonlinear relationship (Goldenberg et al. 2001; Steenkamp and Gielens 2003; Veryzer, 1998b) between the two factors. However, the author hopes to change the use of the term ‘product performance’ to ‘product acceptance’ in the future as the product performance in consumers’ perspective stands for product acceptance.

Meanwhile, Rogers (1995) stated that both favorable and unfavorable attitude formation has certain effects on product acceptance. However, this study will assume that the level of product acceptance is higher for consumer groups with better attitude towards products and focus on looking into the intermediary roles of consumer attitude in the relationship with ‘perceived innovativeness – attitude formation – intentions for product acceptance’. This will eventually be another approach to verifying the product acceptance hierarchy model which Gatigon and Robertson (1985) evaluated more appropriately for high involvement products. This suggests the following hypothesis:

**H2**: The level of perceived innovativeness for new products will have positive effects on attitudes towards products.
H3: Attitude towards new products will have positive effects on product acceptance intentions.

H4: Attitude towards new products will mediate the perceived effect levels.

2.4. Determinants of perceived innovativeness and direct process of attitude formation

According to previous studies, relative advantages of new products over existing products and positive effects of technological capabilities on product acceptance has been presented as the determinants of perceived innovativeness where as the required usage behavior was indicated as a type of resistance factor giving negative effects on the innovative product acceptance in relation to its compatibility (Ram & Sheth 1989; Hwa & Lee, 1994). Also in Nam and Kim’s studies (2003), the author has mentioned compatibility and performance trade-off while focusing on the importance of selecting business strategies needed to maintain the similar level of compatibility between existing and newly developed products in corporate business world. In other words, both relative advantages over existing products and absolute advantage in technology factors have positive influence on consumers’ perceptions on product innovativeness, acceptance intentions, and acceptance processes. However, change factors of usage behavior have positive effects on the level of perceived innovativeness but have a negative effect on product acceptance processes.

An examination of previous research has shown that change factors of usage behavior have negative effects on attitude toward a new product. However, the author found different results that change factors of usage behavior have positive effects on attitude toward a new product. Therefore, the author has additionally added the positive process between the change factors of required usage behaviors with product acceptance besides the assumption of its positive effects on perceptive innovativeness. Also, this study considers the intermediary role of product attitude in relationship with innovativeness perception and has established a hypothesis of direct positive process between change factors of usage behavior and attitude towards product.

Tsiros & Mittal (2000) and Buttle (1998) found that the valence of consumption experience determines the extent to which people talk about their product or service encounter. Communication strategy is a critical element of new product adoption. The decision to adopt a new product is determined by the success of a sequence of two stages: product awareness and product adoption. Previous studies have shown advertising to be the tool that works best during the first stage of introduction. However, the expansion of new media has facilitated the development and management of word of mouth campaigns. Leonard-Barton (1985) shows a positive relationship between opinion leaders’ attitudes and product adoption rates, suggesting that experts can influence consumers, regardless of whether the WOM is positive or negative. Sweeney et al. (2014) shows that positive WOM was more effective and positive WOM messages had a greater effect on people’s willingness to use a service than did negative WOM.

In many cases, the adoption of innovative consumer technology products is driven in part by the desire to gain approval and avoid disapproval (Slama and Wolfe, 1999). When a consumer’s use of a technological innovation is observed by others, product usage can send a message to relevant others about the adopter’s wealth, trendiness, or technological sophistication. Importantly, the symbolic meaning that adopters attach to an innovative product is critically dependent on the ways in which other consumers perceive both the innovation itself and users of that innovation (Hirchman, 1982). For this reason, word of mouth communication should have a relatively greater impact on adoption decisions in product categories where (1) consumers attach meaning to innovation adoption; and (2) innovation use is observed by others. This suggests the following hypothesis:

H1-4: Word of mouth message new product will have positive effects on perception of product innovativeness.

It is a widely accepted notion that word-of-mouth communication plays an important role in shaping individual’s attitude and behaviors (Brown and Reinegen, 1987).
Repeatedly, research has shown the importance of consumer word-of-mouth in the formation of attitudes (Bone, 1995). The effects of WOM on the receiver’s attitudes have been studied (Florian and Tomas, 2002).

H5: Word of mouth message about new product will have positive effects on attitude toward new product perception.

