Effect of Product Appearance and performance on the Consumer's Affection In the Design of Mobile Phones

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Abstract

Product developers nowadays have to consider not only the technological satisfaction of consumers but their affective needs as well. These affective needs are greatly affected by the appearance and performance functions of the product, which are simply called in this study appearance-based affection and performance-based affection. This study examined these two affective factors that must be considered while designing mobile phones. Extracted relationship between the two factors was processed in five steps. The first step includes gathering potential affective expressions that can be need to evaluate the levels of consumer's affection for mobile phone design in the pool of adjectives. In the second step, a simple frequency analysis was done from a consumer survey to extract frequently used affective expression. The third step was to extract primary tasks for mobile phones and to perform an experiment or a survey for the evaluation of mobile phones using those tasks the representative affections were then extracted in the fourth step based on factor analysis. Finally, using ANOVA, the extracted representative affections were prioritized to draw a relationship between appearance-based affection and performance-based affection. The result of this study suggests each of appearance-based affections and performance-based affections that should be considered first in designing mobile phon.

1. Introduction

Consumer's technological demands are becoming higher as the current market shifts to market driven consumer (Karl T. Ulrich, 2007). As a result many products that fulfill those demands of various functions are being released, but in reality fail many times. The reason for these failures is because although the product has the technological demands of consumers, they have not considered the affection aspect in using the product. (S.H. Jeong, 2006). Affection has become the new paradigm since many companies are doing their best to invent products that satisfy consumer's affection (Marc Gobe, 2007).

This trend is the same in the mobile phone market as well. Consumer demand of complex functions and design are becoming higher. Also consumers want their phones to express their individuality, and therefore buy products that satisfy those subjective consumer needs. The consumer's affection can be divided to appearance-based affection of the esthetic aspect and the performance-based affection of the performance

satisfaction side. The preference in affection may vary in the esthetic aspect and performance satisfaction side. So, both of these sides should be considered to design cellular phones.

The fields of past Kansei engineering has researches in each appearance-based affection factor preferred by consumers (G.W. Jung, 2002) and the performance-based affection factor (S.H. Jeong, 2006). However researches on relationship between appearance-based affection and performance-based affection are absent. To effectively reflect consumer's affection in designing cellular phones, researches on consumer's affection are needed.

2. Research Procedure

The study first suggests the relationship between appearance-based affection and performance-based affection, and precedes the steps mentioned in Fig.1 to suggest consumer's affections that should be considered first. First of all, we selected affection adjective on mobile phone and task for evaluating affection on mobile phone. And then, we extracted the representative affection through factor analysis. At the end, we extracted the representative affection though ANOVA.

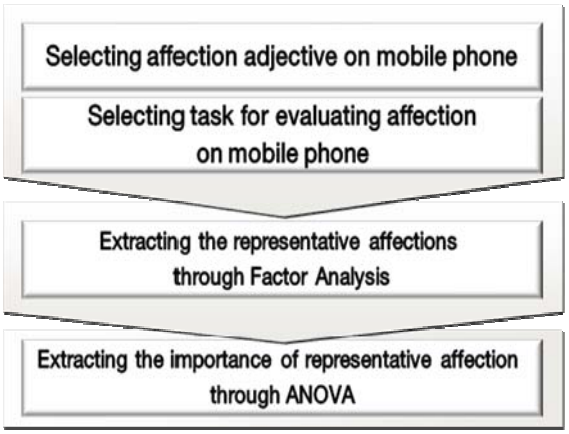

Fig.1. Procedure for extracting the importance of affection between appearance aspect and performance aspect

3. Selection affection adjective and task for evaluating affection on mobile phone

3.1 Constructing the affection adjective pool related on mobile phone

We collected 490 affection adjectives to construct the affection adjective pool related on mobile phone through literature review and previous research (G.W. Jung, 2002; G.T. Jung, 2000; M.R. Seo, 2006; Y.A. Kim, 1998; S.H. Han, 1997; H.N. Lee, 2009). Also, we collected 34 affection adjectives through the review of internet club and professional site. Finally, we collected 21 affection adjectives use for think aloud method. As a result, we could extract 357 affection adjective pool eliminated duplicative and non-relative affections through previous three steps.

3.1.1 Extracting primary affection adjectives through frequency analysis

Frequency analysis was conducted for extracting primary affection adjectives. Subjects were participated in the survey which selected 50 affection adjectives related on mobile phone among its pool. As a result of frequency analysis, 43 affection adjectives which represented over 9.27 of expected frequency were extracted as primary affection adjectives.

