

A Study on Advanced Service Industry

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선진 서비스 산업의 연구

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선진국일수록 서비스 산업의 비중이 큰 것은 주지의 사실이다. 선진국 진입을 위해 진력하는 한국의 입장에서 선진국 서비스 산업의 연구 및 정보는 필요하다. 이 연구는 세계 400대 최량 기업들 중 서비스 기업들의 다양한 경영 업적들이 서비스 산업의 여러 분야와 그 하부 부문에서 어떻게 나타나고 있는지를 기술통계, 분산분석, 단칸 검정 등을 활용해 분석하였다. 이로써 서비스 산업 분야에 대한 진입, 투자, 벤치마킹 등에 관해 활용할 수 있는 유의한 결과들을 도출, 제시하였다.

Keywords : Service industry, management performance, ANOVA, Duncan's test.

1. Introduction

As national economy develops, ultimately the portion of service industry gets larger. One of the reason is that service industry is directly related to the quality of human being's everyday life. Therefore, it has been observed that many advanced countries are at the high level of service industry development. Korea's economic structure has also changed according to such worldwide economic drift, and so data and information about domestic and world service industry are important.

In this area, we can have various studies, a part of which is presented as follows. Bae(1996) studied service industrialization and economic growth, Han(1994) and Yoo(1994) deal with analysis and resource allocation model in service industry competitive power, and Yoo et al.(1997) presented a study on determination of fair price of service industry; Jung et al.(2002) studied factors affecting custom-

er information quality in service industry, Lee and Park(1998) and Park(1998) studied R&D support knowledge service industry, Kim(1999) showed geographical development of information services industry, and Kwon(1997) gave a study on safety problem for service industry employees; In addition, there were other studies on policy-making(Jun, 2003), paradigm change(Kang, 1995), forecasting model(Cho, 1999), and service quality(Kwon and Kim, 2000).

Service industry consists of business service, consumer service, and public service. Among them, first, business service industry is made up of five sectors which are advertising agencies, commercial services, oilfield service, shipping, and software. Secondly, consumer service industry is made up of seven sectors which are healthcare, media & entertainment, transportation & tourism, wholesale and retail, banking & securities, conglomerates, and insurance. Thirdly, public service industry is made up of three sectors

which are energy, telecommunications, and utilities(Forbes Global, 2003).

This paper is interested in management performance in service industry among 400 world best industry firms (Forbes Global, 2003). In our study we view the kinds of service industry and its sectors as independent variables, while management performance in each sector which is usually evaluated by market value, dividend yield, etc. is considered as dependent variables. Thus, we hold hypotheses that can explain the relation between independent variables and dependent variables. From the above reference reviews it is found that previous studies have not dealt with such kind of study. We test the hypotheses by several methods such as descriptive statistics, analysis of variance, and Duncan's test, and SPSS software is used for data processing. Data regarding world best 400 industry firms is given by Forbes Global(2003). Based on the study results people could have some useful information about investment, commencement of an enterprise, affiliation, and benchmarking in those sectors.

2. Descriptive analysis of management performance

We need to study and analyse which sub-industry and which sector are at the higher level of management performance achievement and is most competitive in service industry.

We choose business firm's market value(\$ mil), sales (\$ mil), forward P/E(%), price to sales(%), dividend yield(%), 5 yr avg ROC(%), EPS Growth(%), and years on list of 400 best business firms in the world as main management performance variables. We designate them as y1 to y8, respectively.

Service industry consists of business service, consumer service, and public service. According to this classification, descriptive statistics of y1 to y8 are given in Table 1. Here, largest means are boldfaced. y2 and y5 are the largest in public service, while remaining y's are largest in consumer service. That is, it can be said that consumer service has the largest weight, and then public service is next.

As showed in Introduction, the three service industries, business service, consumer service, and public service are made up of five, seven, and three sectors, respectively.

First, let us see business service according to this sub-classification. Then, descriptive statistics of y1 to y8 are obtained in Tables 2-1 and 2-2. Here, largest means are boldfaced. Oilfield service and software are twice/thrice the largest, while advertising agency and commercial service and shipping are once the largest. That is, it can be said according to the frequency number of the largest cases that software and oilfield service have larger weight while advertising agency, commercial service, and shipping have smaller weight.

