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The Influence of Consumer and Product Characteristics on Intention to Repurchase of Smart band

- Focus on Chinese Consumers

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Abstract

This study examined whether or not consumer preferences and product evaluation influenced user satisfaction, intention to use continuously, and intention to repurchase during the purchase and use of smart bands. In addition, The study examined the influential degree of decisive factors for satisfaction and intention to use continuously (IUC), inter alia, consumers' psychological characteristics (i.e. innovativeness and self-efficacy), usage motivation (i.e. fashion leadership and health concern), and product characteristics (i.e. perceived usefulness, perceived ease of use, and aesthetics.

First, these variables-the consumer's psychological characteristics, usage motivation, and product characteristics - did not directly address the intention to repurchase. However, they did influence satisfaction and IUC which will eventually lead to repurchase. In short, the increase of seven decisive factors would not necessarily mean a direct increase of the repurchasing event, but they do have indirect influence in the case where users feel satisfaction and intention to use continuously. Also, aesthetics and health concern had strong influence, while innovativeness and self-efficacy had minor influence. Second, the study results show that the influence of innovativeness and self-efficacy was minor, and it indicates that users no longer insist smart band products to be further requested to accomplish innovative or challenging tasks. It indicates that satisfaction and IUC are important predictors, because they can be used to predict user's intention to repurchase by identifying whether or not the smart band had met the user's expectation.

Keywords: smart band, satisfaction, intention to use continuously, intention to repurchase

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1 Introduction

China has been working hard to improve the health care policy since 2000; therefore, the life expectancy of Chinese people has increased. As of 2013, the average life expectancy of the population in eastern China such as Hong Kong and Zhejiang is over 80 years old. As a result, the proportion of 65-year-olds population has increased to over 7% by 1999 due to the low fertility policy along with the extension of the life expectancy in China. Thus, China has become an aging society defined by the UN. Also, as the average income increases in China with the extension of life expectancy, they are increasingly interested in living a healthy at an old age. For example, China's health supplements market is growing at an average rate of more than 30% annually, with a market size of 450 billion yuan in 2015 and healthcare are increasing

Recently, diverse wearable devices have been launched en masse in China. Of these, due to the increased social interest in health and wellness, smart bands have found their place as a representative wearable device that aids in health management through smart device and sensor technology and as lifestyle products used in conjunction with smart phones.

In addition, while American smart band manufacturers, such as Fitbit, maintain a comparatively high sales price, to the low sales price rolled out by Chinese smart band manufacturers, such as 'Huawei (华为)'와 'Xiaomi(小米)', Chinese smart bands have quickly become popularized. Under such circumstances, the Chinese smart band market has undergone rapid growth within a short period of time. In recent years, Korea's 'Samsung' and 'SKT' have entered the market, further accelerating market competition. In this heated competition, Chinese companies are making great efforts to differentiate their products' functions and designs. As a result, the smart band and has become an innovative IT product and a fashion accessory leading the fashion market. However, experts from IT Chinese companies are now interested to see whether or not smart bands will grow to be considered a basic necessity, as smart phones have become, or if they will be unable to move past being a temporary fad once the smart band market atmosphere has stabilized.

In this situation, smart band companies are discussing the prospects for customer repurchase power and along with securing of new markets. Do you want to innovate the product by focusing on the function of the smart band, or by

emphasizing its nature as a fashion accessory? A strategy needs to be established to innovate smart bands.

This study is based on the Technology Acceptance Model (Davis, 1989) and the Integrative Expectation-confirmation model (Bhattacherjee, 2001). This study examined whether or not consumer preferences and product evaluation influenced user satisfaction, intention to use, and intention to repurchase during the purchase and use of smart bands. In addition, we analyzed whether product satisfaction and intention to use continuously influenced intention to repurchase during this process.

