

Measurement of Quality Value in the Korean Mobile Phone Service Industry

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ABSTRACT

This article is aimed to analyze the quality value measurement of the mobile phone service. For this, this study is divided into three different models.

Model 1 attempts to identify the factors which influence service quality evaluation by mobile phone users. The analysis results show that the call quality had the greatest effect on customer satisfaction.

Model 2 analyzes the causation of service quality factor, customer satisfaction and recommendation to others variables through covariance structural model. The analysis results show that mobile phone users are satisfied with several specific quality factors and, as a result, will recommend such factors to others.

Model 3 used the value model to analyze the relationship between call quality factors and payment (monthly charge). As a result, the model showed when call quality level increases, users are willing to pay additional call charges.

Finally, this study can provide a reference point for future research.

1. Introduction

Each enterprise must effectively use its own resources to achieve customer satisfaction when it introduces new service. To realize the ultimate goal of the enterprise, profit maximization, it must manage its performance to achieve customer satisfaction and service quality improvement. Because of the rising wave of service industry competition the management of service properties is essential because success in the service industry depends upon service quality properties. It is all the more true in the case of the mobile communication service where service penetration has risen sharply causing keen competition.

The Korean mobile phone market was launched in 1984. Though it has a short history, it has attained over 40% penetration ratio with 18 million subscribers as of the middle 1999.¹ This environment is turning into a hard one in which to survive the manager aggressively pursues profit through providing the customer oriented products, solutions to customer complaints and provision of comfort and customer satisfaction.

Thus, this article is aimed at providing suggestions related to the investment in the mobile phone industry by analyzing the measurement of value in mobile phone service, an information communication service whose market environment is undergoing rapid change.

2. Theoretical Background of Service Quality

There are four characteristics of service quality: intangibility, inseparability of production and consumption, heterogeneity and perishability. The following [Table 1] displays detailed concepts

¹. http://www.etnews.co.kr/etnews/new_etnews_content?199907070022|03

of these characteristics.²

[Table 1] Service characteristics

Characteristics	Basic Concepts	Problems
Intangibility	Invisibility and Intangibility of the substance	o Impossibility of storage o Difficulty of display
Inseparability	Synchronous Occurrence of production and consumption	o Customer participation in production o Difficulty of concentrated quality control
Heterogeneity	Being heterogeneous by Various service provision to customer	O Difficulty of standardization and quality control
Perishability	Instorability of service	O Difficulty of storage as stock

Service quality is perceived as a subjective concept rather than objective one. That is, service quality perceived by customer is not easily measured because of the obscurity of this intangible quality compared to tangible quality in other products.

Parasuraman, Zeithamal, and Berry relate perceived quality to the concept of expectations and performance by identifying the direction and extent of difference between customer perception and expectation.

There are many studies on the determinant factors of service quality, and those of Berry, Zeithaml, Parasuraman (1988) present the basic concept. The quality property of Parasuraman has general expression, so is rather difficult to be applicable to the mobile phone service. Thus this article tries to draw quality parameters by asking about what quality properties the users of the mobile phone services perceive to be important.

3. Market Analysis of Korean Mobile Phone Service

The domestic mobile phone service has shown a nearly two fold increase since it introduced cellular communication service in 1984. Reasons for this sharp rise in subscription include price reductions for vehicle phone terminals from 2 to 1 million won in Apr. 1988 and expanded convenience of use of the mobile phone service to 70 cities nationwide.³ Digital cellular service was launched in 1996, and competition in that area has become intense with PCS (Personal Communication Service) business commencing in Oct. 1997.

The actual number of subscribers of mobile phones in Korea was 2,658 in the first year they were introduced, and has reached 40% penetration rate with 18,000,000 subscribers as of the end of Jun. 1999. This means 40 out of 100 persons are using the service, which indicates mobile phone use has entered an extremely popular era.

The following [Table 2] is the status of the Korean mobile phone service subscribers by year.⁴

[Table 2] The status of the Korean mobile phone service subscribers by year (Unit: 1,000 persons)

Years	1987	1989	1991	1993	1995	1997	1998	1999.6
Subscribers	10	39	166	471	1,641	6,910	13,982	18,024
Penetration rate(%): by 100 persons	0.025	0.094	0.384	1.071	3.725	15.65	31.74	40.91

² Zeithaml, V. A., A. Parasuraman and L. L. Berry, "Problems and Strategies in Service Marketing," Journal of Marketing, Vol.49, pp.34-55, 1985.