Secondly, let us see consumer service. Descriptive statistics of y1 to y8 are given in Tables 3-1 and 3-2. Here, largest means are boldfaced. Media & entertainment and banking & securities are twice the largest, while healthcare, transportation & tourism, wholesale & retail, and insurance are one time the largest. That is, it can be said that media & entertainment and banking & securities have larger weight while healthcare, transportation & tourism, wholesale & retail, and insurance have small weight and conglomerates has smaller weight.

<Table 1> Descriptive statistics of 3 service industries

y	Industry	No. of Obs.	Mean	SD
y1	Business	36	18173	46970
	Consumer	176	18765	31465
	Public	71	16743	22111
y2	Business	36	9053	10176
	Consumer	176	13746	22228
	Public	71	14727	18193
y3	Business	36	22.6	9.82
	Consumer	171	35.0	126.82
	Public	68	13.6	12.077
y4	Business	36	3.50	3.52
	Consumer	176	4.35	24.64
	Public	71	1.42	1.18
y5	Business	36	.867	1.02
	Consumer	175	1.849	5.72
	Public	282	3.123	3.73
y6	Business	35	17.90	14.68
	Consumer	164	29.68	120.74
	Public	62	12.19	10.02
y7	Business	36	27.05	22.84
	Consumer	170	31.61	186.69
	Public	68	12.45	23.17
y8	Business	36	2.08	1.61
	Consumer	175	2.45	1.49
	Public	71	2.25	1.36

<Table 2-1> Descriptive statistics of business service

y	Industry	No. of Obs.	Mean	SD
y1	advertising	4	5386	4032
	commercial	13	7357	7156
	oilfield	4	5793	809
	shipping	7	15106	22514
	software	8	50700	94258
y2	advertising	4	18957	10359
	commercial	13	4994	2920
	oilfield	4	2006	502
	shipping	7	18077	13665
y3	advertising	4	16.02	1.61
	commercial	13	21.75	12.89
	oilfield	4	29.75	4.79
	shipping	7	16.40	4.84
y4	advertising	4	1.00	1.08
	commercial	13	3.10	3.45
	oilfield	4	2.97	.63
	shipping	7	.68	.64
y5	advertising	4	1.40	.67
	commercial	13	.86	1.02
	oilfield	4	.22	.26
	shipping	7	1.68	1.33
y6	advertising	3	22.50	21.86
	commercial	13	14.94	9.15
	oilfield	4	7.30	1.84
	shipping	7	9.88	5.96
y7	advertising	4	19.62	11.64
	commercial	13	25.05	24.56
	oilfield	4	70.57	13.73
	shipping	7	19.95	10.60
y8	advertising	4	2.00	2.00
	commercial	13	2.62	1.85
	oilfield	4	1.00	.00
	shipping	7	1.57	.78
y9	advertising	4	2.25	1.83
	commercial	13	2.25	1.83
	oilfield	4	2.25	1.83
	shipping	7	2.25	1.83

<Table 2-2> Descriptive statistics of business service

y	Industry	No. of Obs.	Mean	SD
y1	advertising	4	5386	4032
	commercial	13	7357	7156
	oilfield	4	5793	809
	shipping	7	15106	22514
	software	8	50700	94258
y2	advertising	4	18957	10359
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y3	advertising	4	16.02	1.61
	commercial	13	21.75	12.89
	oilfield	4	29.75	4.79
	shipping	7	16.40	4.84
y4	advertising	4	1.00	1.08
	commercial	13	3.10	3.45
	oilfield	4	2.97	.63
	shipping	7	.68	.64
y5	advertising	4	1.40	.67
	commercial	13	.86	1.02
	oilfield	4	.22	.26
	shipping	7	1.68	1.33
y6	advertising	3	22.50	21.86
	commercial	13	14.94	9.15
	oilfield	4	7.30	1.84
	shipping	7	9.88	5.96
y7	advertising	4	19.62	11.64
	commercial	13	25.05	24.56
	oilfield	4	70.57	13.73
	shipping	7	19.95	10.60
y8	advertising	4	2.00	2.00
	commercial	13	2.62	1.85
	oilfield	4	1.00	.00
	shipping	7	1.57	.78
y9	advertising	4	2.25	1.83
	commercial	13	2.25	1.83
	oilfield	4	2.25	1.83
	shipping	7	2.25	1.83

Thirdly, let us see public service. Descriptive statistics of y1 to y8 are given in Tables 4-1 and 4-2. Here, largest means are boldfaced. telecommunication are five times the largest, while utilities is twice the largest and energy is once the largest. That is, it can be said that telecommunication has larger weight while utilities has small weight and energy has smaller weight.