2 Theoretical Background

2.1 Smart band

The term wearable device is defined as body-worn or implantable computers which allow users to manage real-time interaction and control. Also, wearable devices are designed to incorporate a variety of daily activities into digital devices. Namely, these devices are produced in a wearable type of products such as glasses, watches, and apparel. They can be categorized into accessories type, sensors-embedded type, attachable type, and implantable type in accordance with their shape and the way they are worn. The customers' first preference is given to wristbands which have the characteristics of accessory and attachable types, and they can be further classified into smart watches and smart bands. Consumers mostly favor smart watches which assist the role of their smart phones; nevertheless, the high price impedes the purchase. On the other hand, smart bands acquired a wide range of users as they have formed an affordable price point by focusing on specific sensing technologies, e.g., tracking the number of steps, heart rate, and amount of body fat.

Reflecting the recent trend of growing interests in sporting activities and health care, the current corporate focus is on developing smart bands that display unique style and functional performances inter alia, tracking calorie consumption, heart rate, and body fat.

2.2 Theoretical approach to the formation of user's intention to use continuously

The purpose of this study is to find the factors that predict the repurchasing power of smart band users. First, the user's intention to use continuously of the smart band is defined as the road of action and the theory of planned behavior. The theory of planned behavior(TPB), suggested by Ajzen, considers that attitude towards a behavior, subjective norms, and perceived behavioral control decide behavioral intention. It further considers that perceived behavioral control and behavioral intention decide the actual behavior. Perceived behavioral control is a subjective evaluation to which degree the person can perform and/or control one's actual behavior, and it is relevant to perceived self-efficacy.

However, it was noted that TPB incorporates limitations on the measurement of actual acceptance of information technology such as the smart band since the concept of the decisive factors that influences behavioral intent were abstract to a certain extent.

Fig 1. Technology Acceptance Model(David et. Al.,'89, Venkatesh , '03)

Therefore, this study additionally reviewed perceived usefulness (PU) and perceived ease of use (PEOU), which are the decisive factors of behavioral intention introduced in the Technology Acceptance Model(TAM) suggested by Davis(1989). Perceived usefulness is a degree to which a person believes that using a particular system would enhance his or her job performance, and it is related to subordinate concepts such as "important", "suitable", "useful", and "valuable". Perceived ease of use is a degree to which a person believes that using a particular system would be free from physical and mental effort(Geoffrey et al., 1998).. The core concept of TAM is that the behavioral intent is influenced by perceived usefulness and the user's attitude towards the product, and the formation of such attitude is said to be dominated by the direct influence of PU and PEOU.

Fig 2. Integrative Expectation-confirmation mode (Bhattacherjee, 2001)

Second, our research studies the users' intention to use the smart band continuously and their intention to repurchase, so it is necessary to examine the psychological determinants that influenced users on **their intention to use continuously and intention to repurchase**. For this, we refer to the Integrative Expectation- confirmation model presented by Bhattacherjee (2001).On the basis of the Oliver's theory and technology acceptance model, Bhattacherjee suggested the Integrative expectation-confirmation Model(2001), which considers that the user's intention to use continuously the information system, can be affected by satisfaction and perceived usefulness. In other words, it is suggested that there are various determinants in the formation of user's intention to use the product continuously, and it shows the importance of forming satisfaction in product use. Satisfaction, which is the user's attitude towards the products they use, affects their intention to repurchase (Oliver, 1980; Cronin and Taylor, 1992) and feeling satisfaction require users to go through a series of process; they distinguish a particular product from others; they select a specific product; and then his/her emotional attitude affects the repurchasing behavior which indicates a possibility of the customer to continuously use the service or the product in the future(Biong1996). That is, the more satisfaction the users receive, the more chances they will remain using the product. After the proposal of this theory, a number of expanded studies have been conducted on a wide range of information system including mobile internet, web portals, etc.

The following is a description of individuals' psychological characteristics which function as the decisive factors for attitude, acceptance, intent for acceptance, and preliminary

studies on innovative technology acceptance [table 1].

