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Consumer Acceptance Model of Smart Clothing according to Innovation

This study identified the appropriateness of acceptance models of smart clothing and differences in the hypothesis of the path to clothing acceptance by classifying consumers depending on the level of technology innovation and fashion innovation through the extended TAM (Technology Acceptance Model) presented by Chae (2009). 815 copies of data were collected from adults over twenty living in major South Korean cities and analyzed them using a SPSS 15.0 and AMOS 5.0 package. Based on the average value of technology innovation and fashion innovation, the respondents were classified into: Group 1 with high technology innovation and fashion innovation, Group 2 with high technology innovation but low fashion innovation, Group 3 with low technology innovation but high fashion innovation, and Group 4 with low technology innovation and fashion innovation. The appropriateness of models for the four classified groups was verified. The analysis proved that an extended TAM for each classified group explains the acceptance process of smart clothing; especially the appropriateness of model of Group 1 and Group 4 was comparatively higher than other groups. Perceived usefulness was revealed as the key variable that affects consumer attitudes to accept smart clothing. Perceived ease of use has indirect positive effects on consumer attitudes passing through perceived usefulness and clothing involvement partly exerted impacts on consumer attitudes and the intention of acceptance. The mediating role of attitudes to explain the intention of the acceptance of smart clothing is high and suggests that it is necessary to take a positive role to help the consumer perceive the functional and useful aspects of the clothing.

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A ubiquitous environment is being created by progress in computer technology and information revolution, and keeping up with the development, interests in wearable computers and smart clothing (in which computer technology and electronic technology are integrated with fashion) are growing. Smart clothing is new conceptual wear with high additional values as it retains the indigenous sensitive property of clothes along with various added IT functions. Wearable computers are being evaluated, as they have the highest potential among next generation PCs, and the global smart clothing market was estimated to grow from 270 million dollars in 2007 to 540 million dollars in 2010 (Venture Development Corporation, 2005). Some advanced markets such as the US and Europe have already promoted the development of smart clothing since 1998, while research in Korea started in 2001. Currently, the development of smart clothing remains is at the early stage. It is expected that Korean technology can secure a high international competitiveness if the nation prioritizes the development and commercialization of smart clothing.

Studies on smart clothing have dealt with the development trends of smart clothing, commerciali-

zation possibilities, and designs (Cho *et al.*, 2006; Lee, 2002; Lee, 2004; Park & Lee, 2002) and as the commercialization of the clothing started, studies on the response and acceptance of consumers were introduced.

Smart clothing is the integration of clothing with innovative IT functions. Studies were performed on which technology acceptance model (TAM) was applied and the model has been used to frequently analyze the intention of the acceptance of innovative technology (Kang & Jin, 2007; Lee, 2008). Chae (2009) empirically proved that clothing involvement is an important variable that estimates consumer interest when consumers accept smart clothing since the clothing is an innovative electronic product, a fashion product, has a perceived ease of use, and a perceived usefulness that is necessary for the acceptance of electronic technology. This study also extended the existing TAM.

Smart clothing is a fashion product and a technologically innovative product and the innovation of consumers seems to have effects on the process of acceptance of smart clothing. Kang and Jin (2007) expressed that such interaction of smart clothing as clothing and electronic product allows the clothing reveal innovation both in technology and in fashion.

In this study, consumers were divided according to technology innovation and fashion innovation. The route of TAM extended by Chae (2009) was analyzed according to the divided consumer groups. The objectives of this study were to analyze models that can explain perception, attitudes, and intention; the acceptance toward smart clothing expected to be perceived as an innovation product since the commercialization of the clothing is being promoted and to provide a strategic foundation for the commercialization of smart clothing by subdividing consumer groups.

LITERATURE REVIEW

Smart Clothing

Smart clothing is new conceptual clothing with additional values that include computer functions through hi-technology (digital and applied IT technology) that sustain the indigenous sensitive property of clothing. This is also known as wearable computers, digital clothing, and intelligent clothing. Smart clothing has also emerged along with wearable computers (or wearable technology) in the computer engineering-related fields. At the early stages, desktop computers were disassembled and certain parts were worn over the human body. Smart clothing has developed into the form of clothing as aiming at perfect combination of clothing and computers since 1999.

