

An Exploratory Study on the Strategic Factors of Companies'

Telecommunication Service Selection

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Abstract

There have been dramatic technology changes in telecommunication sector during last two decades. New application services like the introduction of international mobile services, fiber optical home services and satellite personal services are expected to play a major role in the whole field of telecommunication services. In this respect, many researches have been made in dealing with the techno-economic issues on implementing, providing and upgrading these broadband network services. These researches, however, are mainly focused on the development of strategies for network providers.

On the other hand, in the telecommunication service users' viewpoint, the proper selection as well as the efficient application of the specific telecommunication service among the various alternatives at hand is recognized as a principle means for ensuring the whole business competitiveness. Despite the definite need for the telecommunication service selection strategies, very few researches have been published in this field.

In this paper, attempts are made to identify the companies' decision factors considered in selecting the telecommunication service, to draw the strategic dimensions, to categorize each company with respect to the dimensions, and to finally find the characteristics of each strategic group. Developments of the key strategies for selecting the right telecommunication service will be included in the future research.

1. Introduction

There have been dramatic technology changes in telecommunication sector during last two decades. Broadband technology for multimedia services is widely recognized as the wave of the future. New application services like the introduction of international mobile services, fiber optical home services and satellite personal services are expected to play a major role in the whole field of telecommunication services. In this respect, many researches have been made in dealing with the techno-economic issues on implementing, providing and upgrading these broadband network services. [Ims1998, Akimaru1997, Ims1997, Kwok 1997, Ahn1999] These researches, however, are mainly focused on the development of strategies for network providers.

On the other hand, in the telecommunication service users' viewpoint, the proper selection as well as the efficient application of the specific telecommunication service among the various alternatives at hand is recognized as a principle means for ensuring the whole business competitiveness. Despite the definite need for the telecommunication service selection strategies, very few researches have been published in this field. Ahn(1999) investigated the evolutionary paths and scenarios of the broadband services provided by various access networks including the satellite communication network, performed the techno-economic evaluation of each access network, and measured the competitiveness of the satellite network vs. other access networks. Ahn(1998) also addressed cost analysis of stratospheric telecommunication services and presented competitive network assessment and economic analysis using AHP method. Although these researches handled the network users' managerial issues concerning the upcoming broadband services, they made no effort to derive the selection behaviors and strategies from the detailed analysis.

In the area of assessing the competitive strategies for the business use, extensive studies could be found in the literature. [Harrison1995, Miller1988] General steps taken in this area are to identify the dimensions of the strategy from different stages of the strategy formulation and implementation cycle, to derive a number of taxonomies which separate the business units into strategic groups, and to make a detailed analysis on each group.

In this paper, attempts are made to identify the companies' decision factors considered in selecting the telecommunication service, to draw the strategic dimensions, to categorize each company with respect to the dimensions, and to finally find the characteristics of each strategic group. Developments of the key strategies for selecting the right telecommunication service will be included in the future research.

2. Research Design

2.1 The sample and measurement

A questionnaire for the interview surveys was prepared to 200 companies that were regarded as having made a relatively large amount of telecommunication outlay¹ in 1999. As a result, completed questionnaires were received from 91 companies, which represented a response rate of 46%.

In order to investigate the strategic factors that each company considers in selecting telecommunication service, the companies were asked to answer the relative importance of non-financial decision factor in comparison with financial one, representing price, given the financial score as ten points. And a list of 8 non-financial decision factors was presented to answer the relative importance of each factor when compared with the data speed, whose score was also assumed as ten points. Nine kinds of decision factors were questioned of their relative importance in making a selection of telecommunication service, consequently, they construct variables used in the following analysis.

Dividing them into sum of the scores can normalize the scores each company gave. In more detail, at first, the scores of financial factor and non-financial factor are divided by their sum. Then we can obtain the normalized scores of both financial and non-financial factors. Next the scores of foregoing eight non-financial variables are also divided by their sum. Then the results imply the relative importance of each variable compared with only non-financial factors. Finally multiplying it by the previously obtained normalized score of non-financial factor yields the normalized score of each non-financial variable compared with all kinds of factors including financial one. Hereafter analyses are performed with these normalized data.

Table 1 shows all the lists of decision factors and basic statistics of each factor.