Table 1. Individuals' psychological characteristics on innovative technology acceptance (Cho, 2010)

Researcher	Psychological characteristics
Kim(‘04)	Innovativeness
Soo(‘05)	skill, perceived usefulness, perceived ease of use, suitability, cost of cognition, innovation
Kim(‘08)	innovativeness, suitability, self-efficacy , image, observability
Seo,Seong(‘04)	experience of internet, internet skills, innovativeness, self-efficacy
Choi(‘05)	computer experience, IT innovativeness, self-efficacy
Lee(‘06)	perceived usefulness, self-efficacy
Choi(‘04)	innovativeness, mobile skill, perceived usefulness, perceived ease of use

3. Research questions and methods

3.1 Research model and questions

In order to predict the existing users' repurchasing behavior, this study did not only review the relationship between satisfaction and user's intention to use continuously but also their decisive factors. The study examined the influential degree of decisive factors for satisfaction and user's intention to use continuously, inter alia, consumers' psychological characteristics, usage motivation, and product characteristics. A number of components were added to the factors used in the study after reviewing preliminary studies. Namely, innovativeness and self-efficacy were added to consumer's psychological characteristics; health concern and fashion leadership were added to usage motivation; and perceived usefulness, perceived ease of use and aesthetics were added to product characteristics (Yoon, 2012).

The description of each factor is described in the preliminary studies as follows: [table 2]

Table 2. Characteristics for satisfaction and continued usage intention

Characteristic	Description	Researcher
Innovativeness	An individual's subjective judgment on new ideas, practices, or the degree of product innovation	Rogers(‘03)
Self-efficacy	An individual's confidence or belief that he/she will successfully perform certain tasks given	Bandura(‘97)
Fashion leadership	The power which either helps the user to accept innovative products or persuades the public.	Cho(‘00).
Health concern	Efforts to promote health and interests in collecting health-relevant information	Kim(‘00)
Perceived usefulness	Degree of confidence to which using a certain system will increase his/her work performance	Hassenzah(‘08)
Perceived ease of use	Degree to which he/she can be free of effort when using information system	Davis(‘89)
Aesthetics	Degree to which the user considers the product to be visually appealing	Davis(‘89)

This study developed a hypothesis explaining that the higher the evaluation results of the users' psychological characteristics (i.e. innovativeness and self-efficacy), usage motivation (i.e. fashion leadership and health concern), and product characteristics (i.e. PU, PEOU, and aesthetics) are, the larger the users' satisfaction and user's intention to use continuously will be *[hypothesis 1]*. The study also developed a hypothesis which assumes that high level of satisfaction and intention to use continuously increases the users' intention to repurchase the smart band product [hypothesis 2].

The research model of this study is model below:

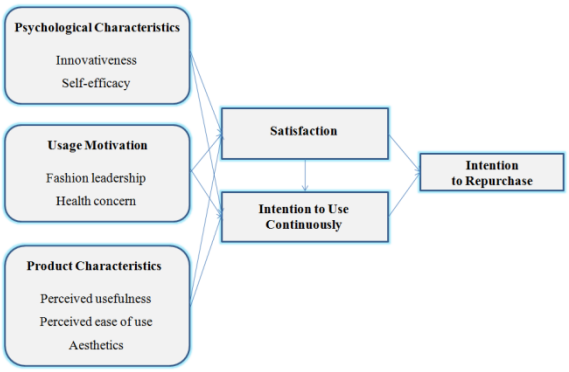

Fig 3. Research method

3.2 Research methods

The question items were extracted from the preliminary studies, and adjustments were made to develop 35 research questions for this study [table 3]. The questions were measured on a 5-point Likert scale.