To examine some cases on the development of smart clothing, active research activities were carried out mainly by MIT, the Georgia Institute of Technology, and Carnegie Mellon University. The first attempt to the provision of property of fashion into wearable computers was the Beauty and the Bits Project. In 1997 the MIT research center and fashion schools in Paris, Tokyo, Milan, and New York collaborated on research and created a functional technology fashion such as designing output installations, sensors, input equipment, and electronic connecting devices on hats, shoes, jewelry, and fabrics. Depending on the purpose, the clothing could be divided into textiles for: overcoming physical impairments, reinforcement of the human body, and entertainment (Lee & Park, 2000). Aside from military or industrial purposes, smart clothing is currently being developed to serve such various purposes as health, leisure, sports, entertainment, location guidance, childcare, and the assistance of the elderly.

In Korea, Virtual Reality Research Center of The Korea Institute of Science and Technology, Korea Advanced Institute of Science and Technology, Industry & University Project of LG Electronics, and Yonsei University are performing research on input technology, tag-based computing, finger-spelled word recognition, and sensor information for the development of smart clothing. They have developed MP3 player clothing, car racing smart clothing (for informing coaches of the condition of the driver), and clothes made with optical fiber whose colors change depending on the sound or rhythm that convey temperature and electrocardiogram.

Most studies that have been done so far for the development of smart clothing in Korea are on

development trends, commercialization possibilities, and design development according to ease of use and wear (Cho *et al.*, 2006; Park & Lee, 2001; Park & Lee, 2002; Yook, 2003). The commercialization of smart clothing has resulted in the publication of more studies on the response and acceptance levels of consumers (Chae, 2009; Kang & Jin, 2007; Lee, 2008; Yun, 2007). The research on technology and strategies for commercialization is still insufficient when compared to the design ideas being presented with various concepts. Further studies on responses, attitudes, and consumer acceptance levels are necessary for commercialization and increased commercialization strategies are required for an appropriate subdivision of consumers.

Extension of TAM (Technology Acceptance Model)

TAM is a model proposed by applying belief variables of the Theory of Reasoned Action (TRA) of Fishbein and Ajzen (1975). The model explains the attitudes and behaviors of consumers to the acceptance of innovation technology such as information technology. Davis (1989) proposed a perceived ease of use and perceived usefulness as belief variables that affect the attitudes of users; the attitudes in turn affect the intention of acceptance in acceptance of information technology (see Figure 1).

The research of Davis (1989) and Davis *et al.* (1989) suggested that external variables provide the bridge between the internal beliefs, attitudes, and intentions represented in TAM, the various individual differences, situational constraints, and managerially controllable interventions impinge on behavior. Other studies have extended TAM by inputting external variables like individual features as TAM was applied in a new form of innovation technology (Agarwal & Karahanna, 2000; Agarwal & Prasad, 1999; Chen *et al.*, 2002; Igbaria *et al.*, 1997; Jackson *et al,*. 1997; Venkatesh & Morris, 2000).

Studies that explain the acceptance factors and process of consumers by TAM were published in Korea as well. Kang and Jin (2007) analyzed the consumer intention of purchase by adding variables, technology innovation, and fashion innovation to TAM, and Lee (2008) extended TAM by adding
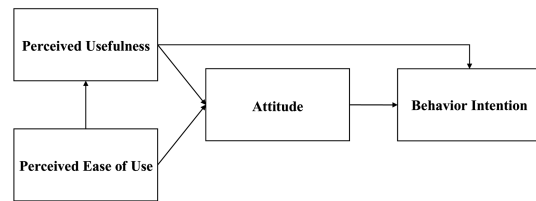

Figure 1. *TAM (Technology Accetance Model)*

perceived value factors. Chae (2009) extended TAM by adding fashion involvement factors as the assumption that consumers will perceive smart clothing as a fashion product rather than electronic goods and empirically verified the compatibility.