Consumers frequently rely on word-of-mouth when considering the purchasing of a new product or service (Amdt 1967; Richins 1983; Brown & Reingen, 1987). The impact of word-of-mouth on purchase decisions (Seema Pai 2007) was also supported in this paper. Recently, several researches have started to examine the impact of specific elements of word-of-mouth on consumer choice and purchase decisions (Dellarocas et al, 2004; Godes & Mayzlin, 2004).

H6: Word of mouth message about new product will have positive effects on product acceptance.

Figure 1. The Proposed Research Model

3. Empirical Analysis

3.1. Data Collection and Measuring Variables

To test the proposed hypotheses, the author obtained technology evaluation data in Asia pacific which cover 3 countries from March 2011 to April 2011. The study has in our dataset a total of 1800 respondents who have knowledge of smart phone in the early stage of product launch. The data contain technology evaluation score (7 point interval scale from 1 which is not at all to 7 which is extremely yes). The survey was conducted to sample ranging from 18 to 54 years old including various ages, sex, occupation, education, and income in Asia Pacific (Malaysia, Thailand, and Philippine). In addition, word of mouth (Seema and S. Siddarth 2007) was included for marketing messages. The author also collected information on innovation characteristics such as relative advantage, technological capability, consumption pattern change, and word-of-mouth. The primary purpose of this study is to evaluate mobile phone innovation in terms of the consumer’s point of view. The definition of manipulated measurement concept is the following.

Table 1. Measurement variables for latent factors in all three countries

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Measurement Variable</th>
<th>Factor Loading</th>
<th>Cronbach Alpha Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Benefit</td>
<td>The new phone meets customer needs better</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The new phone is better quality than existing product</td>
<td>1.00</td>
<td>0.847</td>
</tr>
<tr>
<td></td>
<td>The new product has a unique feature / attribute compared to existing product</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Technology capability</td>
<td>The new phone has specialized expert technology</td>
<td>0.97</td>
<td>0.862</td>
</tr>
<tr>
<td></td>
<td>This new phone technology is cutting edge</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This new phone has a high level of technology</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Consumption pattern change</td>
<td>This new phone can bring change to usual habits</td>
<td>0.97</td>
<td>0.843</td>
</tr>
<tr>
<td></td>
<td>This new phone is suitable to the situation / environment of phone usage</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Perceived product innovativeness</td>
<td>The technology of this new phone is new</td>
<td>0.89</td>
<td>0.893</td>
</tr>
<tr>
<td></td>
<td>The technology of this new phone is different</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The technology of this new phone is unique</td>
<td>0.93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The technology of this new phone is innovative</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>Attitude for product</td>
<td>The technology of this new phone is appropriate</td>
<td>0.89</td>
<td>0.891</td>
</tr>
<tr>
<td></td>
<td>The technology of this new phone is beneficial</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The technology of this new phone is favorable</td>
<td>0.92</td>
<td></td>
</tr>
</tbody>
</table>
In this section, the author proposes an SEM (Structural equation model) to investigate their perception and attitudes toward smartphone adoption intention. SEM has become one of the most widely used multivariate statistical tools in various areas, such as psychology, education, and behavioral sciences (Joreskog & Sorbom, 1989; Bentler, 1983; Parhizgari, 2004; Sohn & Moon, 2003). SEM is basically formulated by two types of equations namely, measurement model and structural model. While the measurement models can be used to grasp the relationships between observed variables and latent factors, the structural model can be used to assess the hypothesized relationship among latent factors.

MLE (Maximum Likelihood Estimation) and PLS (Partial Least Square) are common tools to estimate SEM. Although the MLE is widely used, it still has limitations since the MLE needs not only distributional assumptions but also a large number of samples. PLS, however, is free from such limitations. The author uses the PLS method to estimate SEM and verify the relationship among the factors.

Prior to analyzing an SEM using these data, confirmatory factor analysis was carried out in order to validate the relationship among the measurement variables and latent factors the author set up. The author used Partial Least Squares (PLS) to examine the data with PLS-Graph. PLS is a second-generation multivariate technique that can be used to evaluate the model constructs and to estimate the relationships between the variables. The convergent and discriminate validity of the research instrument were analyzed with PLS. The constructs had high loading factors with most greater than 0.80 (Fornell and Larcker, 1981) demonstrating convergent validity. Next, the author evaluates the research model by evaluating the strength of the underlying relationship.

The results are given in Table 1 and reliability of research instrument is often tested by Cronbach Alpha (\( \alpha \)) (Hair et al., 1998). The results show that \( \alpha \) for every factor is higher than 0.70, which confirms the reliability of relationships among the measurement variables and the latent factors.