<Table 3-1> Descriptive statistics of consumer service

y	Industry	No. of Obs.	Mean	SD
y1	healthcare	44	24752	40727
	media & entertain.	22	14747	13755
	transport. & tour.	7	6443	4982
	wholesale & retail.	41	18686	38426
	banking & securi.	37	16124	17537
	conglomerates	5	13454	20917
y2	insurance	20	20706	34385
	healthcare	44	10376	12951
	media & entertain.	22	5599	4411
	transport. & tour.	7	8232	5856
	wholesale & retail.	41	21218	38487
	banking & securi.	37	12521	13007
y3	conglomerates	5	8752	5143
	insurance	20	20247	20139
	healthcare	44	19.94	17.20
	media & entertain.	21	103.73	277.81
	transport. & tour.	7	175.81	375.24
	wholesale & retail.	39	18.57	11.84
y4	banking & securi.	37	11.40	3.92
	conglomerates	5	14.58	5.72
	insurance	18	26.8	51.19
	healthcare	44	4.06	3.78
	media & entertain.	22	3.95	3.39
	transport. & tour.	7	1.25	1.18
y5	wholesale & retail.	41	1.46	3.29
	banking & securi.	37	10.80	53.43
	conglomerates	5	1.30	1.12
	insurance	20	1.24	1.03
	healthcare	44	4.06	3.78
	media & entertain.	22	3.95	3.39

<Table 3-2> Descriptive statistics of consumer service

y	Industry	No. of Obs.	Mean	SD
y1	healthcare	44	.81	1.05
	media & entertain.	22	.89	1.13
	transport. & tour.	7	1.50	1.31
	wholesale & retail.	40	.88	.90
	banking & securi.	37	4.65	11.91
	conglomerates	5	3.50	1.58
y2	insurance	20	1.63	1.51
	healthcare	44	21.14	8.53
	media & entertain.	21	114.36	330.52
	transport. & tour.	7	22.75	16.38
	wholesale & retail.	39	21.06	14.70
	banking & securi.	30	9.64	6.13
y3	conglomerates	5	13.82	6.62
	insurance	18	10.88	6.35
	healthcare	43	15.167	10.15
	media & entertain.	22	40.77	151.12
	transport. & tour.	6	8.63	4.32
	wholesale & retail.	39	12.16	13.16
y4	banking & securi.	37	16.24	11.84
	conglomerates	5	-4.56	37.82
	insurance	18	151.16	546.92
	healthcare	44	2.32	1.50
	media & entertain.	22	2.95	1.55
	transport. & tour.	6	2.33	2.06
y5	wholesale & retail.	41	2.83	1.53
	banking & securi.	37	2.16	1.40
	conglomerates	5	2.40	1.51
	insurance	20	2.00	1.17
	healthcare	44	2.32	1.50
	media & entertain.	22	2.95	1.55

<Table 4-1> Descriptive statistics of public service

y	Industry	No. of Obs.	Mean	SD
y1	energy	37	11644	16612
	telecommunication	21	28293	31532
	utilities	13	12595	5902
y2	energy	37	14517	19666
	telecommunication	21	17298	18852
	utilities	13	11174	12362
y3	energy	37	9.80	4.02
	telecommunication	20	22.23	19.21
	utilities	11	11.28	3.11
y4	energy	37	1.05	.96
	telecommunication	21	1.89	1.24
	utilities	13	1.69	1.42

4. Hypotheses about management performance

In which service industry and in which service industry sectors business firms are at the higher level of management performance achievement are showed in the previous chapter 3. However, there is no statistical significance since they are descriptive study. Here, we suggest statistical hypotheses about management performance in service industry, test, and then show statistical significant facts. Dependent variables in hypotheses are y1 to y8 described in chapter 2. Independent variables are as follows :