³ Cha, dong-wan, "Information Communication World in view of Conception," Young-ji Corp., 1997.

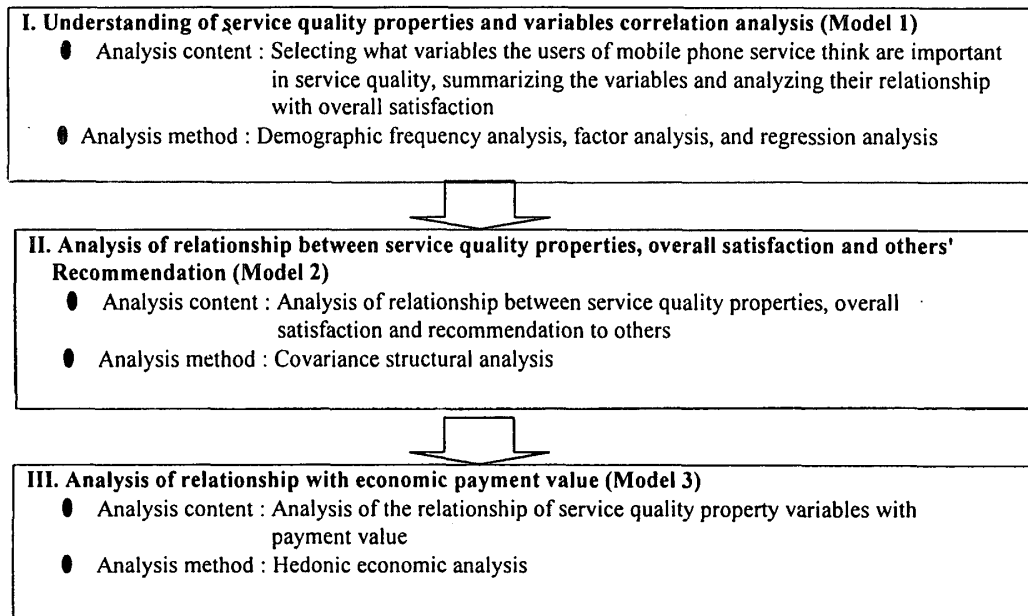
⁴ <http://203.254.64.141:8080/faq/index1.htm>

This rapid distribution of the mobile phone service in Korea actually has induced intense market competition and lead subscription levels to the saturation point. The five current mobile phone suppliers are making use of a strategy to switch providers, as well as signing up present non-subscribers and maintaining their existing subscribers. In this intense competition, a strong customer retention strategy is solely needed.

Thus this study aims at understanding the quality properties of the mobile phone service keeping pace with the changing conditions of the market, and measuring the value of specific quality properties through correlation among these properties at the market.

4. Research Model

This study was conducted according to the following processes.



[Figure 1] Brief research framework for empirical analysis

As shown in the above [figure 1], Model 1 tries to identify service quality factors and determine which factors are most important to customers' general satisfaction through use of a questionnaire. Model 2 analyzes the relationship between service quality variables, overall satisfaction and recommendation to others through covariance structural analysis.

Model 3, building on the conclusions of Models 1 and 2 estimates the value of the quality property identified as most significant according to customers' payment value (monthly charge) using Hedonic value analysis.

5. Empirical Analysis

5.1 Analysis of Questionnaire Data: Frequency Analysis

This study drew up a questionnaire addressing mobile phone service. Usable data were analysis samples of 266 mobile phone subscribers in the metropolitan area (Seoul and Kyunggi Province) gathered between Nov. and Dec. 1998. Gender distribution was 61.3% male and 38.7% female. The age group most represented was 21 to 25 years olds, accounting for 24.8%.

5.2 Analysis Result of Model 1

5.2.1 Factor decision of Service quality: Factor Analysis

Model 1, proceeded using the process outlined in [Table 3] to search for the quality factors most relevant to mobile phone service.

