

## Factors Influencing Adoption and Post-Adoption of Smart Phone

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**Abstract.** This research aimed to develop a comprehensive model for consumers' adoption of smart phone and their behaviors after adoption. For this purpose, a multi-dimensional approach was attempted, considering both the initial adoption stage of smart phone and the stage after adoption. Affecting factors were first deduced based on literature review and in-depth interviews, and based on deduced factors, a comprehensive hypothetical adoption model was established for consumers' adoption of smart phone and their behaviors after adoption. In this empirical research a survey was conducted using an organized questionnaire, involving consumers in their 20s and 30s who were accepting smart phones. A longitudinal survey was performed in order to analyze consumers' behaviors before and after adoption. The first survey (before adoption) secured 628 valid responses; however, the second survey secured 286 valid responses. The results of the empirical research were as follows. First, relative advantage, aesthetics and social image are positively related to adoptive intention of smart phone. Second, adoptive intention of smart phone is positively related to adoption of smart phone. Third, adoption of smart phone is positively related to relationship investment. Fourth, relationship investment is positively related to switching cost and emotional attachment. Fifth, switching cost is positively related to continued adoptive intention. Sixth, emotional attachment is positively related to switching cost and continued adoptive intention.

**Keywords:** TAM, smart phone, relative advantage, aesthetics, social image, relationship investment, switching cost, emotional attachment, continued adoption

### 1. Introduction

High-tech industry is innovative and has a higher global market share than other industries, and therefore every nation has been intensively cultivating High-tech industry. The uncertainty of business success in high-tech IT industry is much higher than in traditional consumer goods industries, its products exert great effects on other industries once developed successfully. For this reason developed countries put emphasis on high-tech industry. High-tech industry is also attracting interests of enterprises as a new growth power. Apple corporation had been in a slump in 1990s; but the launching of iPhone and App Store resulted in hot responses from consumers, eventually bringing about a rapid growth, and its total market value has overtaken that of Microsoft corporation.

As high-tech industry has been showing such a rapid growth, acting as a new growth power of enterprises, there have been many research reports concerning consumer behaviors to explain the process of their adoption of High-tech products or services. The researches about how consumers accept new high-tech products have been based on social psychological theories, which deal with conviction, behavior intention and behavior. Representative theories in this field include TRA of Fishbein and Ajzen (1975), TPB of Ajzen (1991) and TAM of Davis (1989). These researches have been recognized as providing good models that are simple yet have high explanatory power for understanding consumers' adoption of high-tech products and their use behaviors, and they are providing theoretical grounds for extended researches.

However, such researches have the following limitations: First, existing theories and previous researches about the adoption of high-tech products have been placing emphasis only on the initial adoption of high-

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tech products. Second, the adoption factors suggested by existing theories are based on intra-organizational status of accepting information systems, and therefore may not be applicable to high-tech products. Third, most of the researches about the adoption of high-tech employed cross-sectional analysis of initial adoption only. And fourth, most of the existing researches suggested and empirically proved the adoption factors that considered only reasonable and rational aspects.

In order to overcome such limitations of previous researches and to understand consumers' adoption of high-tech products and their behaviors after adoption, the following approaches are necessary: First, models of consumers' adoption of high-tech products must be extended to initial adoption stage and the stage after adoption. Second, in constructing such a model, it is necessary to consider not only reasonable and rational factors but also emotional and social factors, in order to achieve a comprehensive model. Third, with regard to research methodology, a more accurate empirical analysis is necessary through longitudinal analysis, rather than depending on cross-sectional analysis.

## 2. Research Hypotheses

This research aimed to develop a comprehensive model for consumers' adoption of high-tech products and their behaviors after adoption. For this purpose, a multi-dimensional approach was attempted, considering both the initial adoption stage of high-tech products and the stage after adoption. Affecting factors were first deduced based on literature review and in-depth interviews, and based on factors, a comprehensive hypothetical adoption model was established for consumers' adoption of high-tech products and their behaviors after adoption. As the factors affecting the initial adoption of high-tech products, this research suggested 'relative advantage,' which is a reasonable and rational variable; 'aesthetics,' which takes emotional aspect in consideration; and 'social image,' which takes social aspect in consideration. Whereas, as the factors influencing the continuous adoption of high-tech products, the authors suggested 'relationship investment,' 'switching cost,' and 'emotional attachment,' in an effort to analyze consumers' continuous adoption behaviors. Research hypotheses are presented in the following Table 1.

