TECHNOLOGY ACCEPTANCE MODEL, CONSUMSER PERSONALITY AND SMARTPHONE USERS' SATISFACTION

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INTRODUCTION

Technology acceptance model, or TAM, (Davis 1989) explained consumer behavior in adopting new technology and identified crucial factors, which affect users' acceptance. The model was later extended and incorporated social influence factors, such as subjective norms, voluntariness and image (Venkatesh and Davis 2000). Both TAM and extended TAM (TAM2) have been used extensively in informatics and marketing research (Ma and Liu 2004; Schepers and Wetzel 2007). The technology in focus ranges from electronic and voice mail to online learning (Roca, Chui Martínez 2006). The recent trend is the application of these models in the study of the smartphone usage (e.g.,Verkasalo, López-Nicolás, Molina-Castillo, and Bouwman 2010).

The smartphone market is gaining its significance in the worldwide mobile phone market. The worldwide sales of mobile phones grew about 11% between 2010 and 2011, while the sales of smartphones witnessed about 80% growth at the same time (IDC 2011a, b). Facing the increasing number of smartphone users and market competition, both mobile phone vendors and OS providers (e.g., Android, iOS and Symbian) need to better understand users' behavior. The smartphon, as a relatively new innovation, is a perfect object for TAM application. Therefore, we adopt TAM2 but consider the factors, which haven't gained enough attention in the past, in studying smartphone users' perception and satisfaction.

LITERATURE REVIEW

Davis (1989) proposed TAM for both predicting users' acceptance of technology and identifying the reasons for the acceptance, based on the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) (Fishbien and Ajzen 1975). Davis (1989) discusses the relationship between perception, emotions and innovative technology. Different from TPB, TAM assumes that individuals sometimes are forced to accept new technology because of work, so they have no control of using new technology.

The tenet of TAM is that perceived usefulness and perceived ease of use will influence an individual's acceptance of technology and these two constructs are often utilized to investigate users' experience of using high tech products/services. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989). It is related to productivity, performance and effectiveness (Davis 1989) and comes from the benefits of increasing work efficiency and learning performance. Davis (1989) and Taylor and Todd (1995) argue that, if users perceive that innovative technology will assist them in their studies and work performance, they will have the intention to use it because of a positive attitude towards this new technology. Perceived ease of use refers to "the degree to which using the technology will be free of effort (Davis 1989). Venkatesh (2000) states that perceived ease of use is a pivotal factor that affects users' acceptance and behavioral intention.

Venkatesh and Davis (2000) propose an extended TAM model, or TAM 2, by adding social influence processes, job relevance, output quality and result demonstrability. In TAM2, these factors, together with perceived ease of use, influence perceived usefulness, which in turn affect usage intention and behavior. Venkatesh and Bala (2008) further develop TAM2 into TAM3 by adding additional antecedents, such as individual differences, system characteristics and facilitating conditions. In TAM3, these new antecedents are influential factors for perceived ease of use.

Though in TAM2 and TAM 3 image has been considered in the frameworks, a close examination finds that the definition and operationalization (Venkatesh and Davis 2000; Venkatesh and Bala 2008) are not germane to self-image (Sirgy 1982). Besides, little attention has been paid to the influence of self-image congruence in these models. Since self-image congruence plays a vital role in adopting mobile services (Kleijnen et al. 2005), we consider this construct in our framework. Individual difference has also been considered in TAM3 (Venkatesh and Bala 2008) and several TAM based studies (e.g., Lu, Yu, Liu and Yao 2003; Vijayasarathy 2004), but most consider only demographic differences. Though past studies consider the influence of personality (Devaraj, Easley and Crant 2008; Walczuch, Lemmink and Streukens 2007), it has been treated as an antecedent. In this study, we consider the influence of personality on TAM and examine whether patterns of relationships in

the conceptual model will differ between consumers with different personalities. Besides, past TAM studies predominantly consider behavioral intention as a dependent variable. However, once a consumer adopts an innovation, the consumer's perception towards the product or service should lead to the evaluation of the performance (Bailey and Pearson 1983), not the intention to use it. Therefore, we consider satisfaction with a smartphone as the outcome in our model (Figure 1).

Figure 1 Conceptual Framework
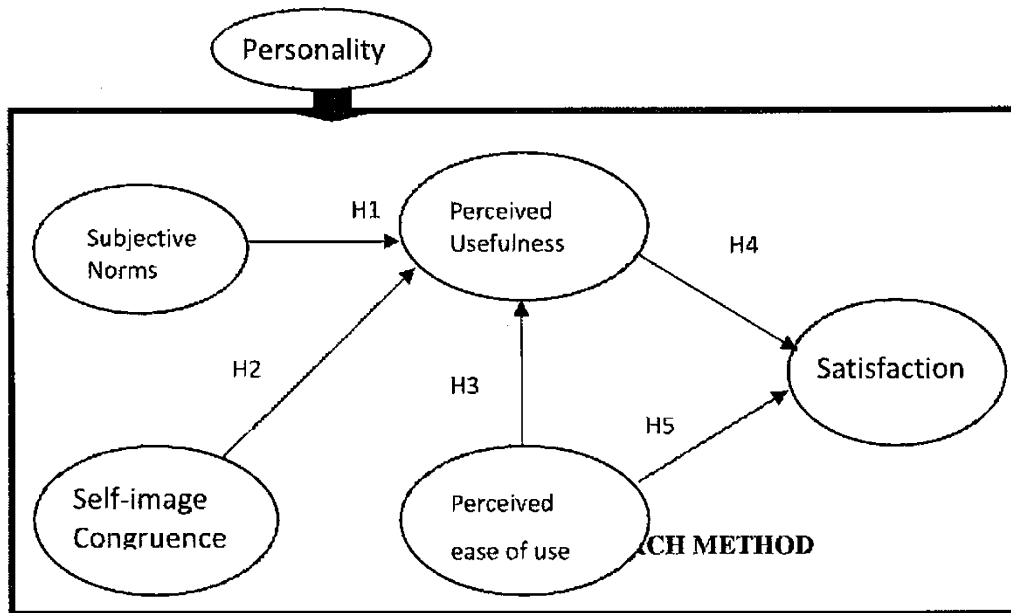
An online survey among smartphone users in Taiwan was conducted. Before the formal survey, a pretest questionnaire was sent to 40 smartphone users in Taiwan via email. Cronbach's αs of all constructs (between .85 and .96) in the pretest showed high level of reliability except for the personality scale ($\alpha = .52$). Though Cronbach's α for personality scale was a bit low, we included this construct, since it is an important construct in our framework and the α was still acceptable (Guieford, 1965).

