Original Research Article

HOW DOES CONSUMER INNOVATIVENESS AFFECT USAGE BEHAVIORSAND SATISFACTIONOF SMARTPHONE USERS - THE MODERATING ROLE OF GENERATIONS

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Abstract: - This paper examines the relationships among customer innovativeness, including novelty information seeking, independent decision and reluctance to adopt new products, smart phone usage behavior, perceived innovation attributes, and customer satisfaction; the moderating effect of generations on this relationship is also investigated. A structural equations model was established to evaluate the relationships between these four constructs among four generations: baby boomers, and generations X, Y and Z. Our results indicate very different behaviors with regard to the relationships between consumer innovativeness, usage behavior, perceived attributes, and customer satisfaction for the generations. Finally, managerial implications and suggested directions for further research are discussed.

Keyword: Consumer innovativeness, Generations, Perceived innovation attributes, Satisfaction, Usage behavior

Introduction: Smart phones are one of most popular innovation consumer products in the world. According to the Institute for Information Industry's latest survey, the number of smart phone users in Taiwan reached over 13.5 million as of the second half of 2014, witnessing a penetration rate of 65.4% (according to the China Times on December 30). The institute forecasts

that Taiwan's smart phone market will reach saturation sometime around 2016 [8]. Additionally, people in Taiwan are the most frequent users of smart phones in the Asia-Pacific region, often watching videos and visiting social networking sites on their handsets, according to the results of a survey released by Google on Tuesday, March 3, 2015 [4].

Smartphone usage behavior would influence customer post-purchase evaluation, which in turn would influence repurchase intention (defined as the process of an individual purchasing goods or services from the same brand or same firm) [5].

The subject of post-purchase behavior will become even more important to the field of marketing management than previously, as more and more intelligent products appear in the future. Recently researchers have noted this issue, and moved their attention to gaining an understanding of customers' post-adoption use of m-services following their initial adoption [2,7]. Other studies of *smart phones* include the adoption of and satisfaction with a cellular phone and mobile application, addiction to cellular phones, and the mobile business (application), for a mobile phone. Despite these developments, no empirical evidence currently investigates the impact of customer innovativeness on smart phone user behavior.

Literature review: Consumer innovativeness has its root in Diffusion of Innovations Theory [13] who defined consumer innovativeness as the degree to which an individual is earlier in adopting new ideas than the average member of his or her social system. Consumer innovativeness has often been cited and studied in research on the diffusion of innovation [12]. Rogers [13] described that attributes of innovations includes five characteristics of innovations: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Usage behavior is a function of a consumer's enduring personality traits, that create a predisposition toward continuously utilization of intelligent functions embedded in z smart phone. Many authors surveyed the attitude and behavior of consumers toward various types of smart phone usage, such as app software, e-mail, Internet browsing, ringtones, and other mobile content. The findings indicated that male and young consumers are generally a larger target market. Consumer satisfaction is a measure of how products and services supplied by a company meet or surpass consumer expectation.

In the literature, antecedents of satisfaction are studied from different aspects. The considerations extend from psychological to physical and from normative to positive aspects. However, in most cases the consideration is focused on two basic constructs as consumer expectations prior to purchase, or use of a product and consumer relative perception of the performance of that product after using it.

Research model

Model: The model for this research is an extensionof Rijsdijk *et al.* [11] and Falaki *et al.*[3]based on Rogers' diffusion of innovations theory and moderated by generations. Consumer innovativeness and the effect of generations, the extended part of the model, are the constructs of interest because they operationalize the question of how personal trait and age affect the individual's smart phone usage behavior.

Literature reviews show that relative advantage, compatibility and complexity play more important roles for innovation adoption than observability and trialability, and that observability and trialability played an insignificant role for consumers who were already experienced in the use of a certain innovation. Since this paper focuses on smart phone post-purchase customer behaviors, we will only consider the innovation attributes of relative advantage, compatibility, and complexity as relevant for our study.