Table 3. Research Questions

Innovation (Shin,’14)	✓ *I have a lot of knowledge about products with new technologies or ideas than others.* ✓ *I have a lot of new technology products than others.* ✓ *I don't hesitate to use products with new technology.*
Self-Efficacy (Eastin & LaRose,‘00)	✓ *It is not difficult to use wearable device.* ✓ *I have confidence in using wearable device.* ✓ *I don't need the help of anyone else when using a wearable device.*
Fashion leadership (Lin & Lu,’00)	✓ *I like products with new technology or ideas.* ✓ *I am sensitive to the latest fashion.* ✓ *I always try to dress in new style.*
Health concern (Speakeetal, ’89)	✓ *I am currently taking care of my mental and physical health such as working out at the gym or doing yoga.* ✓ *I buy health food for my health.* ✓ *I get regular health checkups.* ✓ *My health is very important in my life.*
PU (Geoffrey & Sarah, ‘98)	✓ *Information obtained from Smart Band products can be very useful to me.* ✓ *Smart Band products will provide the services I need at the time when I want.* ✓ *I think smart band products will be important in my life*
PEOU (Kang, ‘15)	✓ *It will be easy to learn how to use smart bands.* ✓ *The new features on Smart Band will be easily adoptable.* ✓ *The use of smart bands will be convenient for me.*
Aesthetics (Shin, ‘15)	✓ *The screen design (menu, icon, etc.) of the smart band should be creative.* ✓ *The overall design of the smart bands should be durable.* ✓ *The overall appearance and feel of the smart band device should be sophisticated.* ✓ *The screen design (color, menu, icon, etc.) of the smart band device should be attractive.*

Satisfaction (Kang, '15)	✓	*I was satisfied with the use of smart bands.*
	✓	*Using smart bands was a smart decision.*
	✓	*I feel good using smart bands.*
	✓	*The functions on the smart band were easy to use.*
	✓	*We are satisfied with accuracy in using smart bands.*
Intention to Use Continuously (Brown & Gregory,'99)	✓	*I intend to use smart band products in the future.*
	✓	*I am likely to use smart band products in the future.*
	✓	*I have a plan to use smart band in the future.*
Intention to Repurchase (Brown & Gregory,'99)	✓	*I am willing to repurchase a smart band that I had purchased before.*
	✓	*I am willing to purchase smart bands that I have experience in purchasing.*
	✓	*I will consider buying the smart band that I bought before.*
	✓	*I will speak highly about the smart band that I purchased to other people.*

3.3 Participants and procedure

Subjects of the survey were Chinese adults in the age group of 20-52 years who had experiences of using smart bands. 325 replies were obtained after conducting the online survey from May 20, 2016 to May 31, 2016. However, only 245 replies were analyzed since non-responses or the case of which the answers were the same for all questions were considered as insincere replies and had been removed. The number of replies made by male and female participants registered 112 and 133 respectively.

Fig 4. 10 Smart band images presented at the survey

The survey presented the top 10 smart band products[Fig.4] sorted by revenue (originally posted on the 2015 Chinese wearable internet website) and asked whether the participants had experience of use. Replies were only requested to the participants with experience or who were using any of them at the time.

4. Result

4.1. Reliability and descriptive statistics

This study estimated the consistency of items to test the survey's reliability and examined whether latent variables are normally distributed.

Table 4. Reliability and Normal Distribution Conditions

Variable		Mean	Sd.	Skewness	Kurtosis]	Cronbach's a
Innovativeness	1	3.53	0.956	-0.062	-0.923	.899
	2	3.67	0.972	-0.123	-0.989	
	3	3.61	0.88	-0.313	-0.282	
Self-efficacy	1	3.22	0.826	0.012	-0.372	.837
	2	3.17	0.906	0.364	-0.356	
	3	3.38	1.04	-0.315	-0.837	
Fashion leadership	1	3.47	0.818	-0.209	-0.078	.812
	2	3.36	0.796	-0.207	-0.141	
	3	3.46	0.76	-0.546	0.151	
Health concern	1	2.58	1	0.187	-0.525	.901
	2	2.63	0.989	0.115	-0.628	
	3	2.29	0.96	0.431	-0.12	
	4	2.51	0.956	0.353	-0.221	
PU	1	3.28	0.94	0.067	-0.089	.845
	2	3.44	0.938	-0.227	-0.281	
	3	3.46	0.947	-0.358	-0.095	
PEU	1	3.51	0.866	-0.915	-0.216	.800
	2	3.85	0.585	-0.834	1.89	
	3	3.98	0.5	-0.036	1.128	
Aesthetics	1	3.2	1.103	-0.044	-0.728	.912
	2	3.03	1.157	-0.088	-0.888	
	3	2.98	1.147	-0.059	-0.838	
	4	3.06	1.18	-1.009	-1.009	
Satisfaction	1	3.31	0.802	-0.208	0.942	.919
	2	3.58	0.677	-0.517	0.984	
	3	3.49	0.733	-0.61	1.072	
	4	3.27	0.81	-0.344	0.574	
	5	3.51	0.766	-0.848	2.053	
Continued usage intention	1	3.38	0.881	0.118	-0.687	.921
	2	3.41	0.871	0.266	-0.583	
	3	3.43	0.919	0.088	-0.806	
Repurchase Intention	1	3.07	1.067	-0.18	-0.634	.945
	2	3.07	1.022	-0.201	-0.871	
	3	2.81	0.935	0.05	-0.247	
	4	2.92	1.003	0.009	-0.852	