[Table 3] Quality factor decision procedure of mobile phone service

Step	Content	Method
First	Conceptual definition of service quality	Literature review
Second	Development of variable items to use	Literature review Interview with customers
Third	Collection and analysis of data	Metropolitan subscriber sample Factor analysis, Regression analysis

The first step outlined in the [table 3] was to construct a conceptual definition of service quality. The second step was to develop the properties related to service quality through literature review and interviews with customers. The third step was to collect and analyze the data from the samples.

At first, factor analysis was conducted on 26 question items in order to examine how quality factors of mobile phone service are discerned by the public at large. The factor analysis was based on the inherent value, i.e., eigen value greater than 1 and enhancement of discrimination power using Varimax rotation method.

As a result, seven factors were identified. The result of factor analysis revealed in [Table 4] indicates the overall variance rate predicated by the total seven factors was 62.28%.

[Table 4] Result of factor analysis of mobile phone service quality variables

Factor Name	Employee Reliability	Convenience of Cancellation	A/S (After Service)	Convenience Of charge payment	Additional Service	Call Quality	Business Rapidity
Quality Variables							
Rapidity of employee	0.794						
Kindness of employee	0.767						
Accessibility of employee	0.711						
Correct counseling of employee	0.699						
Kindness of employee	0.676						
Convenient use of cancel agency		0.803					
Access of agency office		0.699					
Simplicity of cancellation		0.690					
Rapidity of cancel charge calculation		0.578					
Rapidity of A/S			0.807				
Adequacy of A/S fee			0.776				
Multi-shops of A/S			0.652				
Accuracy of A/S			0.569				
Timeliness of bill				0.739			
Convenience of payment				0.656			
Variety of payment				0.615			
Cleanness of agency office				0.548			
Accuracy of billing statement				0.404			
Adequacy of additional service charge					0.822		
Convenient use of additional service					0.781		
Variety of additional service					0.709		
Good quality in call area						0.859	
Wideness of call area						0.823	
Cleanness of call quality						0.723	
Rapidity of subscription and change							0.866
Simplicity of subscription and change							0.763
Eigen Value	3.247	2.697	2.491	2.379	2.271	2.261	1.887
Accumulated percentage of variance	12.487	22.860	32.442	41.594	50.327	59.022	66.279

In [Table 4], the original 26 quality variables are grouped into seven major factors: reliability

of employee, convenience of cancellation, A/S (After service), convenience of charge payment, additional service, call quality and business rapidity.

5.2.2 Analysis of Relationship between Satisfaction and factors: Regression Analysis

Regression analysis was conducted with customer satisfaction as a dependent variable and the seven quality factors as the independent variables in order to examine if the customer satisfaction has a positive relationship with each factor and to find the most significant factor on the quality of mobile phone service. The result is as shown in [Table 5].

[Table 5] ANOVA table

	df	Sum of square	Mean Square	F ratio	p-value
Regression	7	104.790	14.970	11.579	0.000
Residual	258	333.544	1.293		
Total	265	438.335			

This regression model shows that at significance level 0.00, the model is statistically significant. The determinant coefficient, R^2 , of 0.239 means that the identified quality factors of mobile phone service have an effect on customer satisfaction of 23.9%. This suggests that the model is statistically significant, but other variables not included in this model exist which affect customer satisfaction.

[Table 6] Estimators of regression coefficients

Factor	Coefficients	t	p-value
constant	4.305	61.744	0.000
factor 1	0.231	3.302	0.001 **
factor 2	0.187	2.681	0.008 **
factor 3	0.140	2.001	0.046 *
factor 4	0.062	0.890	0.374
factor 5	0.032	0.458	0.648
factor 6	0.530	7.591	0.000 **
factor 7	0.040	0.575	0.566