PLS has several advantages to estimate path coefficients in SEM but one can’t verify the significance of the path coefficients among latent variables.

In order to improve this weakness, bootstrap confidence interval is employed to verify the significance of the path coefficient (Sohn, 1996). Using this method, the significance of the path coefficient between latent factors is verified by the 95% bootstrap confidence interval (Sohn and Moon, 2003). The result is given in Table 6.

Table 2. 95% Bootstrap confidence interval for path coefficient of the proposed SEM

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Path coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product benefit</td>
<td>Perceived product innovativeness</td>
</tr>
<tr>
<td>Technology capability</td>
<td>Perceived product innovativeness</td>
</tr>
<tr>
<td>Consumption pattern change</td>
<td>Perceived product innovativeness</td>
</tr>
<tr>
<td>Attitude for product innovativeness</td>
<td>Attitude for product</td>
</tr>
<tr>
<td>Attitude for product</td>
<td>Intention of adoption</td>
</tr>
<tr>
<td>Word-Mouth</td>
<td>Perceived product innovativeness</td>
</tr>
<tr>
<td></td>
<td>Attitude for product</td>
</tr>
<tr>
<td></td>
<td>Intention of adoption</td>
</tr>
</tbody>
</table>

** Significant parameters at 5% bootstrap confidence interval

* Significant parameters at 10% bootstrap confidence interval
Table 3. Causal relationship between the satisfaction level between two latent variables

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Latent variable</th>
<th>Direct effect</th>
<th>Total effect</th>
<th>Indirect effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product benefit</td>
<td>Intention of adoption</td>
<td>0.000</td>
<td>0.026</td>
<td>0.026</td>
</tr>
<tr>
<td>Technology capability</td>
<td></td>
<td>0.000</td>
<td>0.070</td>
<td>0.070</td>
</tr>
<tr>
<td>Consumption pattern change</td>
<td></td>
<td>0.000</td>
<td>0.084</td>
<td>0.084</td>
</tr>
<tr>
<td>Perceived product innovativeness</td>
<td></td>
<td>0.000</td>
<td>0.144</td>
<td>0.144</td>
</tr>
<tr>
<td>Attitude for product</td>
<td></td>
<td>0.275</td>
<td>0.275</td>
<td>0.000</td>
</tr>
<tr>
<td>Word-Mouth</td>
<td></td>
<td>0.522</td>
<td>0.571</td>
<td>0.049</td>
</tr>
</tbody>
</table>

All path coefficients appear significant at the 5% level except for that between the word of mouth and perceived product innovativeness. However when 90% bootstrap confidence interval was assessed, this appears significant.

Table 2 shows that product benefit, technology capability, and consumption pattern change have significant positive effects on the perception of innovativeness (H1-1, H1-2, H1-3). In addition, the perception of innovativeness has a significant effect on attitude for product (H2). Attitude towards product has significant effect on intention of adoption (H3). The level of changes in usage behavior required for new products will have negative effects on attitude towards product (H4). The H4 that consumption pattern change required for new product will directly give negative effects on attitudes towards product was not supported in this research. The H5 and H6 that word of mouth will have positive effects on perception of product innovativeness, product attitudes, and product acceptance was supported.

In addition to H1, the author analyzed direct and indirect effects among the factors in order to find the most influential factors on the overall innovation index. Direct effects are association of one variable with another specified in the model. Indirect effects are association of one variable with another mediated in the model through other variables. Total effect is represented by the sum of direct and indirect effects (Kim & Kang, 2001). Table 3 shows the relationship between two latent variables.

As shown in Table 3, attitude for product and word of mouth have direct influence on the innovation index while technological capability, consumption pattern, and perceived product innovativeness have indirect influence on the innovation index. The results show that it is efficient to control word of mouth factor for improvement of innovation index in a short time. This also shows that word of mouth in Thailand and Philippine has the highest total effect on the innovation index. This shows the importance of word of mouth in comparison to the others (technological capability, consumption pattern, attitude towards product, and perceived product innovativeness).