The survey was found to be reliable since all alpha values all exceeded 0.8. Since all measured variables are normally distributed, correlation analysis was conducted to verify the causal structure of latent variables, and the results indicated that variables are significant correlated ($p<0.001$).

4.2. Model evaluation

The study used structural equation model to test the hypothesis The Chi-Square verification results indicated that the data fits the model as $\chi 2$ and p values were 643.263 and 0.000 respectively. In terms of the model evaluation, using fit indices, RMSEA (0.038) was a good fit, and TLI (0.966) and CFI

(0.969) indicated that the model fitness stood at a satisfactory level.

Table 5. Fit of the Research Model

	X^2	df	CFI	TLI	RMSEA
Model	643.263	543	.969	.966	.038

4.3. Hypothesis testing

The test results derived from the path coefficient to verify the hypothesis suggested in this study are listed in [table. 5], and the comprehensive modeling results are illustrated in the [fig 4].

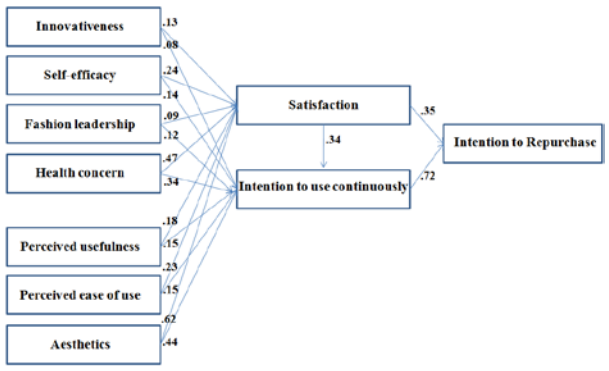

Fig 5. Influential relationship user's intention to use continuously and satisfaction

Table 6. Direct, Indirect and Total effect of Latent Variables

Independent variable	Dependent variable	Direct Effect	Indirect Effect	Total Effect
Innovativeness	Satisfaction	.129**	0	.129
Self-efficacy	Satisfaction	.091*	0	.091
Fashion leadership	Satisfaction	.232***	0	.232
Health concern	Satisfaction	.465***	0	.465
PU	Satisfaction	.174***	0	.174
PEU	Satisfaction	.226***	0	.226
Aesthetics	Satisfaction	.617***	0	..617
Innovativeness	IUC	.077*	.046	.123
Self-efficacy	IUC	.091**	.033	.150
Fashion leadership	IUC	.133**	.083	.217
Health concern	IUC	.325***	.167	.492
PU	IUC	.141***	.063	.204
PEU	IUC	.144***	.081	.225
Aesthetics	IUC	.432***	.221	.654
Satisfaction	IUC	.359***	0	.359
Innovativeness	IR		.110	.110
Self-efficacy	IR		.112	.112
Fashion leadership	IR		.196	.196
Health concern	IR		.423	.423
PU	IR		.169	.169
PEU	IR		.199	.199
Aesthetics	IR		.563	.563
Satisfaction	IR	.347**	.191	.538
IUC	IR	.533***	0	.533