Factors	Average	Std. Dev.
Financial factor(Price)	.459	.121
Data Speed	.062	.030
Quality of Service	.084	.033
Ease of Use	.068	.022
Awareness	.054	.020
Flexibility to accommodate changes	.065	.026
Expandability	.067	.022
One-to-multipoint capability	.065	.030
Maintainability	.076	.030

As expected, the financial factor turns out to be the most important one, measured as 46%, in selecting telecommunication service. Among non-financial factors, quality of service factor is scored highest, followed by maintainability factor. However it is found that there are no considerable differences in the other non-financial factors.

¹ Korea Telecom Co., which is the largest Telecommunication Company in Korea, gave help in selecting relevant sample companies.

2.2 Methods

To achieve the purpose of this research, three stages analysis is performed as follows. At first stage, factor analysis is made with nine decision variables in order to draw the dimensions of company's telecommunication service selection strategy. At second stage, companies are categorized with respect to the strategy dimensions through cluster analysis. By doing so, we try to obtain the strategic groups of companies in selecting the telecommunication service with a viewpoint of taxonomy. We, consequently, can find the strategic characteristics of companies belong to each cluster by ANOVA. Finally, several hypothetical tests are made whether there is a relationship between the strategic group and the telecommunication service currently being used. Figure 1 shows the research flow presented in this paper.

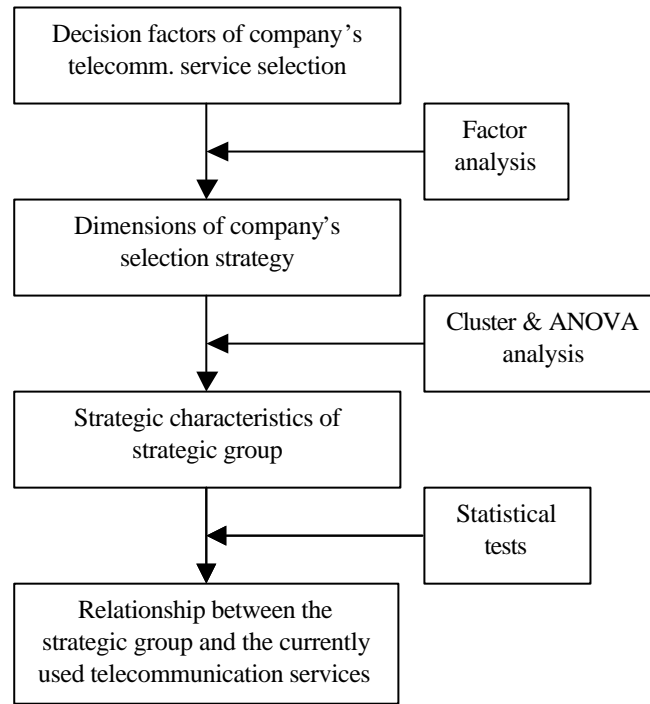


Fig. 1 Research flow

3. Results

3.1 Dimensions of telecommunication service selection strategy

Considering the situation that a company is looking for which kind of telecommunication service is suitable for the company, two different dimensions are apparent in general – financial and non-financial. The financial dimension can be taken as one distinctive dimension in itself when we think about the fact that the price and budget is the most critical factor for any consumers in deciding to buy something. Based on this fact, the financial factor is selected as one kind of dimension of telecommunication service selection strategy a priori in this paper.

Other than financial dimension, there may be some strategic dimensions concerning non-financial factors. These factors include bandwidth, quality of service, maintainability, flexibility to accommodate changes, one-to-multipoint capability, expandability, ease of use, awareness which are known to be the major characteristics of telecommunication services. In this paper, the factor analysis performed to draw other strategic dimensions using eight variables of non-financial factors. The procedure of factor analysis carried out in this study is as follows. Basically factors were extracted by running the principle components extraction method with the varimax rotation. The result of factor analysis is shown in Table 2.

As shown by Table 2, the three distinct factors, which have considerable explanatory power (65%) for the variances, were obtained from the eight variables. The title of each factor, operational, functional and speed, was determined to represent the

included variables as closely as possible. As a result four kinds of strategic dimensions of company's telecommunication service selection were drawn and suggested in this study; *financial dimension*, *operational dimension*, *functional dimension* and *data speed dimension*.

Table 2. Result of factor analysis

Variables \ Factors	1	2	3
Operational			
Maintainability	.879		
Flexibility to accommodate changes	.816		
Quality of Service	.721		
Functional			
One-to-multipoint capability		.776	
Expandability		.733	
Ease of Use		.513	
Awareness		.507	
Data speed			
Bandwidth			.958
Eigenvalue	2.852	1.268	1.042
% Variance explained	35.66	15.85	13.03

3.2 Strategic groups of telecommunication service selection

In this section, companies are grouped according to similarity in their strategy pattern. The strategy pattern implies the pattern of relative importance on which company places among four kinds of strategy dimensions when selecting the telecommunication service. Thus taxonomy of telecommunication service selection strategy is attempted with respect to the strategy dimensions – financial factor, operational factor, functional factor and data speed factor.