3.2 Selecting tasks for evaluating affection on mobile phone

We selected the tasks for evaluating affection on mobile phone. The tasks were consisted of the functions which represented high level of important and high frequency of the use in previous research (G.T Jung, 2002; H.Y. Yoon, 2004; M.J. Song, 2009; M.Y. Kim, 2006; S.E. Jung,2009, S.H. Jeong,2006)(Table 1).

Table.1. Task for evaluating affection in mobile phone

Task for evaluating appearance-based affection
- Examine the external design of a mobile phone
- Turn on the mobile phone and examine internal design
- Examine the size of a mobile phone
- Examine the display size of a mobile phone
- Examine the weight of a mobile phone
- Touch the surface of a mobile phone and examine the quality of the material

Task for evaluating performance-based affection
- Carry a mobile phone
- Check the call history and make a call
- Search the name in phone book and text massage
- Input new number to phonebook
- Check current time and set the alarm for 7 o'clock
- Connect internet and search data

4. Extracting the representative affections through Factor Analysis

4.1 Extracting the representative appearance-based affections and performance-based affections

A survey was conducted to extract the representative appearance-based affections and performance-based affection through factor analysis. The subject consisted of 87 individuals ranging age from 23 to 34 years (Males: 51, Females: 36). After execute the task, the importance score of the primary affection adjectives for appearance was marked on the basis of 100 points. And then, the importance score of the primary affection adjectives for performance was marked in the same way.

4.1.1 Reliability test of survey data

Reliability test was conducted to evaluate the reliability of survey data. We used Cronbach's Coefficient Alpha as a reliability test. In this case, the reliability was inferred if Cronbach's Coefficient Alpha was nearly one (H.J. NO, 2000). As a result, we could derive that the survey data that were consisted of appearance-based affections score and performance-based affections score were reliable.

4.1.2 Screening affection adjectives

MSA(Measure of Sampling Adequecy) was conducted to screening affection adjectives. The affection adjectives were eliminated if MSA value was below 0.5 (Hair et al, 2006). As a result of MSA, five appearance-based affection adjectives and two performance-based affection adjectives were eliminated. And then, KMO(Kaiser-Meyer-Olkin) was conducted to examine the variable appropriation of appearance-based affection adjectives and performance-based affection adjectives. The variables are appropriate if KMO value was over 0.5 (Hair et al, 2006). KMO value of appearance-based affection adjectives was 0.743 and the value of performance-based affection adjectives was 0.693. According to KMO value, the appropriation of sample was identified.

4.1.3 Factor analysis of affection adjectives

Factor analysis was conducted to extract representative appearance-based affection and performance-based affection. We conducted factor analysis using varimax. The affection adjectives were eliminated if communality value was below 0.5. And the affection adjectives that were multiple loading were also eliminated. the result was illustrated in Table 2 and Table 3.

Table.2. Factor analysis for appearance-based affection adjective

	F1	F2	F3	F4	F5	F6	
	Unique	**Luxurious**	**Fancy**	**Slim**	**Durable**	**Modernistic**	Communality
Innovative	0.94	0.18	0.02	0.12	0.17	-0.06	0.96
Stimulating curiosity	0.91	0.06	0.19	0.17	0.20	-0.06	0.94
New	0.87	0.28	0.07	-0.12	0.03	-0.05	0.86
Creative	0.82	0.15	0.08	-0.15	-0.12	0.21	0.78
Fresh	0.81	0.18	0.11	0.33	0.25	-0.15	0.90
Brilliant	0.72	0.21	0.36	0.26	0.00	-0.15	0.79
Harmonious	0.70	0.26	0.25	0.19	0.28	-0.05	0.74
Esthetic	0.29	0.87	0.15	0.06	0.07	0.04	0.87
Luxurious	0.17	0.76	0.36	0.08	0.16	-0.09	0.78
High-class	0.28	0.71	0.26	0.37	0.23	-0.07	0.85
Sophisticated	0.40	0.67	0.14	0.39	0.20	0.04	0.83
Pretty	0.22	0.08	0.83	-0.13	0.24	-0.06	0.82
Appealing	0.12	0.12	0.80	0.34	0.06	-0.08	0.80
Colorful	0.17	0.28	0.75	0.21	0.06	0.11	0.73
Cute	0.14	0.26	0.71	0.33	-0.06	0.15	0.73
Agile	0.15	0.12	0.19	0.87	0.01	-0.05	0.84
Slim	0.11	0.19	0.17	0.85	0.22	0.20	0.88
Thin	0.30	0.39	0.14	0.73	0.20	0.04	0.84
Durable	0.06	0.02	0.03	-0.19	0.86	0.31	0.88
Substantial	0.09	0.20	0.07	0.34	0.79	0.03	0.79
Stable	0.33	0.01	0.31	0.03	0.75	0.18	0.80
Modernistic	-0.06	-0.27	0.16	0.20	0.16	0.75	0.73
Simple	0.12	0.20	-0.17	0.18	0.21	0.72	0.68
Slick	-0.26	-0.21	0.14	-0.06	0.22	0.70	0.67
Sensuous	0.07	0.39	-0.09	0.14	-0.06	0.68	0.65
% of Variance	22.43	13.19	12.63	12.58	10.23	9.49	80.55