PU : perceived usefulness, PEU : perceived ease of use
IUC : intention to use continuously, IR : intention to repurchase

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

① Influential relationship to satisfaction

The results indicated that innovativeness, self-efficacy, fashion leadership, health concern, perceived usefulness, perceived ease of use, and aesthetics had statistically significant positive correlation with satisfaction. Namely, as with the increase of each factor, the user's satisfaction towards the smart band will increase. The path coefficient which indicates the influence of aesthetics on satisfaction was relatively high (0.617), while that of health concern on satisfaction was intermediate (0.456). The path coefficient for fashion leadership, perceived usefulness, and perceived ease of use were respectively 0.232, 0.174, and 0.226, which were comparatively low. The path coefficient for self-efficacy and innovativeness were respectively 0.91 and 0.129, which are considered to have statistically significant correlations, yet indicating a minor influence on satisfaction.

② Influential relationship to continued usage intention

The result indicated that innovativeness, self-efficacy, fashion leadership, health concern, perceived usefulness, perceived ease of use, and aesthetics directly influence the user's intention to use continuously. At the same time, all seven factors, except for satisfaction, also had indirect influence on user's intention to use continuously via an intermediate (i.e. satisfaction). Namely, the user's intention to use continuously the smart band will increase as with the increase of each factor. All seven factors had direct/indirect influences on IUC, but the degree of influence varied. It was found out that the direct and indirect influences of aesthetics on IUC were 0.432 and 0.221 respectively. Also, the direct and indirect influences of health concern on IUC were respectively 0.325 and 0.167. However, in case of innovativeness and self-efficacy, even the sum of direct and indirect influences for each component were respectively 0.123 and 0.150, indicating minor influences on user's intention to use continuously.

③ Influential relationship to repurchasing

Satisfaction and user's intention to use continuously had statistically significant correlations with intention to repurchase. The path coefficient that indicates IUC's direct influence to the intention to repurchase was 0.533. Satisfaction had direct and indirect influences on intention to repurchase, and the sum of the path coefficients was 0.538. The path coefficient when intention to repurchase was influenced via an intermediate (i.e. IUC) was 0.191, while it was 0.347 when there was a direct influence on intention to repurchase.

5. Conclusion

Hypothesis 1 was tested to examine to which degree the consumer's psychological characteristics (i.e. innovativeness and self-efficacy), usage motivation (i.e. fashion leadership and health concern), and product characteristics (i.e. perceived usefulness, perceived ease of use, and aesthetics) influence the intention to repurchase.

As a result, these variables did not directly address the intention to repurchase. However, they did influence

satisfaction and IUC which will eventually lead to repurchase. In short, the increase of seven decisive factors would not necessarily mean a direct increase of the repurchasing event, but they do have indirect influence in the case where users feel satisfaction and user's intention to use continuously. Also, aesthetics and health concern had strong influence, while innovativeness and self-efficacy (which are psychological characteristics of individuals) had minor influence.

The examination result of hypothesis 2 was that satisfaction has significant influence on user's intention to use continuously, and both factors had a strong influential relationship with intention to repurchase. It indicates that satisfaction and IUC are important predictors, because they can be used to predict user’s intention to repurchase by identifying whether or not the smart band had met the user’s expectation.

Since consumers are directly influenced by their degree of satisfaction when they make decision on whether to repurchase the product, companies must consider the needs for user experience management. Health concern is a noteworthy factor among those that have indirect influences; it is expected that people who are interested in promoting their health are more likely to repurchase the smart band if it is a well-designed product and they feel satisfaction and continued usage intention.

On the other hand, the study results show that the influence of innovativeness and self-efficacy was minor, and it indicates that users no longer insist smart band products to be further requested to accomplish innovative or challenging tasks. Therefore, this study suggests that the proper way to increase the repurchasing rate of smart bands is to focus on designing both an aesthetically impressive product and an accurate health care information system. Also, in terms of promotional activities, highlighting aesthetics or the role as a health promotional service provider is considered to be more efficient than the existing advertisements which tend to focus on innovativeness or self-efficacy.

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