Innovation

Innovation in this study stands for the degree of innovation as it applies to products and consumers. Innovation is the inclination of an individual to accept innovation comparatively earlier than others within the social system. Goldsmith and Hofacker (1991) proposed that innovation should be measured by field in order to use it as a variable to predict innovation acceptance since innovation appears domain-specific in specific subjects and fields, but not identically in all subjects and fields.

Smart clothing is innovative clothing in which electronic technology converges, the consumer technology innovation toward new technology and fashion innovation related to fashion products will exert effects on acceptance. In this study, consumers were divided according to innovation and fashion innovation preferences. Technology innovation in information technology refers to the voluntary will of individuals to try new technology or individuals with high technology innovation skill that have a higher intention to use a new information technology or system (Agarwal & Prasad, 1998). Kim, Hong, and Lee (2005) stated that technology innovation has effects on the attitude and purchase intention of consumers for digital convergence products. Park (2004) indicated that innovation groups reveal positive reactions about ease of use, usefulness, and intention of use of internet shopping.

Fashion innovation is the degree of acceptance for new fashion style of products with strongly
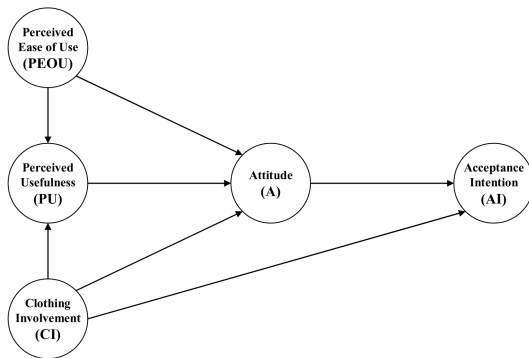
Figure 2. *Research Model (Extended Tam)*

fashionable aspects like clothing (Kim & Rhee, 2001). Hong and Oh (2001) showed that groups with high innovation have a positive intention to purchase clothing on the Internet, and Kang and Jin (2007) stated that fashion-innovative individuals strongly recognize the usefulness of smart clothing.

Based on the studies above, this study classified consumers according to technology innovation and fashion innovation. The hypothesis below were set up to analyze the process of Extended TAM (See Figure 2) verified by Chae (2009).

H: There would be differences in the process of the acceptance of smart clothing by the consumer group classified according to technology innovation and fashion innovation.

RESEARCH METHOD

Measures

For this study, a questionnaire asked questions about technology innovation, fashion innovation, clothing involvement, perceived ease of use, attitudes, intention of acceptance, and demographic features. Referring to the studies of Agarwal and Karahanna (2000), five questions (in terms of technology innovation) asked how the surveyed people perceive new products first, accept, and have an intention to buy the products. The five questions in terms of fashion innovation were developed to know about the degree of acceptance in whether they are interested in new fashion and accept it earlier, as based on the studies of Kim and Rhee (2001). Five questions in terms of

clothing involvement (CI) measured, interest, pleasure, significance, and clothing knowledge and were modified based on the study by Kim (1999). Four questions were modified based on the studies of Agarwal and Karahanna (2000), and Venkatesh (2000) to find the perceived ease of use (PEOU) which measures the degree of consumer expectations that the system will be easy to use. Five questions were modified based on the previous studies to find the perceived usefulness (PU) which measures the degree of consumer expectations that the use of the system will be useful for work performance. To measure personal attitude (A), three questions examined the degree of personal preference for smart clothing in referring to the studies of Fishbein (1963) and Chattopadhyay and Basu (1990), and to find the intention of acceptance (AI) for smart clothing, three questions were modified on the basis of study by Agarwal and Karahanna (2000).

Before the questions about perceived ease of use were answered the perceived usefulness, and intention to purchase, stimuli were shown to respondents; various photos of more than two kinds of MP3 player jackets, sensor clothing, and optical fiber clothing were shown to add explanation to the functions and operation methods. Brand names were not indicated to avoid side effects from a perception about specific brands.