Table 4. 95% Bootstrap confidence interval for path coefficient of the proposed SEM

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Path Coefficient</th>
<th>Latent variable</th>
<th>Path Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product benefit</td>
<td>Perceived product innovativeness</td>
<td>Malaysia</td>
<td>Thailand</td>
</tr>
<tr>
<td>Technology capability</td>
<td>Perceived product innovativeness</td>
<td>0.184**</td>
<td>0.044</td>
</tr>
<tr>
<td>Consumption pattern change</td>
<td>Perceived product innovativeness</td>
<td>0.518**</td>
<td>0.421**</td>
</tr>
<tr>
<td>Perceived product innovativeness</td>
<td>Attitude for product</td>
<td>0.152**</td>
<td>0.394**</td>
</tr>
<tr>
<td>Product benefit</td>
<td>Perceived product innovativeness</td>
<td>0.265**</td>
<td>0.211**</td>
</tr>
<tr>
<td>Technology capability</td>
<td>Perceived product innovativeness</td>
<td>0.498**</td>
<td>0.452**</td>
</tr>
<tr>
<td>Consumption pattern change</td>
<td>Attitude for product</td>
<td>0.372**</td>
<td>0.138**</td>
</tr>
<tr>
<td>Word-Mouth</td>
<td>Perceived product innovativeness</td>
<td>0.122**</td>
<td>-0.059*</td>
</tr>
</tbody>
</table>
** Significant parameters at 5% bootstrap confidence interval

* Significant parameters at 10% bootstrap confidence interval

Table 4 shows the cross-cultural difference on information communication technology (ICT) in globalized business environments. Based on the results which the author found, all coefficient values have positive values between two latent variables in three countries. Especially, technological capability has a strongly positive effect on the perception of new product in Malaysia. In addition, word-of-mouth has a strongly positive effect on intention of adoption in Malaysia and Thailand. Table 2 and Table 4 show that product benefit, technological capabilities, and consumption pattern have all positive effects on the perception of innovativeness in three countries. Attitude toward a product proved to play a mediating role between perception of innovativeness and intention of adoption. Lastly, technological capability has a positive effect on perception of innovativeness only in Malaysia.

Table 5. 95% Bootstrap confidence interval for path coefficient of SEM

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Path Coefficient</th>
<th>Asia-Pacific</th>
<th>All</th>
<th>Less than 20</th>
<th>More than 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived product innovativeness</td>
<td>0.194**</td>
<td>0.239**</td>
<td>0.169**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived product innovativeness</td>
<td>0.515**</td>
<td>0.489**</td>
<td>0.525**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived product innovativeness</td>
<td>0.168**</td>
<td>0.183**</td>
<td>0.153**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived product innovativeness</td>
<td>0.282**</td>
<td>0.269**</td>
<td>0.308**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived product innovativeness</td>
<td>0.501**</td>
<td>0.452**</td>
<td>0.472**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived product innovativeness</td>
<td>0.330**</td>
<td>0.268**</td>
<td>0.194**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word-Mouth</td>
<td>0.054</td>
<td>0.036</td>
<td>-0.045</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Significant parameters at 5% bootstrap confidence interval;
* Significant parameters at 10% bootstrap confidence interval

Regarding age level, overall research results show that technological capability in Asia-Pacific market, regardless of high (more than 40) or low (less than 20), age has relatively higher positive effect on the perception of innovativeness than in Malaysia. On the other hand, word-of-mouth in Thailand has a relatively higher positive effect on attitude towards product than in both Malaysia and Philippine. In addition, perception of innovativeness and word-of-mouth has a strongly positive effect on attitude towards new product and intention of new product adoption respectively regardless of age in all three countries.

Table 5 shows the cross-cultural differences on information communication technology (ICT) in globalized business environments. Based on the results which the author found is that word-of-mouth has a positive effect on the perception of new product innovativeness regardless age in three countries. In Philippine, especially, word-of-mouth does not have strongly positive effect on attitude towards new product.

4. Conclusion and Managerial Implications

Academic literatures provide ample evidence as to the importance of adopting a customer focus. In practice, there are also many modern techniques such as Quality Function Development, which provide blueprints for making sure that the “voice of the customer” permeates every new product development effort. Specifically, the nature of high tech markets makes it all the more important to rethink the first to market mentality to establish the product as the first in the market, and exploit the innovators and early adopters to take advantage of the role these two segments play in specialization of a product. Many reasons for product launch failures exist: expert consumers from product testing, poor customer “fit”, not understanding the implications of customer expectations,
and not correctly or accurately understanding the product’s psychological benefits.