As a result of Factor Analysis about appearance-based affection adjective, 25 affection adjective were chosen as affection adjective that explain appearance-based affection efficiently. Six affective factors were extracted and defined as Unique, Luxurious, Fancy, Simple, Durable, Modernistic from focused group interview. And the six affective factors could explain performance-based affection in 80.55%.

Table.3. Factor analysis for performance-based affection adjective

	F1	F2	F3	F4	F5	F6	F7	
	Unique	**Technical satisfaction**	**Simple**	**Slim**	**Luxurious**	**Fancy**	**Inconvenient**	Communality
Creative	0.82	0.27	0.06	0.09	0.25	0.02	-0.07	0.83
Attractive	0.76	0.26	-0.01	0.15	0.29	0.24	0.03	0.81
Stand-out	0.74	0.44	-0.03	0.08	0.07	-0.02	0.12	0.77
Characteristic	0.71	0.22	-0.20	-0.08	0.22	0.26	0.02	0.72
Brilliant	0.67	0.24	0.04	0.09	0.12	0.32	0.40	0.79
Innovative	0.20	0.85	-0.01	0.00	0.34	0.01	0.01	0.88
High-Tech	0.13	0.81	0.00	0.14	0.06	0.27	0.07	0.78
Up-to-date	0.37	0.81	0.00	0.18	0.15	0.04	0.17	0.87
Distinct	0.47	0.71	-0.03	-0.08	-0.02	0.15	-0.06	0.76
Modernistic	0.29	0.69	0.09	0.20	0.27	0.07	-0.24	0.74
Simple	0.10	-0.08	0.90	-0.11	0.07	-0.04	0.14	0.86
Easy	-0.28	0.16	0.86	0.01	0.07	0.01	-0.10	0.85
Convenient	0.25	-0.15	0.83	-0.13	0.00	-0.10	0.12	0.81
Casual	-0.10	0.06	0.72	0.38	-0.01	0.09	-0.14	0.70
Light	-0.09	0.09	0.66	0.36	-0.17	-0.30	0.17	0.73
Agile	0.14	0.07	-0.04	0.91	0.18	0.11	0.06	0.90
Slim	0.15	0.07	0.04	0.86	0.20	0.18	0.11	0.86
Thin	-0.26	0.24	0.31	0.69	0.34	0.08	0.07	0.82
Luxurious	0.30	0.06	-0.03	0.11	0.80	0.14	0.19	0.81
High-Class	0.22	0.28	-0.12	0.31	0.73	0.16	0.15	0.81
Slick	0.20	0.27	0.19	0.41	0.64	0.29	0.07	0.82
Charming	0.26	0.35	0.11	0.20	0.63	0.33	-0.05	0.75
Cute	0.05	0.13	-0.03	0.11	0.15	0.89	-0.01	0.84
Pretty	0.24	0.11	-0.10	0.09	0.31	0.79	0.28	0.89
Appealing	0.35	0.21	-0.16	0.26	0.13	0.73	0.28	0.88
Intricate	0.02	0.05	0.01	0.09	0.08	0.07	0.95	0.93
Heavy	0.09	-0.06	0.13	0.08	0.14	0.19	0.91	0.91
% of Variance	14.73	14.60	12.74	10.87	10.32	10.04	8.68	81.98

As a result of Factor Analysis about performance-based affection adjective, 27 affection adjective were chosen as affection adjective that explain performance-based affection efficiently. Seven affective factors were extracted and defined as Unique, Technical satisfaction, Simple, Slim, Luxurious, Fancy, Inconvenient from focused group interview. And the seven affective factors could explain performance-based affection in 81.98%. These results about appearance and performance were shown in Table 4.