Sample and Data Analysis

Panels of dedicated Korean internet research organizations, adults over 20 living in Seoul, satellite cites, and other metropolitan areas were selected. 815 effective data collected during March 2009 were used for this analysis. Examining the features of the samples, people who are in their twenties account for 282 (34.6%), thirties 350 (42.9%), and over forty 183 (22.5%), and males consist of 383 (47.0%) and females 432 (53.0%). In terms of educational back-ground, 580 people (71.2%) who have university degree took the biggest part with 71.2%, and 332 people (40.7%) are office workers followed by students 117 (14.4%), skilled workers 107 (13.1%), homemakers 104 (12.8%). The average monthly earnings are $2,000-4,000 with 380 people (46.6%),

$4,000-6,000 with 169 people (20.7%), and less than $2,000 with 178 people (21.8%). In order to identify differences in variables of the constitution of groups (classified depending on technology innovation and fashion innovation) an analysis of variance (ANOVA) was carried out using SPSS 15.0 package; to verify the path of acceptance of smart clothing, covariance structure modeling was created and an AMOS 5.0 package used.

RESULTS AND DISCUSSION

Classification by Group

The results are shown of classifying respondents into four groups based on average technology innovation and fashion innovation. The group that retains high technology innovation and fashion innovation (Group 1) consists of 306 people (37.5%). The group with high technology innovation but low fashion innovation (Group 2) 84 people (10.3%). The group with low technology innovation but high fashion innovation (Group 3) 75 people (9.2%), and the group with low technology innovation and fashion innovation (Group 4) 350 people (42.9%).

Performing ANOVA and a Duncan Test to verify whether there are significant differences in terms of indicators by the group, all indicators, perceived ease of use, perceived usefulness, clothing involvement, attitude, and intention showed statistically significant differences at the level of p < 0.001.

Table 1 shows that Group 1 (with high technology innovation and fashion innovation) has the highest mean value in all indicators, while Group 4 (with low technology innovation and fashion innovation) showed the lowest. In case of all the indicators (except for clothing involvement) Group 1 showed the highest mean value, followed by Group 2 and 3; and Group 4 showed lowest based on the results of a Duncan Test. Only in clothing involvement did Group 1 and Group 3 show the highest mean value, followed by Group 2, and Group 4 with the lowest. It is interpreted that consumers with high technology innovation and fashion innovation perceive that the use of smart clothing is easy and useful. In addition, they have a stronger tendency of acceptance intention for smart clothing than other Groups since the personal interests about clothing are high and there is a positive attitude for smart clothing. Consumers with low technology innovation and fashion innovation have the lowest tendency in all the group indicators.

Table 1. *Analysis of Differences of Variables Depending on the Classified Group*

Variables	Group	M (S.E.)	Duncan test	F
Perceived Ease of Use (PEOU)	1. High Technology Innovation High Fashion Innovation	5.21 (1.02)	A	38.80***
	2. High Technology Innovation Low Fashion Innovation	4.93 (1.06)	B	
	3. Low Technology Innovation High Fashion Innovation	4.75 (1.13)	B	
	4. Low Technology Innovation Low Fashion Innovation	4.35 (1.02)	C	
Perceived Usefulness (PU)	1. High Technology Innovation High Fashion Innovation	4.90 (1.03)	A	73.23***
	2. High Technology Innovation Low Fashion Innovation	4.17 (0.99)	B	
	3. Low Technology Innovation High Fashion Innovation	4.30 (1.00)	B	
	4. Low Technology Innovation Low Fashion Innovation	3.79 (0.88)	C	
Clothing Involvement (CI)	1. High Technology Innovation High Fashion Innovation	5.67 (0.72)	A	206.96***
	2. High Technology Innovation Low Fashion Innovation	4.36 (0.83)	B	
	3. Low Technology Innovation High Fashion Innovation	5.47 (0.87)	A	
	4. Low Technology Innovation Low Fashion Innovation	4.03 (1.02)	C	
Attitude (A)	1. High Technology Innovation High Fashion Innovation	4.94 (1.06)	A	66.90***
	2. High Technology Innovation Low Fashion Innovation	4.10 (1.20)	B	
	3. Low Technology Innovation High Fashion Innovation	4.25 (1.11)	B	
	4. Low Technology Innovation Low Fashion Innovation	3.78 (1.00)	C	
Acceptance Intention (AI)	1. High Technology Innovation High Fashion Innovation	4.80 (1.09)	A	77.07***
	2. High Technology Innovation Low Fashion Innovation	3.85 (1.22)	B	
	3. Low Technology Innovation High Fashion Innovation	4.04 (1.21)	B	
	4. Low Technology Innovation Low Fashion Innovation	3.50 (1.05)	C	

