Comparison of Customers Perception of Feature and Smart Phone Users Mainly in 20s

Hyun-Jong Kim†

ABSTRACT

The property of the mobile phone is taking important role to choose it. In the present situation, exploring, comparing and analyzing the important properties of regular mobile phone(feature phone) and smart phone are very meaningful study. Therefore, the survey was carried out to get the properties of feature phone and smart phone and analyze the difference of those phones. And proposed the important variables for customer satisfaction which must be given priority. The result showed that 'design' and 'quality' are important to both mobile phone user groups. The problems with mobile phones currently in use were 'poor performance' to feature phone users and 'expensive charge' and 'poor A/S' to smart phone users. Two groups also showed significant difference with the customer satisfactions, and smart phone user group showed higher satisfaction. For smart phone user group, four factors are induced from the properties but 'Hardware Quality'(representing 'Call Quality', 'A/S', 'Convenience to use', 'Battery life') and 'Design & Function'(representing 'Internet', 'Convergence Functions', 'Design', 'Color') have significant and positive effects on Customer Satisfaction.

Key words : Mobile Phone, Smart Phone, Feature Phone, Customer Satisfaction, SEM

† Professor, Dept. of Logistics & Distribution Management, Gwangju University, Korea
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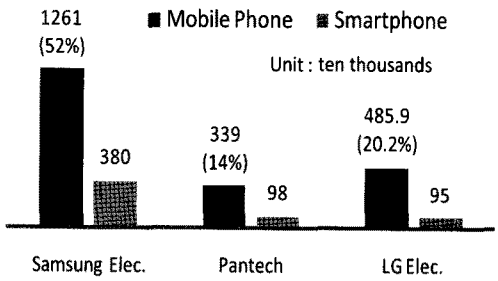
1. Introduction

Although global handset sales increased 15.6% annually from 2003 to 2007, because of the recession in 2007 the mobile phone sales market was entered stagnation period. But smart phone sales showed 58.7% annual growth since 2003, and the sales ratio, only 3.6% in 2003, was increased to 34.5% in 2009. Global mobile phone reached 417 million units during the third quarter of 2010, according to the report published by Gartner, a 35% upsurge from the third quarter of 2009. Global smart phone reached 81 million units during the third quarter of 2010, a 90% upsurge from the third quarter of 2009. Smart phone occupied about 21% of the world mobile phone market in 2010[2][12]. The number of domestic mobile phone subscribers reached 50 million at the end of November 2010. 50.6% of the subscribers was covered by the SKT company, 31.6% by the KT Company, and 17.8% by the LGU+ company[10]. Domestic sales of mobile phones for each



[Figure 1] Domestic Mobilephone Sales Market(2010)

Manufacturer in 2010 is showed in [Figure 1][4]. Korean market, which has one of the world's highest ASP, has many factors that smart phones can rapidly rise and it seems like that market will have rapid growth. Domestic smart phone subscribers in 2010 exceeded 7 million and expect to exceed 20 million in 2011[15]. Smart phone has become an emerging phenomenon for personal and business voice, data, e-mail, and Internet access. At the moment, phones with a variety of designs and functions are released in mobile phone market, and each company is developing the phones considering the consumers favor to maximize the profit. The property of the mobile phone is taking important role to choose it. In the present situation, exploring, comparing and analyzing the important properties of regular mobile phone(feature phone) and smart phone are very meaningful study. Therefore, the survey was carried out to get the properties of feature phone and smart phone and analyze the difference of those phones. And proposed the important variables for customer satisfaction which must be given priority.

2. Theoretical Background

Smart phone provides new opportunities for the mobile phone manufacturers and telecom companies in the face of limit growth. But domestic mobile companies which showed good accomplishment are fall into depression in global smart phone market. Meanwhile, the mobile phone industry's core competitiveness was a technology and hardware-centric. In the case of the introduction of new products and services, the properties of products and services to affect the decision of customers are very necessary and interesting topics for manufacturers, service providers and researchers. Because it can be certainly appear by finding the properties that customers are considered to be important or can remove the concerns. And the results can be employed to customer acceptance and diffusion of products and services. An analysis of current customers' awareness will help predict future demand of the products and services. The customer's preference in choosing phone changed much, which now they select the products based on the quality of its hardware,