The formal questionnaires were distributed in the format of an online survey link posted on various on-line channels, including email, online forums for mobile phones (sogi.com, eprice.com and mobile one), and Bulletin Board System (PTT) in Taiwan. Online tokens were given as incentives to encourage smartphone users to participate in the survey. The final sample consisted of 767 responses; the profile of respondents showed that the main age group of smartphone users is between 25 and 34 (44%), similar to the result from a market survey (Pollster, 2010). Most respondents (47%) were office workers. The top three most frequently used functions by smartphone users were digital camera, web browser and emails. To check whether common method variance existed, we applied Harman's single factor test and the result showed no issue, based on the criteria proposed by Malhotra, Kim and Patil (2006). Therefore, we proceeded to conduct the model test.

DATA ANALYSIS

The analysis started with a confirmatory factor analysis (CFA) using AMOS 16.0. The measurement model contains five latent constructs (Figure 1). After an initial CFA analysis, we dropped several items due to validation problems. CFA for the revised model shows good fit statistics ($\chi^2_{(67)} = 3.61$; GFI = .96; AGFI = .93; CFI = .98; RMSEA = .06). The factor loadings for all measurements are statistically significant (p<.001) and exceed .70, providing evidence for the convergent validity of the constructs. In addition, construct reliabilities for all scales range from .84 to .96 and the average variance extracted (AVE) exceed .50 on all constructs, demonstrating good reliability. Finally, AVEs exceed all inter-construct correlations, indicating high discriminant validity.

Maximum likelihood estimation proves estimates of the model. The overall fit statistics for the path model suggests a good level of fit ($\chi^2_{(69)} = 252.36$, GFI = .96, AGFI = .93, CFI = .98, RMSEA = .06) and thus path coefficients of the structural model were examined. All structural paths are statistically significant at p<.001(Table 1). The results indicate that subjective norms ($\gamma = .14$, p< .001), self image congruence ($\gamma = .20$, p< .001) and perceived ease of use ($\gamma = .27$, p< .001) all

significantly influence perceived usefulness but explain only 20% of variances in perceived usefulness. Meantime, Perceived ease of use, among the three antecedents, exerts the largest influence on perceived usefulness. Both perceived ease of use (β = .65, p< .001) and perceived usefulness (β = .18, p< .001) further affect satisfaction and explained 55% of variances in smartphone user satisfaction.

Table 1. Results of Hypothesized Path Model Estimates

	Hypothesis	Std Reg Weights	t-value
Subjective norm -> Perceived usefulness	H1	.15	3.68***
Self-image -> Perceived usefulness	H2	.20	5.18***
Perceived ease of use - > Perceived usefulness	H3	.27	7.18***
Perceived usefulness -> Satisfaction	H4	.18	5.88***
Perceived ease of use -> Satisfaction	H5	.65	18.87***

***p<.001

COMPARISONS AMONG DIFFERENT PERSONALITY GROUPS AND BETWEEN BRANDS

Item analysis and exploratory factor analysis for the 10 personality items were first conducted using SPSS16.0 and resulted in 3 factors, which were named Systematic, Corky and Gentle. We then conducted clustering analysis and discriminant analysis to categorize the respondents. The clustering analysis based on Ward's approach suggested three groups are the optimal result. The next step is to divide clusters using K-means method, from which three groups with distinct personalities were identified. The first group, containing 36 respondents, is Systematic and consists of 36 respondents. The second group is Corky and contains 291 respondents and the third, Gentle, with 440 respondents.

The metric invariance test shows that the factor compositions of these three groups are different ($\chi^2_{(18)}$ = 37.74, p = .004). The following multigroup analysis shows that the three groups are different only in the relationship between perceived ease of use and satisfaction. We also compare the models between Apple and HTC users. The metric invariance test result shows that the models for these two brand groups are invariant ($\chi^2_{(9)}$ = 15.36, p = .082). This result suggests the relationships among constructs studied in this study do not vary between these two brand groups.

CONCLUSIONS

This study finds that social norm and self image congruence, besides ease of use, influence users' perception of smartphone usefulness. Also, in this study we find three distinct personality groups of smartphone users, the largest group of which is users labelled as being gentle. Meantime, only the influence of perceived ease of use on satisfaction varies among different personality groups. We also find that perceived ease of use plays a more important role than perceived usefulness in smartphone users' satisfaction. This finding is different from the results in past TAM studies. Detailed theoretical and managerial implications are discussed in the full paper.

REFERENCES

References are available upon request.