***$p < .001$, A > B > C

Table 2. *Results of Testing the Model* (Group 1)

Group	Path	Standardized Path Coefficient	S.E.	C.R.	*P*-value	Significance
1. High Technology Innovation High Fashion Innovation	PEOU → PU	0.65	0.053	12.1	***	supported
	PEOU → A	-0.01	0.04	-0.222	0.824	denied
	PU → A	0.889	0.054	14.786	***	supported
	CI → PU	0.096	0.077	1.898	0.058	denied
	CI → A	0.112	0.049	3.124	**	supported
	CI → AI	-0.092	0.053	-2.773	**	supported
	A → AI	0.971	0.061	18.636	***	supported

$^{**}p < .01,\ ^{***}p < .001$

Inspection on Extended TAM according to Classified Groups

Chae (2009) extended the TAM for smart clothing (Figure 1) and verified the appropriateness of the model ($\chi^2 = 812.3$, $df = 161$, $p = .000$, $GFI = 0.906$, $AGFI = 0.877$, $NFI = 0.952$, $RMR = 0.216$). This study identified differences in the acceptance path and verified the hypothesis about each path according to the classified groups. The analysis was carried out using an AMOS 5.0 package, GFI (Goodness-of-fit: more than 0.9 is desirable), AGFI (Adjusted Goodness-of-fit: more than 0.9 is desirable), NFI (Normed Fit Index: more than 0.9 is desirable), RMR(Root Mean Square Residual: less than 0.05 is desirable), and P value about χ^2 (more than 0.05 is desirable) to verify the appropriateness of the model at the optimum level.

Verification of TAM of Group 1 (High Technology Innovation and Fashion Innovation)

The appropriateness and acceptance path of Group 1 are shown in Figure 3 and the results of verification about each acceptance path are in Table 2. The perceived ease of use had significant effects on perceived usefulness with a 0.650 path coefficient. The perceived usefulness had impacts on attitudes toward smart clothing with a path coefficient of 0.889, however the perceived ease of use did not have meaningful effects on consumer attitudes. These results show that the perceived ease of use has an indirect impact on consumer attitudes through a perceived usefulness that is in agreement with the research results of Davis (1989), Davis *et al.* (1989), and Lee (2007) which presented perceived ease of use as an antecedent variable of perceived usefulness.
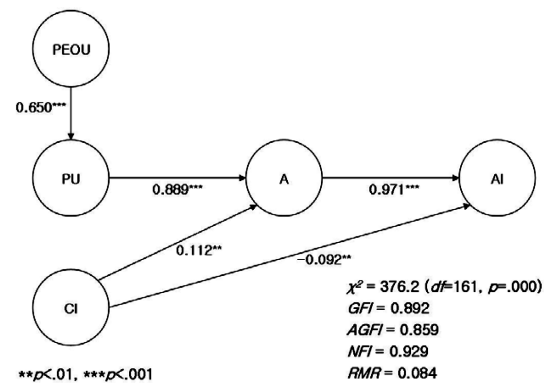