<Table 4-2> Descriptive statistics of public service

y	Industry	No. of Obs.	Mean	SD
y5	energy	37	3.84	4.59
	telecommunication	21	1.25	1.58
	utilities	13	4.08	2.27
y6	energy	33	12.78	9.64
	telecommunication	16	10.84	12.77
	utilities	13	12.35	7.46
y7	energy	37	3.33	15.38
	telecommunication	20	29.48	30.51
	utilities	11	12.17	9.39
y8	energy	37	1.84	1.32
	telecommunication	21	2.48	1.40
	utilities	13	3.08	.95

Let k be the variable for kinds of service industry, and as its values, k has 1, 2, and 3 which mean business service, consumer service, and utilities, respectively; Let b be the variable for sectors in business service industry, and as its values b has 1, 2, 3, 4, and 5, which mean advertising agency, commercial service, oilfield services, shipping, and software, respectively; Let c be the variable for sectors in consumer service, and as its values, c has 1, 2, 3, 4, 5, 6, and 7, which mean healthcare, media & entertainment, transportation & tourism, wholesale and retail, banking & securities, conglomerates, and insurance, respectively; Let u be the variable for sectors in public service, and as its values, u has 1, 2, and 3 which mean energy, telecommunications, and utilities, respectively.

We construct hypotheses which are related to descriptive analysis given in chapter 2 as follows:

- I. Management performance(y1 to y8) of business firms is different in three service industry(k).
- II. Management performance(y1 to y8) of business firms is different in five sectors in business service industry(b).
- III. Management performance(y1 to y8) of business firms is different in seven sectors in consumer service industry(c).
- IV. Management performance(y1 to y8) of business firms is different in three sectors in public service industry(u).

These hypotheses are tested by analysis of variance, and SPSS software is used for data processing and statistical analysis..

5. Significant findings about management performance

Since analysis in Chapter 3 does not involve significant results, here we test the hypotheses given in Chapter 4, so that we can have significant facts. First, when we use analysis of variance method with dependent variables y1 to y8 and the levels of independent variable k, we find the only one significant result in y5(Table 5). Thus, we reject hypothesis I except y5, that is, we find that "only management performance, dividend yield(y6) of business firms is different in three service industry(k)" with a significance level 0.1.

Then, when we use analysis of variance method with de-

pendent variables y1 to y8 and the levels of independent variable b, we find six significant results in y2-y7(Table 6). Thus, we accept hypothesis II except y1 and y8, that is, we find that “all management performance variables except market value(y1) and years on list(y8) of business firms is different in five sectors in business industry(b)” with a significance level 0.05.

<Table 5> ANOVA with k's levels

Variable	p
y1	.903
y2	.361
y3	.316
y4	.566
y5	.057 ▽
y6	.441
y7	.666
y8	.319

▽ : significant at 0.1 level

<Table 6> ANOVA with b's levels

Variable	p
y1	.280
y2	.003**
y3	.02*
y4	.000**
y5	.022*
y6	.003**
y7	.000**
y8	.418

* : significant at 0.05 level

** : significant at 0.01 level

Next, when we use analysis of variance method with dependent variables y1 to y8 and the levels of independent variable c, we find four significant results in y2, y3, y5, and y6(Table 7). Thus, we accept hypothesis III except y1, y4, y7 and y8, that is, we find that “management performance variables(sales, forward P/E, dividend yield, and 5 yr avg ROC) of business firms is different in seven sectors in consumer service industry(c)” with a significance level 0.1.

Finally, when we use analysis of variance method with dependent variables y1 to y8 and the levels of independent variable u, we find six significant results in y1, y3 to y5, y7 and y8(Table 8). Thus, we accept hypothesis IV except y2 and y6, that is, we find that “all management performance variables except sales and 5-yr average ROC(y2 and y6) of business firms are different in three sectors in public service industry(u)” with a significance level 0.05. We summarize the all significant variables in Table 9.