advertisement, brand image, and its company's general reputations. Assaei(1998) proposed that the consumer's attitudes is a core factor of determining purchase intention which becomes the pre step of committing the purchase through the rational behavior model[1]. According to him, since the intention is a direct factor that determines the purchasing behavior, it is also possible to predict an actual purchasing behavior using purchase intention. Customer's decision-making occurs in the prediction of their purchase behavior and if, in general, the favor in particular product's property increases, it is more likely to form higher desire in purchase, which eventually leads to consumer's behavior. Due to the rapid development of mobile phone industries for last decade, considerable researches were performed about the properties of mobile phone. Kim(2010) classified those researches into two categories: a research of mobile communication service and the terminal of a mobile phone[6]. As a research of mobile phone marketing, mobile phone evaluation criteria study(Lee and Kim, 2001)[13]], handset purchasing effect factor analysis(Lee, 2002)[14], and the effect of consumer characteristics on benefits sought and importance in attributes of durable goods(Kim and Kang, 2005)[8] and other various subjects in this area were researched. Lee and Kim(2001) tried to verify the consumers' evaluation of mobile phone quality and the influencing factor on consumer satisfaction[13]. They inferred three evaluation criteria of mobile phone using factor analysis: 1) External factors of handset(design, color, size, price), 2) Internal factors of handset(performance, call quality, after service, durability), 3) Service factors(various functions, contract, service option, assurance, contract period, charge rate). Kim and Park(2008) applied Kim and Kang(2005)'s research result to mobile phone handset market segmentation[7]. They described market-segment profile after identified the market segments of mobile phone handsets based on the benefits sought, using cluster analysis and concluded that customers are appeared to seek benefits of joy, image and practicality. Kim(2010) induced, from the mobile phone properties, 'Hardware Quality', 'Practicality', 'Convergence Functions' and 'Awareness' are influence factors on the choice of handset and telecom company[6]. Recently, the center of the mobile phone market has changed from feature phone to smart phone. Actively changed consumers' diverse needs in telecommunications are showing a pattern through the implementation of smart phones. Today's smart phone has an impressive range of applications and functions. Kim, S(2010) tried to find and prove the factors influencing the purchase intentions of smart phone by expanding technology acceptance model[9]. He showed that the perceived usefulness, ease-of-use, and playfulness give positive effects to the purchase intention. Kang(2010) pointed out that the general factors preventing smart phones activation were expensive prices of terminals, difficult directions, and too simple terminals. Korean telecommunications firms have tried to activate application stores by opening advertisements and contest exhibits through many media, but they failed to get good effects due to low awareness and complex purchase procedures[5]. The competitive factors in the PC market in Gong(2010)'s research are performance, price and design. He concluded that the quality and quantity of applications and contents will affect smart phone sales[3]. A lot of individual studies for feature and smart phone are performed, but the comparison study of those phones is not relatively well done. Therefore, at this point, comparing properties of smart phone with feature phone is meaningful and interesting issue, which is to find and prove the factors influencing the customers perception. In this study, the properties of feature and smart phone which based on the preceded researches were compared and analyzed.

3. Research Design and Data Analysis

From the previous discussed researches, the properties of feature phone and smart phone that influence on the customer were analyzed. The general properties of respondents were explored and compared. And each type of phone properties of the respondents were grouped by common factors using factor analysis. The validity and reliability of the models were examined. Based on the factor analysis results, three structural model were tested. Also, it was analyzed that the