Figure 3. *Appropriateness of Extended Tam (Group 1)*

Clothing involvement did not have meaningful impacts on perceived usefulness, but impacted consumer attitudes with a path coefficient 0.112 and unlike other groups, on intention of acceptance with path coefficient -0.092. This proves that interests in the clothing of consumers with high technology innovation and fashion innovation can exert effects to take positive attitudes about smart clothing but not on acceptance. This can be interpreted as consumers (who take care of clothing and think it as a means to express an image) do not intend to wear smart clothing since the stimuli of smart clothing are expressed simply as clothes with special functions rather than beautiful designs. Impacts on consumer attitudes (on the intention of acceptance) were meaningful with a path coefficient 0.971 and this result agrees with the research of Lee (2008). The mediating role of consumer attitudes is absolute in acceptance model of smart clothing. In the acceptance model of other information technology, some studies supported the mediating role of attitudes (Adams *et al.*, 1992; Jackson *et al.*, 1997) while others reported that the role is insignificant (Davis *et al.*, 1989).

Table 3. *Results of Testing the Model* (Group 2)

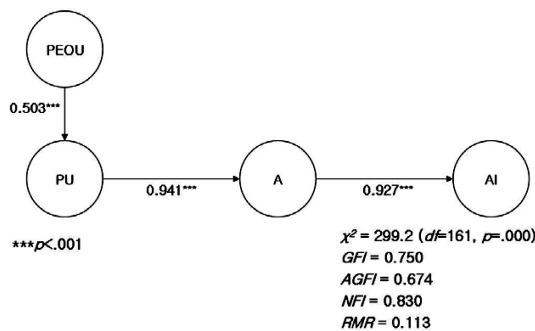| Group	Path	Standardized Path Coefficient	S.E.	C.R.	*P*-value	Significance
2. High Technology Innovation Low Fashion Innovation	PEOU → PU	0.503	0.094	4.699	***	supported
	PEOU → A	-0.084	0.072	-1.134	0.257	denied
	PU → A	0.941	0.114	9.191	***	supported
	CI → PU	0.146	0.118	1.369	0.171	denied
	CI → A	-0.023	0.081	-0.348	0.728	denied
	CI → AI	-0.079	0.081	-1.26	0.208	denied
	A → AI	0.927	0.092	10.644	***	supported

*** $p < .001$

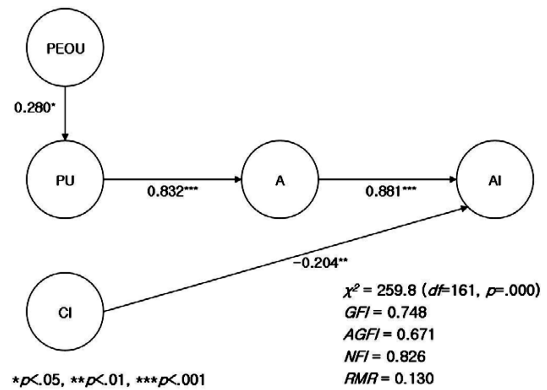Figure 4. *Appropriateness of Extended Tam (Group 2)*

Figure 5. *Appropriateness of Extended Tam (Group 3)*

Verification of TAM of Group 2 (High Technology Innovation and Low Fashion Innovation)

The appropriateness and acceptance process of Group 2 are indicated in Figure 4 and the results of verification are in Table 3. Perceived ease of use has meaningful effects on perceived usefulness with path coefficient of 0.503, while perceived usefulness has a impact on attitude of 0.941 and attitudes in turn on intention of acceptance is 0.927. Other paths did not show statistically meaningful effects. In this group with low fashion innovation but high technology innovation, the impact of clothing involvement was excluded unlike other groups, and this group revealed the acceptance model to which the existing TAM (Davis, 1989) was applied and in the TAM the perceived ease of use and perceived usefulness were used as key belief variables. In accepting smart clothing, the consumers retaining high technology innovation usually perceive innovative functions added to the clothing as acceptable and not just the clothing itself.