Method

Measures and questionnaire development: According to the literature review, this paper integrates the scale developed by Manning *et al.* [8]and reluctance to adopt new products involving four items, to measure the construct of customer innovativeness using the following five-point scale: 1 = "strongly disagree," 2 = "disagree," 3 ="neutral", 4 = "agree,", and 5="strongly agree". The items from Osman *et al.*

[11] and Statista[15]were combined to measure usage behavior by the following five-point scale: 1 = "never used," 2 = "(average) less than one time usage per day," 3 =" (average) among one to five times usage per day, ", 4 = "(average) among six to ten times usage per day," and 5=" (average) over ten times usage per day". Item "none of the above" was not included in these questions. In addition, measures for relative advantage, compatibility, complexity, and consumer satisfaction were included in the research instrument. The relative advantage scale consisted of five items, the compatibility and complexity were measured with five items each, and the scale for consumer satisfaction was measured with three items. All items were modified from Rijsdijk *et al.* [11], and measured using a five-point scale where 1 = "strongly disagree," 2 = "disagree," 3 ="neutral", 4 = "agree,", and 5="strongly agree". To measure consumer satisfaction, three items including "I am satisfied with my smart phone", "my smart phone is good" and "My smart phone usage experience is better than my expectations", were used and measured using a five-point scale as described previously. To classify respondent generations, a question consisting of four generations is included, in accordance with the general definition of generation [14], using the following scale: (1) baby boomers (BB) = "born before 1964," (2) Gen. X = "born between 1965 to 1981," (3) Gen. Y = "born between 1982 to 1993," and (4) Gen. Z = "born after 1994."

Data Collection: Members of two schools in Taiwan including 300 undergraduates and 236 faculties at a university Department and 300 students and 259 faculties at a high school, were selected to participate in this study. Each respondent received an email containing an internet address (http://www.mysurvey.tw/s/DTcpMAWS), and were asked to fill an online self-reported questionnaire located at the address. Finally, 390 complete questionnaires were returned; among them, 21 respondents indicated that they did not own a smart phone.

A total of 45% of the respondents were male, indicating a significant difference in respondent gender. The generation percentages of the respondents were not unfit for the demographics of these segments; our findings might be affected by a non-response bias due to low response rates. However, since it was not the purpose to deliver representative, descriptive data on the smart phone use behavior, but to show the relationships among studied variables, we believe these issues are only minor limitations to our study.

Results

Measure validation: An exploratory factor analysis was employed to identify and purify the reliability of innovation attributes and customer perceived risk scale. After deleting a few items according to the criterion mentioned previously, Cronbach Alphas (αs) of all constructs are greater than 0.7, indicating an acceptable level of internal consistency. Convergent validity of the measures was tested by calculating the composite reliability (CR) of the constructs and the average variance extracted (AVE). The criteria of reliability and validity are satisfying, as AVE is above .50 and CR above .70.

Measurement model test: After purification of the measurements, we then performed a series of confirmatory factor analyses to test the unidimensionality of the eight scales. Table 1 shows the fit statistics of confirmatory factor analysis for all constructs. Most fit indexes were better than their respective critical points, indicating each construct would be a unidimensional construct.

Table 1 Fit statistics of CFA for all constructs

	(χ^2 / f)	SRMSR	RMSEA	CFI	GFI	NFI
EN	41.4/14=2.96	0.040	0.110	0.949	0.979	0.926
LW	82.9/54=1.54	0.041	0.055	0.962	0.901	0.968
CM	1.16/2 =0.58	0.013	0.000	1.000	0.999	0.992
AC	17/5 =3.4	0.082	0.072	0.865	0.958	0.858
CX	8.25/2 =4.12	0.023	0.132	0.979	0.994	0.973
NS	28.8/5 =5.76	0.021	0.164	0.981	0.984	0.977
ID	44.1/9 = 4.90	0.059	0.148	0.913	0.978	0.894
RA	13.5/2 =6.75	0.056	0.180	0.898	0.991	0.883
CS	18.8/2 = 9.4	0.045	0.218	0.919	0.986	0.911

Multiple-group model test: Multiple-group comparison involved measurement invariance model tests that assess invariance of construct (influent factor), factor loadings, item (attribute), intercepts and error variance and structural invariance model tests that assess invariance of variances, covariance and means of the latent constructs [9]. This paper followed the general succession of tests proposed by Milfont and Fischer [9] that provided a strategy for assessment of the comparability of factor models. The indices of the full scale invariance model, compared to the full metric model, did not show a good fit to the data. As suggested by Milfont and Fischer full measurement invariance is too restrictive and unlikely to hold in practice. This paper searched for partial measurement invariance that can be assessed when some but not all of the parameters are invariant across groups. The goodness-of-fit indices (χ^2 / f =4772/2508, RMSEA = 0.095, GFI=0.91 and CFI = 0.90), indicate the structural model is well fitted by the data.