<Table 1> Sample Demographics

variable	scale	frequency	%	feature phone		smart phone	
				frequency	%	frequency	%
gender	male	102	37.0	64	31.4	38	52.8
	female	174	63.0	140	68.6	34	47.2
age	teens	10	3.6	8	3.9	2	2.8
	20s	206	74.6	150	73.5	56	77.8
	30s	46	16.7	34	16.7	12	16.7
	above 40	14	5.1	12	5.9	2	2.8
job	student	204	73.9	155	76.0	49	68.1
	work	62	22.5	41	20.1	21	29.2
	housewife	8	2.9	7	3.4	1	1.4
	others	2	0.7	1	0.5	1	1.4
mobile phone manufacturer	Samsung	138	50.0	102	50.0	36	50.0
	LG	51	18.5	44	21.6	7	9.7
	Pantech	39	14.1	31	15.2	8	11.1
	Motorola	19	6.9	17	8.3	2	2.8
	Apple	18	6.5	0	0.0	18	25.0
	others	11	4.0	10	4.9	1	1.4
joined telcom co.	SKT	148	53.6	110	53.9	38	52.8
	LGU+	48	17.4	36	17.6	12	16.7
	KTF	80	29.0	58	28.4	22	30.6
used period	under 6mo.	88	31.9	36	17.6	52	72.2
	6mo.~1yr.	86	31.2	74	36.3	12	16.7
	1yr.~2yr.	81	29.3	75	36.8	6	8.3
	2yr.~3yr	17	6.2	15	7.4	2	2.8
	above 3yr.	4	1.4	4	2.0	0	0.0
select reason	price	45	16.3	37	18.1	8	11.1
	design	97	35.1	81	39.7	16	22.2
	quality	77	27.9	41	20.1	36	50.0
	A/S	12	4.3	8	3.9	4	5.6
	brand	31	11.2	26	12.7	5	6.9
	other	14	5.1	11	5.4	3	4.2
desired product	Samsung	150	54.3	116	56.9	34	47.2
	LG	13	4.7	11	5.4	2	2.8
	Pantech	15	5.4	11	5.4	4	5.6
	Motorola	10	3.6	8	3.9	2	2.8
	Apple	75	27.2	48	23.5	27	37.5
	others	13	4.7	10	4.9	3	4.1
problem	expensive charge	96	34.8	51	25.0	45	62.5
	poor performance	99	35.9	89	43.6	10	13.9
	inconvenience to use	32	11.6	31	15.2	1	1.4
	poor A/S	22	8.0	10	4.9	12	16.7
	others	27	9.8	23	11.3	4	5.5

reconstructed latent variables effecting on customer satisfaction with structural equation model.

3.1 Sample

Data was collected from the mobile phone users living in Seoul and Gwangju Metropolitan City. The survey was conducted from Dec. 6 to Dec. 24 in 2010. Self-administered surveys were distributed to 300 users. After checking sample bias and discarding incomplete questionnaires, leaving 276 usable samples, which represents a 92% response rate. A summary of the responses and the descriptive statistics are reported in <Table 1>. The questions of property importance and customer satisfaction of the mobile phone were constructed as not important-important statements on a 5-point Likert scale. In terms of measurement, all properties of mobile phone which from prior research were reconstructed to 14 questions but the questions were refined from the result of screening process and factor analysis to 12 questions. Therefore factor analysis was conducted for 12 properties in <Table 2> and three structural equation models were constructed with dependent variables, customer satisfaction, in <Table 4>.

<Table 2> Response score of the property

question(variable)	mean	s.d.	feature phone		smart phone	
			mean	s.d.	mean	s.d.
Call Quality	4.30	0.83	4.28	0.82	4.36	0.86
After Service	4.42	0.83	4.43	0.84	4.42	0.80
Convenience Operating	4.41	0.76	4.43	0.72	4.38	0.86
Battery Life	4.38	0.85	4.38	0.84	4.36	0.86
Price	4.03	0.93	4.05	0.86	3.97	1.11
Design	4.28	0.80	4.30	0.78	4.24	0.88
Color	3.92	0.91	3.95	0.87	3.86	1.04
Solidity	4.18	0.84	4.17	0.83	4.21	0.89
Internet	3.79	1.07	3.62	1.09	4.28	0.86
Convergence	4.14	0.99	4.12	0.97	4.21	1.04
Trend(Popularity)	3.25	1.14	3.22	1.10	3.35	1.24
Brand name	3.54	1.03	3.50	0.98.	3.64	1.15

3.2 General properties of sample

<Table 1> shows several facts that the difference between feature phone and smart phone. Feature phone market shares Samsung(50.0%), LG(21.6%) and Pantech(15.2%) in that order, but smart phone shares Samsung(50.0%), Apple(25.0%), Pantech(11.1%) and LG(9.7%). In smart phone sales, the survey result Pantech ahead of the LG is consistent with [Figure 1]. Feature phone users that less than 1 year are 53.9%, on the other hand 88.9% of smart phone users use it less than 1 year. 'Design'(39.7%) is the largest proportion of 'select reason' for feature phone users, but 'quality'(50%) is most important factor for smart phone users. The problems with mobile phones currently in use are 'poor performance'(43.6%) to feature phone users and 'expensive charge'(62.5%) and 'poor A/S'(16.7%) to smart phone users. The results mentioned above are similar to that of 'A survey on smart phone utilization'[11]. Also the survey delineated that users were satisfied with 'function' and 'performance' of smart phone, dissatisfied with 'price of handset' and 'calling plan'. To test the relationship between 'type of phone' and other variables, crosstabulation analysis was carried out. <Table 3> shows that 'type of phone' has significant differences with other variables except 'telecom company' and 'desired product'. A series of t-test for customer satisfaction that compare smart phone users with feature phone was performed. The results in <Table 4> suggested that there was signigicant difference except 'Customer support'(rapid response, compensation, after service etc.) satisfaction question. Taken as a whole, <Table 4> shows the satisfaction of smart phone users was higher than that of feature phone users.