Verification of TAM of Group 3 (Low Technology Innovation and High Fashion Innovation)

The appropriateness and acceptance process of Group 3 are described in Figure 5 and the results of verification for each acceptance path are in Table 4. Perceived ease of use had an impact on perceived usefulness with a path coefficient of 0.280, perceived usefulness on attitudes is 0.832, and attitudes in turn on intention of acceptance 0.881 and revealed a similar path as Group 2. Comparing and analyzing impacts of perceived ease of use, impacts from perceived ease of use of Group 3 on perceived usefulness (path coefficient 0.280) is comparatively lower than Group 1 (path coefficient 0.650) and Group 2 (path coefficient 0.503). Consumers with low technology innovation have lower perception that ease of use of innovative technology make it useful than consumers with a high technology innovation. This result supports the research of Kang and Jin (2007) that claimed that technology innovation of consumers exerts impacts on perceived ease of

Table 4. *Results of Testing the Model* (Group 3)

Group	Path	Standardized Path Coefficient	S.E.	C.R.	*P*-value	Significance
3. Low Technology Innovation High Fashion Innovation	PEOU → PU	0.280	0.107	2.347	*	supported
	PEOU → A	0.035	0.064	0.447	0.655	denied
	PU → A	0.832	0.096	7.984	***	supported
	CI → PU	-0.032	0.147	-0.266	0.790	denied
	CI → A	0.129	0.087	1.668	0.095	denied
	CI → AI	-0.204	0.104	-2.677	**	supported
	A → AI	0.881	0.121	8.792	***	supported

*p < .05, **p < .01, ***p < .001

Table 5. *Results of Testing the Model* (Group 4)

Group	Path	Standardized Path Coefficient	S.E.	C.R.	*P*-value	Significance
4. Low Technology Innovation Low Fashion Innovation	PEOU → PU	0.405	0.048	7.219	***	supported
	PEOU → A	0.059	0.041	1.42	0.156	denied
	PU → A	0.791	0.064	14.52	***	supported
	CI → PU	0.128	0.044	2.358	*	supported
	CI → A	0.062	0.036	1.626	0.104	denied
	CI → AI	-0.07	0.037	-1.73	0.084	denied
	A → AI	0.826	0.053	15.149	***	supported

*p < .05, ***p < .001

use. In addition, clothing involvement showed negative effects on the intention of acceptance, and this can be interpreted in that fashion-innovative consumers are skeptical about the acceptance of smart clothing due to the high interests in and importance of clothing. It seems to result from the stimuli as Group 1.

Verification of TAM of Group 4 (Low Technology Innovation and Low Fashion Innovation)

Appropriateness and acceptance process of Group 4 are shown in Figure 6 and the result of verification for each process are in Table 5. Perceived ease of use has meaningful impacts on perceived usefulness with a path coefficient of 0.405, perceived usefulness on attitudes is 0.791, and attitudes in turn on intention of acceptance 0.826. The results showed the same path as other groups and the path coefficients for each path were high. This proves that application of TAM is very reasonable in accepting smart clothing (Lee, 2008). Perceived ease of use revealed impacts on perceived usefulness in all four classified groups and is contrary to the research results of Kang and Jin (2007) who presented that perceived ease of use does not have a significant
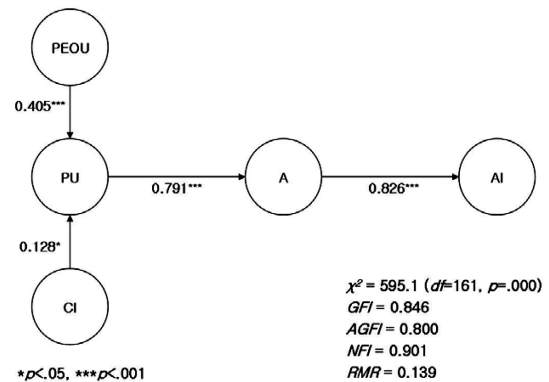

Figure 6. *Appropriateness of Extended Tam (Group 4)*

impact on perceived usefulness in accepting smart clothing. Most of studies on TAM reported that perceived ease of use has impacts on perceived usefulness (Koo, 2003; Park, 2004; Lee, 2008). Unlike other the groups, clothing involvement showed meaningful impacts on perceived usefulness (path coefficient 0.128). It is expected that they will form positive attitudes about smart clothing and accept it after perceiving the usefulness of smart clothing rather than prompt more positive attitudes and acceptance even if they have interests in fashion and perception about the importance of clothing.