First, this research has modeled the relationship of innovations and product results (product behavior and acceptance intention in customer’s point of view) of the new product in customer’s point rather than from company’s point of view. In other words, while current researches mainly define the innovation level and type of products from company’s point of view and examine the market result, this essay modeled from what Veryzer (1998b) proposed; relative vantage point compared to current products, absolute technical superiority, changes in required usage behaviors and etc as 3 decision factors for innovative perception. It positively verified that this proposal of 3 factors give positive effects to innovative perception from the customer’s point of view.

Also, by modeling Veryzer(1998b)’s innovation evaluation criteria into leading variable, it was verified that while relative advantage, technology capability compared to the original product influence innovation perception in a similar size, the impact size of the required consumption pattern change is significantly smaller than the two variables.

Furthermore, contrary to Veryzer (1998b)’s result that the required consumption pattern change gives a positive(+) impact to consumers’ perception on product innovation but gives a negative(-) impact on product attitude, this research obtained a result that it gives a positive(+) impact. With a research considering regional variation, national variation, and sample variation the author gained a different outcome from the previous research.

Secondly, the author verified the similarity in relationship between innovative product perception and the product acceptance through acceptance level model which showed that acceptance intervened with the behavior. In other words, as Gatigon and Robertson (1985) indicated, for highly involved products with big innovation acceptance cost in the customer’s point of view, rather than having acceptance right after perceiving the products characteristics, it means acceptance intention happens in order after perceiving the products characteristics and constructing the behavior towards the product.

Third, the size of the perceived innovation is proven to give a positive effect on the product behavior and acceptance intention. But, even though the product innovative perception from the consumer gives a positive effect on the product acceptance intention, after a certain level the acceptance intention doesn’t increase proportionately to the size of innovation perception but the size gradually decreases. This also has proven the hypothesis that if the product innovation is up to a certain level, it tends to be rejected by the customers (Veryzer 1998b).

This is assumed to give help to future researches of product innovation perception and acceptance related customer’s point of view. Also, it will play as a supplement role for the relationship between product innovation and product result evaluated through company’s point of view-sector relationship, nonlinear relationship.

Practically, for innovative products, the company can lead the market on their own, only if the products released to the market are perceived in the consumers’ point of view, form a behavior, and go through a product acceptance process are considered, fact that consumer’s point of view for innovative product development and introducing process is important. Especially, new products are perceived as having high innovation because it is affected by vantage points, absolute technical superiority, and required changes in usage behavior to the current point. Out of these, required usage behavior compared to current products, vantage points, and absolute technical superiority gives bigger effects on the innovative perception. However, by verifying that changes required in usage behavior factors has positive effects on the innovation perception, it gives negative effect on the product behavior, innovative product can be developed by company’s point of view and when releasing, suggestions about which dimension should be more emphasized can be gained. Considering that innovative perception doesn’t get a bigger proportion to the product acceptance intention but decreases from certain level, to increase the innovation of new product, the company must consider output compared to input and the decreasing return. As a conclusion, it is assumed that by tuning the innovation from the company’s point of view to the innovation perceived
by the customers, strategic means to increase the possibility of having success in the market can be gained.

5. Limitations and Directions for Future Research

The limitations of this study are as below. First, to generalize the model on innovation perception factors in consumer’s view and relationship on intention about acceptance, the future research needs to additionally apply different product, different region, and different consumer group on the research model. Second, there is also a need to examine the research’s main results according to the user’s characteristics. For example, Rogers (1995) divided the classes into Innovator, Early adaptor, Early majority, Late adaptor, Laggards according to their adoption speed of the new product, Gatigon and Robertson (1985) explained characteristics of an innovative consumer who has high adoption possibility of the new product during the early stage. Also, there can be difference by perception & attitude on innovation, intention about accepting because of consumer’s participation about the product. Therefore, reviewing the research results based on consumer's innovation tendency or participation degree would be meaningful.

Third, comparing the result utilizing Garcia and Calantone (2002)'s innovation classification criteria in a business perspective with this research’s result is also thought to be interesting. Despite these limitations, this study has shown that relative advantage, technology capability, consumption pattern change and word of mouth have all positive effects on the perception of innovativeness. These finds also indicated that attitude toward a product turned out to play a mediating role between perceived innovativeness and intention of adoption. Lastly, although it is clear that the relationship perceived innovativeness and intention of adoption is a positive one, the effect increases at a decreasing rate. The research described here will stimulate future research that expands my understanding of the role of innovativeness in stimulating new product adoption.

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