<Table 3> Result of Crosstabulation Analysis(* p-value)

variable	gender	age	job	manufac -turer	telecom company	problem	used period	select reason	desired product
type of phone	0.001*	0.018	0.000	0.000	0.836	0.000	0.000	0.000	0.372

<Table 4> Questions for customer satisfaction

Satisfaction variables	feature phone		smart phone		Significant Prob. (t-test)
	mean	s.d.	mean	s.d.	
Hardware Quality	3.33	0.96	3.75	1.07	0.002
Customer Support	3.34	0.95	3.36	1.09	0.895
Security & Credibility	3.22	0.88	3.54	1.00	0.016
Overall Satisfaction	3.20	0.88	3.74	1.09	0.000

3.3 Factor and Reliability Analysis

A factor analysis was performed to reduce the 12 properties(<Table 2>) to a meaningful, interpretable, and manageable set of factors. The results of the dimensionality and reliability assessment for the measures are shown in <Table 5>. The dimensionality of each measure was evaluated with exploratory factor analysis. The principal component method was used for factor extraction and the VARIMAX method of rotation was employed. The results of exploratory factor analysis show that, in this study, four factors emerged as dimensions of the mobile phone properties. Those eigenvalues are greater than 1 which is a critical value. A variable with factor loading equals to or greater than 0.5 was considered significant and included in the analysis. All factor loadings are relatively high and significant, providing strong evidence for convergent validity. The results of KMO(Kaiser-Meyer-Olkin) Measure of Sampling Adequacy(0.790 for mobile phone and 0.774 for smart phone) and Bartlett's Test of Sphericity(p=0.000) show that the samples are suitable to factor analysis. These four dimensions, with 12 properties, explained 67.99%(mobile phone) and72.12%(smart phone) of the total variance. In <Table 5A>, the four dimensions were named: 'Hardware Quality', 'Practicality', 'Convergence Functions', and 'Awareness'. The reliability test conducted for each factor indicated that the reliability coefficients for the four factors ranged from 0.68 to 0.82, which exceeded the recommended significant level of 0.60. Therefore, good internal consistency among the attributes within each dimension was found. 'Practicality' and 'Hardware Quality' dimensions are similar to the dimensions, External factors(design, color, size, price) and Internal factors(performance, call quality, after service, durability), of Lee and Kim(2001)[13]. The result of an analysis for feature phone was almost same as the case of mobile phone in <Table 5A>. Certainly it is due to the sample constitution(74% of the respondents have feature phone). But, <Table 5B> shows somewhat different combination. In <Table 5B>, the four dimensions were named: 'Hardware Quality', 'Design & Function', 'Awareness', and 'Practicality'. The reliability test conducted for each factor indicated that the reliability coefficients for the four factors ranged from 0.63 to 0.86, which exceeded the recommended significant level of 0.60. 'Internet' and 'Convergence' are not relatively important factor to mobile phone users, but it is natural for smart phone users to choose those as relatively important variables. As <Table 5B> shows, the reliability coefficients are higher than 0.6 and so the internal consistency reliability is acceptable. Based on the results of factor analysis, 'Hardware Quality' and 'Practicality' appear to be important

contributors to the importance of mobile phone. And 'Hardware Quality' and 'Design & Function' appear to be important contributors to the importance of smart phone. As seen in <Table 5>, those two factors account for 39.8%, 45.5% of the total variance, respectively.

for the measurement model of smart phone also provide evidence of a reasonably well-fitting model. Although RMR and AGFI of smart phone model acceptance criteria are not within acceptable ranges, SRMR and all other indexes fit accept level. The SEM results, along with their associated path

<Table 5> Dimensionality and Reliability of the Measure

<Table 5A> Mobile phone(feature phone + smart phone)

(Latent) Variables	Property	commu nality	factor loading	Eigenvalue (var. %)	Cronbach α
Hardware Quality	Call Quality	.584	.701	2.860 (23.837)	0.819
	After Service	.767	.789		
	Convenience	.704	.782		
	Battery Life	.699	.796		
Practicality	Price	.594	.681	1.911 (15.923)	0.680
	Design	.667	.739		
	Color	.634	.633		
	Solidity	.619	.588		
Convergence Functions	Internet	.767	.805	1.814 (15.118)	0.677
	Convergence	.751	.793		
Awareness	Trend(Popularity)	.775	.870	1.574 (13.113)	0.715
	Brand name	.708	.808		