CONCLUSION AND IMPLICATIONS

TAM is the model has proved to be the highest influential method among studies that have been carried out on the acceptance of information technology. Chae (2009) verified appropriateness of existing TAM presented by Davis (1989) by adding a factor, clothing involvement, due to the features of smart clothing. Through an extended TAM presented by Chae (2009), this study classified consumers into four groups depending on technology innovation and fashion innovation that identified the appropriateness of acceptance models of the groups and differences in the path.

The analysis proved that the acceptance process of smart clothing could be explained by an extended TAM (Chae, 2009) for each classified group and (particularly) models of the group with high technology innovation and fashion innovation and the group with low in both aspects revealed comparatively high appropriateness.

'Clothing involvement' variable added to the existing TAM (Davis, 1989) showed partly meaningful impacts on each path of classified groups, but they were lower than expected. This seems that various kinds of design for smart clothing have not been commercialized yet so the functional value of smart clothing presented for this study tends to be more strongly perceived than the aesthetic value by respondents. It is suggested that if various products that reflected aesthetic tastes of consumers were commercialized and clothing involvement could be more related. The perceived ease of use showed stronger influence on perceived usefulness than groups with low technology innovation in the case of groups with high technology innovation that revealed that consumers with high technology innovation perceived the use of smart clothing easy and useful. The role of clothing involvement was not important and it did not affect perceived usefulness. Especially, groups with high fashion innovation revealed an interesting result that clothing involvement had negative impacts on intention of acceptance. This shows that products with a more trendy design should be produced to induce highly fashion-conscious and innovative consumers to purchase

smart clothing. Consumers with low technology innovation and fashion innovation had a high interest in clothing. They took attitudes and created intention to accept smart clothing after perceiving the usefulness of smart clothing rather than showing positive attitudes and intention of acceptance readily. This implies that marketing strategies are needed to induce consumers to perceive the usefulness that is produced by the convenient functions of smart clothing.

In all the classified groups, perceived usefulness was the most comparatively important variable among the impacts on consumer attitudes about smart clothing. It was shown that perceived ease of use of a product has a greater effect on the perceived usefulness than clothing involvement. This shows that consumers tend to recognize commercialized smart clothing as innovative products with additional special functions rather than recognizing beautiful designs and fashion of the clothing since (currently) limited diverse smart clothing has been commercialized.

The value of path coefficient from attitudes to intention of acceptance was high and the mediating role of attitudes was strongly stressed so that all the classified groups revealed that they have an intention of acceptance after taking positive attitudes in regards to smart clothing. Other research on TAM showed different opinions about the mediating role of attitudes, but it is likely that smart clothing will be purchased through the creation of attitudes as the clothing is still at the early stage of commercialization.

The process of acceptance of smart clothing by the classified groups revealed differences and it is expected that consumer attitudes or behavior will be different depending on the classified group or classified market. In this respect, the classification of markets relying on consumer features and corresponding commercialization strategies are necessary. Technology and fashion-innovative consumers will act as early adopters or opinion leaders because smart clothing is at the early commercialization stage. Since consumers do not retain sufficient knowledge about smart clothing, highlighting the usefulness through sufficient publicity about functions

for a convenient life is important and trendy designs should be developed to appeal to fashion-innovative consumers.

In this study, the individual characteristics of consumers and demographic variables were not considered. There are limitations; especially, people who are in thirties and who are earning less than 4 million won per month (4,000 USD) accounted for the biggest part of the sample. Detailed market classification strategies should be studied according to the development and commercialization stage of smart clothing since the classification of markets will differentiate depending on the 'individual characteristics' variable or the 'demographic features' variable. Also, the perception of consumers about smart clothing is insufficient and prices of smart clothing products are not necessarily low, so it is expected that a 'price' variable or a 'perceived risk' variable will impact the acceptance of the clothing and further studies to examine these variables should be carried out.

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