Table 1. Hypotheses

	Hypothesis	Expected direction
H1	Relative advantage of high-tech product will have a positive effect on adoptive intention.	+
H2	Aesthetics of high-tech product will have a positive effect on adoptive intention of high-tech product.	+
H3	Social image of high-tech product will have a positive effect on adoptive intention of high-tech product.	+
H4	Adoptive intention of high-tech product will have a positive effect on adoption of high-tech product.	+
H5	Adoption of high-tech product will have a positive effect on relationship investment.	+
H6	Relationship investment of high-tech product will have a positive effect on switching cost.	+
H7	Relationship investment of high-tech product will have a positive effect on emotional attachment.	+
H8	Switching cost of high-tech product will have a positive effect on continued adoptive intention of high-tech product.	+
H9	Emotional attachment of high-tech product will have a positive effect on switching cost.	+
H10	Emotional attachment of high-tech product will have a positive effect on continued adoptive intention of high-tech product.	+

### 3. Method

In this empirical research a survey was conducted using an organized questionnaire, involving consumers in their 20s and 30s who were accepting smart phones, which could be taken as the most advanced high-tech products. A longitudinal survey was carried out from March 2010 to May 2010 in order to analyze consumers' behaviors before and after adoption. The first survey involved consumers who had intention to purchase smart phones through mobile phone agents located in Seoul Metropolitan area. Then, about 30 days after the first survey, the second survey was carried out involving the respondents of the first survey. The reason the second survey was conducted about 1 month after the first survey was to find out the various changes in their emotion and behavior as they became sufficiently acquainted with and used the functions of the high-tech products after adoption. The first survey (before adoption) secured 628 valid responses; however, the second survey secured 286 valid responses. Therefore the questionnaire sets of the 286 consumers who responded to both the first and second surveys were subjected to coding for empirical analysis.

The measurement scales for this study have been drawn from extant literature with only minor modification as needed to fit the study's context. These measures are well established in marketing, psychology and information systems literature. All items used the five-point scale (1=very strongly disagree, 5= very strongly agree). For example, 'relative advantage' was measured by four items including 'The degree to which consumers can do more easily what they want to do with smart phones than with existing mobile phones,' 'The degree to which smart phones are more useful for the activities consumers want to perform than existing mobile phones,' 'The degree to which smart phones are more efficient for the activities consumers want to perform than the other devices,' and 'The degree to which smart phones are more efficient in general than the other devices,' based on Rogers(2003) and Venkatesh et al.(2003).

### 4. Results

Confirmatory factor analysis (CFA) and reliability analysis confirm the reliability and validity of variables adopted in this study. The reliability of all instruments assessed by the Cronbach's reliability coefficient was above the conventional level of 0.5. CFA results showed the overall fit of this model is appropriate. The fit statistics of pre-adoption stage, chi-square = 137.232, (p=.000, d.f.=83), GFI=.940, AGFI=.913, NFI=.918, CFI=.965, RMSEA=.048 were all indicative of good fit. All factor locator loadings from CFA were significant. And the fit statistics of post-adoption stage, chi-square = 193.640, (p=.000, d.f.=93), GFI=.925, AGFI=.890, NFI=.907, CFI=.948, RMSEA=.062 were all indicative of good fit. All factor locator loadings from CFA were significant.

Table 2 Reliability analysis : Pre-adoption and Post-adoption stage

Pre-adoption	Cronbach $\alpha$ value	Post-adoption	Cronbach $\alpha$ value
Relative advantage	.741	Adoption	.868
Aesthetics	.850	Relationship investment	.869
Social image	.806	Switching cost	.743
Adoptive intention	.818	Emotional attachment	.775
-	-	Continued adoptive intention	.822

The hypothesized relationships were tested using the covariance structure modeling technique. Covariance structure modeling was performed using the maximum likelihood method (ML) to test the hypotheses. Covariance structure analysis (AMOS 7.0) testing the Proposed model resulted in a chi-square

statistic of 172.42, ( $p=.000$ ,  $d.f.=102$ ). Although the chi-square value was significant, this statistic is sensitive to sample size and model complexity; as such, the GFI(goodness of fit index), AGFI(adjusted GFI), NFI(normed fit index), CFI(comparative fit index) and RMSEA(root mean square error of approximation) are more appropriate for assessing model fit in this case(Bagozzo and Yi, 1988). GFI=.938, AGFI=.904, NFI=.943, CFI=.972, RMSEA=.041 indicate satisfactory model fit. The summary of hypothesis testing is summarized in Figure 1.