Kaiser-Meyer-Olkin Measurement : 0.790
Bartlett's sphericity test(chi-square) : 1121.432
p-value < 0.000

<Table 5B> Smart phone

(Latent) Variables	Property	commu nality	factor loading	Eigenvalue (var. %)	Cronbach α
Hardware Quality	Call Quality	.661	.723	3.263 (27.192)	0.864
	After Service	.693	.769		
	Convenience	.529	.748		
	Battery Life	.846	.900		
Design & Functions	Design	.749	.799	2.193 (18.273)	0.766
	Color	.715	.757		
	Internet	.765	.657		
	Convergence	.529	.553		
Awareness	Trend(Popularity)	.793	.885	1.860 (15.501)	0.743
	Brand name	.758	.825		
Price & Solidity	Price	.815	.867	1.339 (11.157)	0.630
	Solidity	.610	.553		

Kaiser-Meyer-Olkin Measurement : 0.774
Bartlett's sphericity test(chi-square) : 374.083
p-value < 0.000

3.4 Structural Equation Model Analysis

Structural Equation Modeling is one modeling approach used confirm relationships among underlying factors. Based on the factor analysis, Structural Equation Model(SEM) was tested using Amos 7.0 to analyze the influence of the properties to customer satisfaction and standardized path coefficients. In this case it was used to test the various models offered above in order to predict behavioral intentions to use mobile phones. The structural equation modeling fit statistics, reported in <Table 6>, indicate that the three models exhibit a reasonable fit. The overall fit statistics for the measurement model of mobile phone and feature phone provide evidence of a reasonably good model fit. Similarly, the overall fit statistics

coefficients, are shown in <Table 7>. Two factors(Convergence Functions, Awareness) in mobile and feature phone models have no significant effects to Customer Satisfaction under significant level 0.05. But, 'Practicality' and 'Hardware Quality' have significant and positive effects to Customer Satisfaction. In smart phone model, 'Design & Function' and 'Hardware Quality' factors showed significant and positive effects to Customer Satisfaction. According to the results, 'Practicality' is the most important and key role factor to evaluate Customer Satisfaction for feature phone users. And 'Design & Function' is the most important and key role factor to evaluate Customer Satisfaction for smart phone users.

<Table 6> Measures of SEM Fit

	$\chi^2(p)$	$\chi^2(p)$ /df	Absolute Fit Index				Relative Fit Index		
			RMR (SRMR)	GFI	AGFI	RMSEA	NFI	TLI(NNFI)	CFI
Accept Level	p > 0.05	1~2	<0.05(<0.08)	>0.90	>0.90	<0.05	>0.90	>0.90	>0.90
Mobile phone	60.82(0.058)	1.35	0.04(0.043)	0.97	0.93	0.036	0.95	0.97	0.99
Feature phone	60.19(0.053)	1.37	0.04(0.048)	0.96	0.91	0.043	0.94	0.96	0.98
Smart phone	63.01(0.141)	1.21	0.06(0.059)	0.92	0.82	0.018	0.90	0.99	0.99

<Table 7> Summary of Test Results for the SEM

Model	Hypothesis Path			Estimate	S.E.	C.R.	P-value	α=0.05
Mobile phone	Customer Satisfaction	<---	Convergence Func.	.657	.584	1.125	.261	reject
		<---	Hardware Quality	.874	.430	2.033	.042	accept
		<---	Practicality	1.252	.455	2.752	.006	accept
		<---	Awareness	.173	.240	.720	.472	reject
Feature phone	Customer Satisfaction	<---	Convergence Func.	.612	.578	1.059	.290	reject
		<---	Hardware Quality	.793	.411	1.929	.048	accept
		<---	Practicality	1.175	.390	3.015	.003	accept
		<---	Awareness	.131	.190	.691	.489	reject
Smart phone	Customer Satisfaction	<---	Price & Solidity	.402	.306	1.313	.189	reject
		<---	Hardware Quality	.769	.365	2.107	.035	accept
		<---	Design & Functions	1.004	.425	2.360	.018	accept
		<---	Awareness	.187	.182	1.027	.305	reject