(※) ** 1% significance level, * 5% significance level

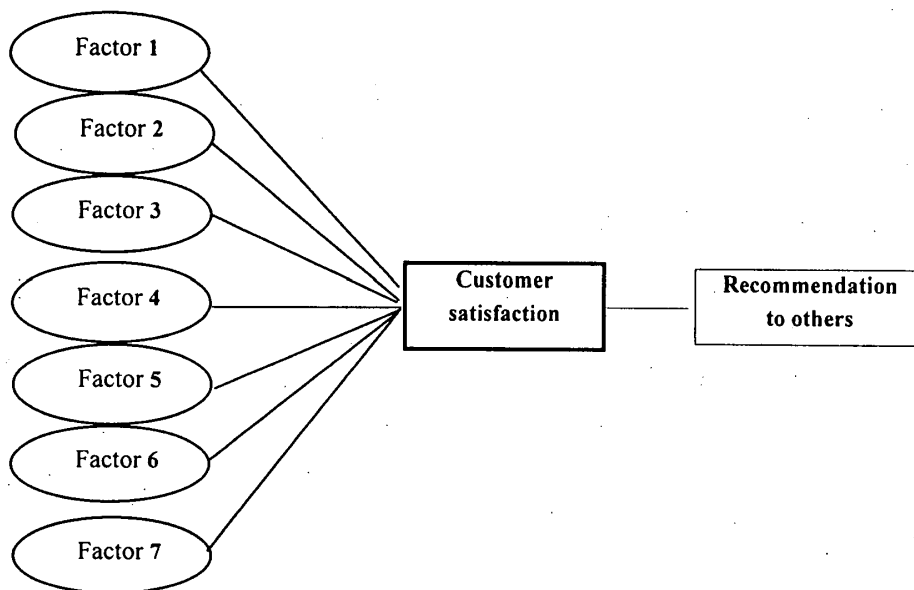
As shown in [Table 6], factors 1, 2, 3 and 6 had a statistical significance and the remaining (factor 4, 5 and 7) had no significance. That is, Employee Reliability (factor 1), Convenience of Cancellation (factor 2), A/S (factor 3), Call Quality (factor 6) had statistically significant effects, but the other factors had no significant effect. At the highest significance level (0.000), call quality as a basic quality factor is the main factor, and the kinder and more reliable personnel are, the higher satisfaction is. Also, as the number of service providers increase, cancellation convenience appears as a significant factor. As subscribers grow in numbers, higher A/S leads to higher customer satisfaction.

5.3 Analysis Result of Model 2: Covariance Structural Analysis

This step, which additionally analyzes the causation with service quality factors, customer satisfaction and recommendation to others, uses the covariance structural model.⁵

This study analyzes the correlation between service quality factors, customer satisfaction, and recommendation to others in measuring service quality. Thus, as shown in [Figure 2], the relationship among quality factors, customer satisfaction and recommendation to others can be set.

⁵. SmallWaters Corporation, "Amos User's Guide Version 3.6", SPSS Inc., 1997.



[Figure 2] Research model for covariance structural analysis

The significance level of Chi-square value should be reviewed in order to understand the adequacy of the above model.⁶ The model's value of chi square (25.464) and p-value (0.602) are not significant, so the model can be said to be adequate. The regression coefficient between customer satisfaction and recommendation to others was 0.776 which was also statistically significant at p-value of 0.000.

Thus, the hypothesis that when mobile phone users feel satisfied with many quality factors and they will recommend the service to others seems to be correct.

5.4 Analysis Result of Model 3: Value Model Analysis

5.4.1 Summary of Value Model

As determined earlier in Model 2, call quality was the most significant factor, so this model attempts to develop a value model of the relationship between call quality and payment (monthly charge). At the Model 3 stage of this study the student group was left out due to their having no income.

The economic value model used in this study was originally for the value measurement of environmental materials, which cannot usually be transacted through the mechanism of the market, and for which it is not easy to measure the enhancement of economic welfare level by the improvement and pollution prevention projects of atmosphere and water quality.

However, one convenient measurement method whose usefulness is credited as an effort to overcome this difficulty, is Hedonic technique, also called the indirect measurement method. This study applies Hedonic technique to the value measurement of a service property for mobile phone use.

This study has determined the property used by consumers to identify mobile phone service quality through the questionnaire. It then formulated a regression equation with the quality property as the independent variable and payment intention as the dependent variable in order to obtain the value per immeasurable influential factors in market products (service). From this method, the important properties can be discovered and the enterprise can focus their efforts when producing their products (service).