Ward's method of hierarchical cluster analysis was used to categorize companies. Ward's method minimizes intracluster differences and maximizes intercluster differences on the clustering variables, in this case the four strategy dimensions (Zahra & Covin, 1993). The result of the cluster analysis suggested that a four-cluster solution best fit the data. This conclusion is based on an examination of changes in the squared euclidean distance between various cluster solutions as well as an examination of the dendrogram that depicts the cluster separation points. Table 3 shows the means and standard deviations of the strategy dimension variables in each cluster, which forms strategic group. The one-way ANOVA *F*-ratios for each strategy dimension are also displayed to verify that there are overall intercluster differences in this regard. In addition, Duncan's range test was used to aid in interpreting cluster differences through pairwise comparisons of cluster means, as summarized in Table 3.

Table 3. Result of cluster analysis

Dimensions	Cluster Means(Std. Dev.)				<i>F</i> -value	Duncan results
	1 (n=42)	2 (n=3)	3 (n=34)	4 (n=12)		
Financial	.491(.032)	.151(.087)	.370(.033)	.679(.063)	246.59**	4 > 1,2,3 1 > 2,3 3 > 2 2 > 1,3,4 3 > 1,4 1 > 4
Operational	.069(.008)	.166(.053)	.085(.013)	.045(.011)	80.52**	4 < 1,2,3 1 > 2,3 3 > 2 2 > 1,3,4 3 > 1,4 1 > 4
Functional	.063(.012)	.075(.031)	.079(.022)	.037(.008)	19.48**	4 < 1,2,3
Data speed	.059(.015)	.052(.008)	.075(.042)	.043(.009)	4.59*	3 > 4

p* < 0.05, *p* < 0.01

The title and the description of the four strategic groups based on the information in Table 3 is as follows.

Cluster 1: *Middle-of-the-road group*. The title given to this cluster stems from the fact that these companies have modest scores on the four strategy dimensions compared to other clusters. The companies in this group place the highest importance on the financial dimension whose score ranks the second among four strategic groups. However there is no considerable differences in the importance of the other three strategy dimensions. The number of respondents that belong to this group is up to 42, the largest among the four groups.

Cluster 2: *Operational & functional - focused group*. Firms in this cluster show the most noticeable behavior in that the score of the financial dimension is not the top rank, while the other clusters place the highest importance on that. Thus this group gives the lowest score to the financial dimension among the four clusters, instead the operational dimension is the most important strategy for this group. So the label “operational & functional–focused” is given to these companies. In addition, it is found that the functional dimension is also considered as relatively important one compared with the other strategic groups. This group comprises only three companies.

Cluster 3: *Data speed & functional - focused group*. This cluster exhibits the highest score in two sorts of dimensions, functional and data speed. Thus companies which place the strong emphasis on the dimension of data speed and functions of telecommunication service belong to this group, titled as the data speed & functional-focused. However we can find that the firms in this group place somewhat little emphasis on the financial dimension. This group is composed of 34 companies.

Cluster 4: *Financial - focused group*. The strategic emphasis placed by this group is strongly focused on the only financial dimension. On the other hand, firms in this group exhibit the lowest score on the all dimensions concerning non-financial factors. Thus the only important strategic issue pursued by the companies in this group in selecting the telecommunication service is whether the service is economically justifiable. 12 companies belong to this strategic group.

3.3 Strategic groups of telecommunication service selection

In this section, the relationship between the four strategic groups and companies’ actually selected telecommunication service type is examined. We asked to the companies whether they currently use satellite telecommunication service and/or leased line service for data transmission, which can be considered as the typical high-end telecommunication services for business customers. Table 4 shows the classification of the respondents by this question.

Table 4. Classification by currently used telecommunication services

		Satellite	
		Yes	No
Leased line	Yes	YY(n=18)	YN(n=49)
	No	NY(n=7)	NN(n=17)

In Table 4, YY represents the companies which are currently using both satellite and leased line telecommunication services, the number of which is 18, and so on. Thus we can find that the number of YN - companies using only leased line service - is the largest and the NY group is the smallest.

In order to examine whether there exists significant relationship between the strategic groups and the currently used telecommunication services, the Chi-square test was performed using the contingency table, and the results are illustrated in Table 5.