4. Conclusion and Discussion

In recent years, due to the rapid evolution of mobile communication technologies, the mobile carrier company and handset manufacturing industry are facing a big transition period. Because smart phone, unlike a feature phone mainly for voice calls, provides not only a voice but also a variety of converged services at the same time, effects of purchasing are different of feature phone. And the influence of consumers become larger than ever before, hence in-depth consumer research is necessary to reflect in mobile phone marketing. Global smart phone reached 81 million units during the third quarter of 2010[2], and the number of domestic mobile phone subscribers reached 50 million at the end of November 2010[10]. In this study, mobile phone-related characteristics of customers were explored and compared. It is analyzed that the factors of mobile phones(feature phone, smart phone) properties, and the relation between customer satisfaction and properties of mobile phone by Structural Equation Modeling. The following results of this study will be effectively used for the management policy of mobile phone marketing. First, smart phone and feature phone users were showed different pattern. According to <Table 1>, 'design' and 'quality' were the largest proportions of 'select reason' for feature phone users(39.7%, 20.1%) and smart phone users(50%, 22.2%) respectively. The problems with mobile phones currently in use were 'poor performance'(43.6%) to feature phone users and 'expensive charge'(62.5%) and 'poor A/S'(16.7%) to smart phone users. The result showed that 'design' and 'quality' are important to both mobile phone user groups. Large number of smart phone users dissatisfied with expensive rate system. Therefore diverse and economical rate system is provided for securing and maintaining customers. Two groups, feature phone user and smart phone

user, showed significant differences with other variables in <Table 3> except 'telecom company' and 'desired product'. Both of groups preferred Samsung and Apple product. Two groups also showed significant difference with the customer satisfactions(Hardware Quality Satisfaction, Security & Credibility Satisfaction, Overall Satisfaction), and smart phone user group showed higher satisfaction. Theses results mean most of the mobile phone users are potential customer of smart phone. Second, four factors from 12 mobile phone properties were drove by factor and reliability analysis for each group. The dimension of two groups' properties was appeared differently. 'Hardware Quality', 'Practicality', 'Convergence Functions' and 'Awareness' are induced from the properties of mobile phone group. Based on the results of factor analysis, 'Hardware Quality' and 'Practicality' appear to be important contributors to the importance of mobile phone. And 'Hardware Quality', 'Design & Function', 'Awareness' and 'Price & Solidity' are induced from the smart phone group. 'Hardware Quality' and 'Design & Function' appear to be important contributors to the importance of mobile phone. 'Convergence Functions(Internet, Convergence)' is one of the factors in mobile phone group. But, 'Internet' and 'Convergence' were included in 'Design & Function(Internet, Convergence, Design, Color)' factor of smart phone group. Third, based on the theoretical support and the model fit, the structural models were deemed acceptable. 'Hardware Quality' and 'Practicality' have significant and positive effects on Customer Satisfaction for feature phone model and mobile phone model. According to the results, 'Hardware Quality'(representing 'Call Quality', 'A/S', 'Convenience to use', 'Battery life') and 'Practicality'(representing 'Price', 'Design', 'Color', 'Solidity') are essentially important and will play a key role in evaluating Customer Satisfaction. For smart phone user group, 'Hardware Quality' and 'Design & Function'(representing 'Internet', 'Convergence Functions', 'Design', 'Color') have significant and positive effects on Customer Satisfaction. With the new technology and the popularization of mobile phone, the functions and designs of mobile phone have been varied rapidly. These show that 'trand' and 'brand name' are not relatively important than other factors[6]. This results of study could provide useful information to mobile phone companies. From the review of the study, they can manage their core properties of product effectively and produce new strategic methods to secure their competitiveness. However, the present study does have some limitations that should be addressed in future research. Most of the respondents are university students and their residential area is restricted to Seoul and Gwangju Metropolitan City; hence, there may be a sampling bias. And, if this study perform with service quality properties then the result will be more appropriate and useful. Furthermore, the in-depth research for the properties of recently released various kinds of smart phones must be meaningful and helpful for both customers and mobile companies.

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Hyun-Jong Kim

1985 Chung Ang Univ.(BS) Dept. of Math.
1988 New York Univ.(MS) Dept. of Applied Math.
1995 Chung Ang Univ.(PhD) Dept. of Statistics
1992~Current Gwangju University, Dept. of Logistics & Distribution Management
Research Interests : Smart management, Service Quality Management, Data Mining
E-Mail : hkim@gwangju.ac.kr