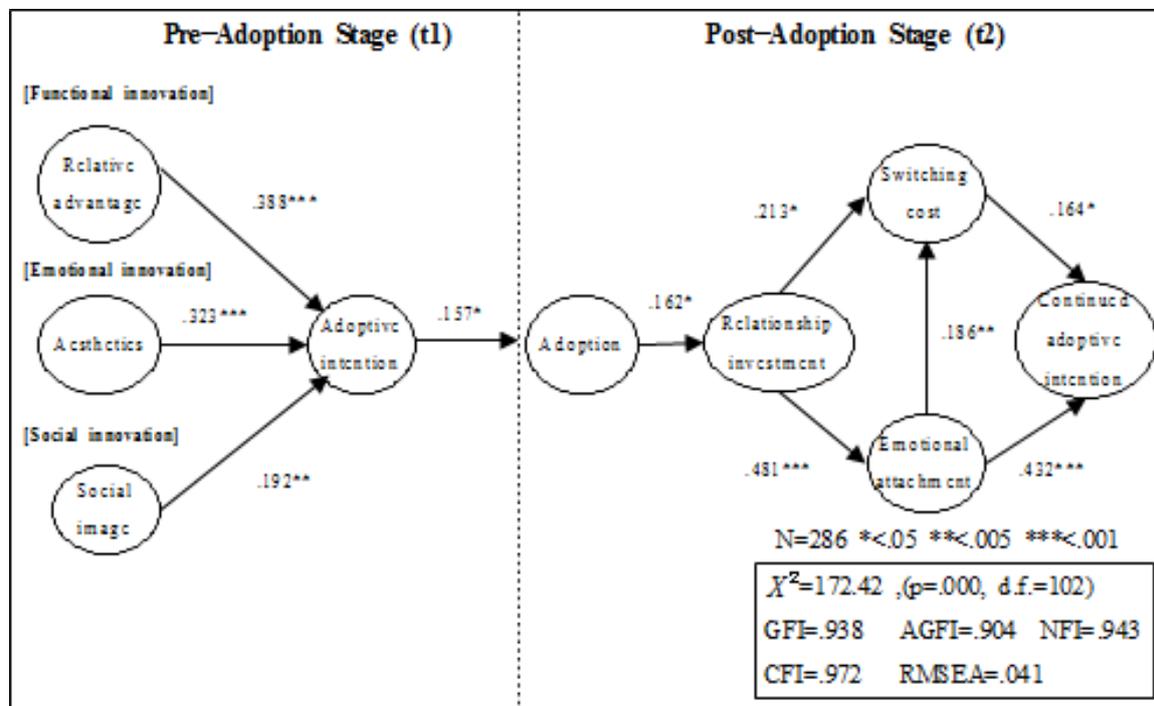


Figure 1. Results of estimation

## 5. Conclusion

The results of the research provide the following suggestive points: First, in order to have consumers more promptly accept high-tech products, there must be an initial marketing strategy that considers relative advantage, aesthetics and social image. The reason is that, unlike in the case of existing traditional products, the adoption of high-tech products is substantially affected by relative advantage, aesthetics and social image.

Second, in order to have consumers to continuously accept high-tech products, there must be a marketing strategy that considers relationship investment, switching cost and emotional attachment. This means that a suitable marketing strategy is required for high-tech products, in whose case relationship investment is made immediately after adoption and continuous adoption depends on switching cost and emotional attachment. Third, there must be a comprehensive strategic management that encompasses the strategy for initial adoption as well as the one for continuous adoption. The results of this research showed that in the case of high-tech products, the factors affecting initial adoption were different from those affecting continuous adoption. Therefore it would be necessary to establish differentiated marketing strategies. That is, in the initial adoption stage, a marketing strategy that can make consumers better perceive relative advantage, aesthetics and social image would be necessary; whereas in the continuous adoption stage, a strategy that can positively develop such factors as relationship investment, switching cost and emotional attachment.

This research is meaningful in that an initial comprehensive analysis has been made concerning consumers' adoption and their behaviors after adoption, Yet it has some limitations and therefore needs further researches, as follows: First, there could be other factors that can affect consumers' adoption of high-tech products and their behaviors after adoption. Therefore it would be necessary in future researches to suggest and empirically prove model that involves diverse additional variables. Second, this research was performed in Korea only, and therefore its results may not be applicable to the behaviors of the consumers of

other countries. Especially, this research did not consider cultural attribute variables, even though consumers' adoption behaviors can largely be affected by cultural factors. Therefore researches for international comparison, involving cultural attribute factors, would be necessary in the future. Third, the comprehensive model of consumers' adoption of high-tech products and their adoption behaviors that was suggested in this research is based on survey with consumers who were accepting smart phones, and the results of this research may not be exactly applicable to the adoption of other information systems or digital devices. Consumers' adoption behaviors may vary depending on the types and properties of high-tech products, and it would therefore be necessary in future researches to extend research object to diverse high-tech products.

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