Table 5. Result of the Chi-square test

Current service Strategic group	YY	YN	NY	NN	χ^2 -value
Middle-of-the-road	7	23	2	10	18.54*
Operational & Functional	1	1	0	1	
Speed & Functional	10	19	1	4	
Financial	0	6	4	2	

* $p < 0.05$

Table 5 shows that the null hypothesis of Chi-square test – two kinds of category variables are independent – is rejected. So we can conjecture that there may exist relationship between the strategic groups and the groups divided by the currently used telecommunication services. Based on this finding, to further clarify the relationship between the two kinds of categories, we develop three hypotheses about the relationship between strategic types and the currently used telecommunication services.

Hypothesis 1: Middle-of-the-road group tends not to use high-end telecommunication services.

Hypothesis 2: Speed & Functional-focused group is likely to use both of the high-end telecommunication services.

Hypothesis 3: Financial-focused group is likely to select the satellite telecommunication service.

In order to statistically test one of above Hypothesis, we regrouped companies relevantly - for the Hypothesis 1, whether companies belong to the middle-of-the-road or not ,and whether they belong to the NN group or not – and Chi-square tests were performed again using newly categorized groups. If the result of Chi-square test fails to reject independence hypothesis, the Hypothesis will be rejected. On the other hand, if the Chi-square values were large enough to reject null hypothesis, then the frequency of the cell made by certain strategic group and service group – for Hypothesis 1, cell made by Middle-of-the-group and NN group – is checked. As a result, if the frequency is higher than the expected frequency, we can conclude that the data support the tested Hypothesis.

Table 6 presents the test results for the Hypothesis 1.

Table 6. Result of test for Hypothesis 1

Strategy Service		Middle-of-the-road	
		Yes	No
NN	Yes	10(7.8*)	7(9.2)
	No	32(34.2)	42(39.8)
χ^2 -value		1.35**	

* Figures in the parentheses are the expected frequencies

** $p > 0.05$

In Table 6, it is found that the independence hypothesis can not be rejected. So Hypothesis 1 is rejected, accordingly we can not conclude that the Middle-of-the-road group is likely not to use both of the telecommunication services. The result of testing Hypothesis 2 is summarized in Table 7.

Table 7. Result of test for Hypothesis 2

Strategy Service		Speed & Functional - focused	
		Yes	No
YY	Yes	49(45.7*)	8(11.3)
	No	24(27.3)	42(39.8)
χ^2 -value		3.17**	

* Figures in the parentheses are the expected frequencies

** $p < 0.1$

Table 7 shows our data supports the Hypothesis 2 with the 10% significance level. Thus it can be said that the firms in Data speed & Functional-focused strategic group have a tendency to use both satellite and leased line telecommunication services. Finally the result of the test for Hypothesis 3 is shown in Table 8.

Table 8. Result of test for Hypothesis 3

Strategy Service		Financial - focused	
		Yes	No
NY	Yes	4(0.9*)	3(6.1)
	No	8(11.1)	76(72.9)
χ^2 -value		3.17**	

* Figures in the parentheses are the expected frequencies

** $p < 0.01$

Examining Table 8, it is found that our data strongly supports that the two category variables are not independent and the Financial-focused group is significantly more populated in NY group than expected frequency. This finding suggests that the companies that place the strongest emphasis on the financial factor prefer the satellite communication service.

4. Conclusion

In this paper, we explored the strategic aspects of companies considering the telecommunication service selection, and the data collected from the interview survey is used. Specifically, in the company's decision process of selection telecommunication service, the attempts are made to identify the companies' decision factors, to draw the strategic dimensions from the decision factors, to categorize companies as strategic group with respect to strategic dimensions, and to finally find the characteristics of each strategic group through statistical analysis.

The major findings are as follows. At first, nine kinds of factors such as, finance, bandwidth, quality of service, ease of use, awareness, flexibility to accommodate changes, expandability, one-to-multipoint capability and maintainability are identified as key decision factors of telecommunication service. Secondly, four strategy dimensions are drawn as financial, operational, functional and data speed, each of which consists of some of decision factors. Thirdly, four types of strategic groups are categorized as Middle-of-the-road, Operational & Functional-focused, Speed & Functional-focused and Financial-focused. Finally the relationship between the types of strategic groups and the companies' currently used telecommunication services are examined.

The findings of this paper may shed some light on the development of efficient selection strategy for companies looking for the suitable telecommunication service. Developments of the key strategies for selecting the right telecommunication service will be included in the future research.

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