Table 4. The results for representative appearance and performance-based affection

Representative appearance-based affection *(% of variance)*	**Representative performance-based affection** *(% of variance)*
Unique *(22.43%)*	Unique *(14.73%)*
Luxurious *(13.19%)*	Technical satisfaction *(14.6%)*
Fancy *(12.63%)*	Simple *(12.74%)*
Slim *(12.58%)*	Slim *(10.87%)*
Durable *(10.23%)*	Luxurious *(10.32%)*
Modernistic *(9.49%)*	Fancy *(10.04%)*
	Inconvenient *(8.64%)*

Consumer appearance-based affection preference in mobile phone was caused by Unique, Luxurious, Fancy, Slim, Durable, Modernistic. But performance-based affection preference was caused by Unique, Technical satisfaction, Simple, Slim, Luxurious, Fancy, Inconvenient. The result showed differences between appearance-based affection and performance-based affection. According to the result, we could derive that appearance-based affection and performance-based affection should analyze each other.

5. Extracting the importance of the representative affection through ANOVA

5.1 Extracting each importance of the representative affections in evaluating mobile phone satisfaction

A survey was conducted to extract each importance of the representative affections in evaluating mobile phone satisfaction. The subject consisted of 30 individuals ranging age from 21 to 37 years (Males: 17, Females: 13). The importance score was marked on the basis of 100 points. After the survey, we conducted One-way ANOVA to find the difference of importance among the representative affections. AS a result of ANOVA, the difference of importance was found to be significant at α=0.05 (p-value = 0.021). These finding implied that the importance of the representative was different each other. Thus, we could derive the result that grouping each importance is possible.

5.1.1 Grouping each importance of the representative affections

We conducted the post-hoc analysis using SNK (Student-Newman-Keuls). Then the result was illustrated in Table 5. Although each importance of the representative affections was not grouped independently, we could group each importance by comparing mean values (Group1–Unique_*Appearance* / Group2–Technical Satisfaction_*Performance*, Unique_*Performance* / Group3–Simple_*Performance* / Group4–Slim_*Performance* / Group5–Luxurious_*Appearance*, Luxurious_*Performance* / Group6–Fancy_*Appearance*, Slim_*Appearance*, Fancy_*Performance*/ Group7–Inconvenient_*Performance*, Durable_*Appearance*, Modernistic_*Appearance*). Thus, we could derive the result that the group 1 ~ 7 were considered in sequence in designing mobile phone.

Table 5. The result of post-hoc analysis

	Groups					
Representative affection	**A**	**B**	**C**	**D**	**E**	**F**
Unique *(Appearance)*	A					
Technical satisfaction *(performance)*		B				
Unique *(performance)*		B				
Slim *(performance)*		B	C			
Simple *(performance)*			C	D		
Luxurious *(Appearance)*				D	E	
Luxurious *(performance)*				D	E	
Fancy *(Appearance)*					E	
Slim *(Appearance)*					E	
Fancy *(performance)*					E	
Inconvenient *(performance)*						F
Durable *(Appearance)*						F
Modernistic *(Appearance)*						F

6. Discussion and Conclusion

The main purpose of this research was to define appearance-based affection and performance-based affection and to suggest the order of priority in consumer's affection, which is consisted of appearance-

based affection and performance-based affection in designing mobile phone.

It was found from research that consumer had different affection between in appearance aspect and in performance aspect by using Factor Analysis. And we found that the appearance-based affection can arise from Unique, Luxurious, Fancy, Slim, Durable, Modernistic and that the performance-based affection can arise from Unique, Technical satisfaction, Simple, Slim, Luxurious, Fancy, Inconvenient, Then grouping each importance of the representative affections was conducted by using ANOVA. Thus, we could derive the result that the group 1 ~ 7 were considered in sequence in designing mobile phone. We expect that the result from this research can help suggesting the direction of mobile phone design satisfied consumer's affection.

For more direct reflection of affection research, the relationship between consumer's affection which is consisted of appearance-based affection and performance-based affection and part of mobile phone would be studied for further research. And then analyzing Design factor of mobile phone also might be necessary for increasing satisfaction of consumer's affection.

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