The effects of antecedents on their following variables among generations are presented in Table 2, in which the effects related to consumer innovativeness is presented in the first panel and the effects related to perceived innovation attributes is presented in the second panel. Several interesting findings are presented here. Customer innovativeness has significant influence on usage behavior in different ways for generations of smart phone users Specifically, the effects of novelty information seeking on usage behavior are positive in Gen. Yand Gen. Z (0.336

and 0.41, respectively), while the effect to Gen. X is insignificantly. Conversely, the effect is negative in BB (-0.38). However, the effects of novelty information seeking on perceived innovation attributes are insignificant in all generations. The loading factors on the paths between independent decision and usage behavior and between independent decision and perceived innovation attributes are all insignificant. The negative coefficient (-0.376), on the path between usage behavior and perceived innovation attributes in BB. The coefficients of usage behavior on consumer satisfaction are positive in BB, Gen. X and Gen. Z (0.346, 0.04 and 0.068), respectively; negatively in Gen. Z (-0.065). It is worth noting that the negative indirect effect (-0.28 = -0.376*0.743),of usage behavior on consumer satisfaction, through perceived innovation attributes, renders insignificant the total effect of usage behavior on consumer satisfaction in BBs. Although the effects of complexity on perceived innovation attributes are not significant for all generations. Additionally, the indirect coefficients of relative advantage and compatibility, through perceived innovation attributes on consumer satisfaction, are all positive, and the coefficients of perceived innovation attributes to consumer satisfaction are all positive. In general, the empirical evidence strongly supports that the generation gaps exist in the relationships among consumer innovativeness, usage behavior, perceived innovation attributes and consumer satisfaction.

Table 2 Generation Effects Analysis

Effect variables	BB	Gen. X	Gen. Y	Gen. Z
Explanatory Variable --- Novelty information seeking				
Usage behavior	-0.380	Insig.**	0.336	0.410
Perceived innovation attributes	Insig.	Insig.	Insig.	Insig.
Explanatory Variable --- Independent decision				
Usage behavior	Insig.	Insig.	Insig.	Insig.
Perceived innovation attributes	Insig.	Insig.	Insig.	Insig.
Explanatory Variable --- Reluctance to adopt new products				
Usage behavior	-0.299	-0.393	Insig.	Insig.
Perceived innovation attributes	Insig.	Insig.	Insig.	Insig.
Explanatory Variable --- Usage behavior				
Perceived innovation attributes	-0.376	Insig.	Insig.	Insig.
Customer satisfaction	insig.	0.040	0.068	-0.065 =(0.346-0.280*)
Explanatory Variable --- Relative advantages and compatibility				
Perceived innovation attributes	0.846	0.824	0.907	0.981
Customer satisfaction	0.629*	0.368*	0.596*	0.606*
Explanatory Variable --- Complexity				
Perceived innovation attributes	Insig.	Insig.	Insig.	Insig.
Explanatory Variable --- Perceived innovation attributes				
Customer satisfaction	0.743	0.447	0.657	0.555

* denotes the indirect effect of explanatory variable on effect variable.

**Insig. denotes the p-value > 0.05.

Conclusions: To investigate the relationships among customer innovativeness, including novelty seeking, independent decision and reluctance to adopt new products, smart phone usage behavior, perceived innovation attributes composed of relative advantage, compatibility and complexity, and customer satisfaction, as well as to investigate the moderating effect of generations on this relationship, a total of 390 respondents were surveyed, and completed their questionnaires; among them, only 21 (5.4%),replied that they did not own a smart phone.

This paper shows that the effect of customer innovativeness of novelty information seeking on Smartphone usage behavior depends very greatly on generation age. This result is only partially consistent with many previous studies in which the positive relationship between customer innovativeness and usage behavior is confirmed. The uniqueness of this paper results is to show that the impact of customer innovativeness on usage behavior have a significant moderating effect; in particular, this effect becomes negative in BB. We also found that BB usage behavior has a significant direct negative effect on the perceived attribute, while the effect is absent for

the other three generations. Additionally, the direct effect of customer behavior of BB on satisfaction is positive; however, this effect is offset by its indirect negative effect, through perceived innovation attributes. Consequently, the total effect of customer behavior on satisfaction vanishes in BB. The effect of customer behavior on satisfaction is positive in Gens X and Y, but negative in Gen. Z. The impact of relative advantage and compatibility on perceived innovation attributes is positive, and the impact of complexity on perceived attributes is insignificant. These results lead a positive effect of perceived innovation attributes on satisfaction for all generations. This result is consistent with previous studies [1,6, 11].In sum, our results indicate a very different behavior regarding the relationships between customer innovativeness, usage behavior, perceived attribute and customer satisfaction for these generations.

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