For example, the property of call quality is not separately graded in the market. That is, additional payment is not specifically made for the service property called call quality. The utility of hedonic economic value analysis lies in calculating the value which customers are

⁶. The model comes to be proper when Chi square value is not significant.

willing to pay for this property called call quality property.⁷

5.4.2 Application of Value Model

This study tries to isolate the economic value analysis of call quality level of mobile phone service. The call quality factor was selected because it was identified as the most significant quality factor for customer satisfaction.

For this, the following regression model was developed:

$$P = \beta_0 + \beta_1 F_1 + \beta_2 F_2 + \beta_3 F_3 + \beta_4 F_4 + \beta_5 F_5 + \beta_6 F_6 + \beta_7 F_7 + \varepsilon$$

P: monthly charge (log), F₁: income variable (log), F₂: call quality variable (log), F₃: age variable, F₄: educational level variable, F₅: vocational variable, F₆: sex variable (dummy), β₁-β₆: regression coefficient to each variable, ε: error term, independent, with N(0, σ²) distribution

As a result of empirical analysis of the above model, the following was determined:

[Table 7] Estimated regression equation
 [Dependent variable = Log (monthly charge)]

variables	Estimated Regression Coefficient	t値	p 値
Constant	-1.369	-6.486	.0000
Income	0.571	8.390	.0000**
call quality level	0.503	6.200	.0000**
age	-0.003	-1.985	.0489*
education	-0.0637	-3.089	.0024**
vocation	-0.0032	-0.475	.6353
sex	-0.0038	-0.127	.8994
R ²	0.554		
F値(model fitting)	31.701		0.000

(※) ** 1% significance level, * 5% significance level

In the regression model of [Table 7], significance level 0.0000 is statistically significant and determinant coefficient R² of 0.554 indicates that the independent variables of the regression model have an effect on payment of 55.4%.

As seen in [Table 7], income had a significant relation with monthly charge (payment) with estimated value 0.571, which means 1% increase of individual income can raise call charge by 0.571%. The response extent relating payment with age and education shows statistically significant negative (-) value. Occupation and sex are shown to have no relation.

The coefficient in the above estimated equation indicates the elasticity of the dependent variable, since payment and independent variable, call quality, are estimated in log forms. If both members are differentiated with all the other conditions except price and quality kept constant, the following value can be obtained:

$$\frac{d \text{ price/price}}{d \text{ quality/quality}} = 0.503$$

This means when call quality level improves by 1%, users are willing to pay a monthly charge of 0.5 % more.

If the result here is multiplied by the current total subscribers, the entire payment increase can

⁷ Kwak, S. J. and C. S. Russell, "Contingent Valuation in Korean Environmental Planning: A Pilot Application to the Protection of Drinking Water Quality in Seoul," Environmental and Resource Economics Vol.14, pp.511-526, 1994.

be estimated. If investment expense for the improvement of call quality level is calculated, it is then possible to analyze investment validity through NPV (Net Present Value).

6. Conclusion

6.1 Summary

This study researched what service quality factors affect customer satisfaction and how much value service quality factors have for service providers.

For this, this study was divided into three overall models.

Model 1 has its significance in that it suggests to what service quality factors providers should assign the highest priority by identifying which factors influence mobile phone service quality evaluation by the users. As a result of the analysis, call quality was determined to have the greatest effect on customer satisfaction.

Model 2 analyzed the causation of service quality factor, customer satisfaction, and recommendation to others through covariance structural model. The analysis showed that when mobile phone users feel satisfaction with various quality factors, they would recommend the service to others.

Model 3 analyzed the value model of the relationship between the factor, call quality, and payment (monthly charge). Call quality was identified in Model 2 as the most significant variable to customers. The model was statistically significant and showed when call quality level increases, users are willing to pay additional call charges.

6.2 Further Study

The limitations and future suggested research tasks be as follows:

First, this study limited the sample to the metropolitan area. The range needs to be expanded nationwide in order to draw more generalized conclusions.

Second, we suggest future analysis be subdivided by occupation. It will be more effective to concentrate market strategy on subdivided groups rather than on the collective whole.

Third, because the mobile phone market is more rapidly changing market than any other market, the reliability of this analysis will be enhanced by continued analysis over time.

Finally, we are confident that this study can provide a reference point for future research.

Reference

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