<Table 7> ANOVA with c's levels

Variable	p
y1	.749
y2	.082 ▽
y3	.006**
y4	.735
y5	.048*
y6	.056 ▽
y7	.189
y8	.190

<Table 8> ANOVA with u's levels

Variable	p
y1	.015*
y2	.638
y3	.000*
y4	.021*
y5	.022*
y6	.82
y7	.000**
y8	.01*

<Table 9> Summary of significant variables

Hypothesis	Variables
1	y5 ▽
2	y2, y3, y4, y5, y6, y7
3	y2 ▽, y3, y5, y6 ▽
4	y1, y3, y4, y5, y7, y8

▽ : significant at 0.1 level : remaining ones : significant at 0.05 level

6. Comparison of management performance means in service industry sectors

In Chapter 5 we had results about whether a factor is significant or not. However, We do not know at what level of one factor dependent variables has significantly different values compared with at other levels. For this we here do Duncan's tests where we can have subgroups. From Duncan's test results we judge that members in the one same group do not have significantly different means and members in the one same group have means different from those in the other group. Let a parenthesis () show a subgroup. Then, Table 10 shows that when we have significant results in y5, business service and consumer service belong to the one same subgroup while consumer service and utilities belong to the other subgroup, which can be expressed by (business service, consumer service), (consumer service, utilities), using ().

Similarly, from considering the other variables given in Table 9, we have the corresponding Duncan's tests in Tables 11-24. Thus, we derive a summary of subgroups at each combination of <b's, c's, and u's levels, dependent variables y1 to y8>:

- at <b, y2>=<business service, sales> :
(oilfield, commercial, software), (shipping, advertizing)
- at <b, y3>=<business service, forward P/E> :
(advertizing, shipping, commercial), (commercial, software, oilfield)
- at <b, y4>=<business service, price to sales>:
(shipping, advertizing, oilfield, commercial), (software)
- at <b, y5>=<business service, dividend yield> :
(software, oilfield, commercial), (commercial, advertizing, shipping)
- at <b, y6>=<business service, 5 yr avg ROC>
(oilfiel, shipping, commercial, advertizing), (advertizing, software)
- at <b, y7>=<business service, EPS Growth>
(software, advertizing, shipping, commercial), (oilfield)
- at <c, y3>=<consumer service, forward P/E>
(banking, conglomerates, wholesale, healthcare, insurance, media), (media, transport)
- at <c, y6>=<consumer service, 5 yr avg ROC>
(banking, insurance, conglomerates, wholesale, healthcare, transport), (conglomerates, wholesale, healthcare, transport, media)

- at <u, y1>=<public service, market value>:
(energy, telecommunication), (utilities)
- at <u, y3>=<public service, forward P/E>
(energy, utilities), (telecommunication)
- at <u, y4>=<public service, price to sales>
(energy, utilities), (telecommunication)
- at <u, y5>=<public service, dividend yield>
(telecommunication), (energy, utilities)
- at <u, y7>=<public service, EPS Growth>
(energy, utilities), (telecommunication)
- at <u, y8>=<public service, years on list>
(energy, telecommunication), (utilities).

<Table 10> Duncan's test of y5 with k's levels

Service	n	p =0.05 subgroup mean	
		1	2
business service	36	.867	
consumer service	175	1.849	1.849
utilities	71		3.123

<Table 11> Duncan's test of y2 with b's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
3	4	2006.0	
2	13	4994.5	
5	8	6323.1	
4	7		18077.8
1	4		18957.5

<Table 12> Duncan's test of y3 with b's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
1	4	16.025	
4	7	16.400	
2	13	21.753	21.753
5	8		29.462
3	4		29.750

<Table 13> Duncan's test of y4 with b's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
4	7	.6857	
1	4	1.0000	
3	4	2.9750	
2	13	3.1077	
5	8		8.1500

<Table 14> Duncan's test of y5 with b's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
5	8	.2000	
3	4	.2250	
2	13	.8692	.8692
1	4		1.4000
4	7		1.6857

<Table 15> Duncan's test of y6 with b's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
3	4	7.3000	
4	7	9.8857	
2	13	14.9462	
1	3	22.5000	22.5000
5	8		33.3125

<Table 16> Duncan's test of y7 with b's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
5	8	18.4625	
1	4	19.6250	
4	7	19.9571	
2	13	25.0538	
3	4		70.5750

<Table 17> Duncan's test of y3 with c's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
10	37	11.408	
11	5	14.580	
9	39	18.576	
6	44	19.943	
12	18	26.800	
7	21	103.733	103.733
8	7		175.814

<Table 18> Duncan's test of y6 with c's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
10	30	9.646	
12	18	10.888	
11	5	13.820	13.820
9	39	21.069	21.069
6	44	21.147	21.147
8	7	22.757	22.757
7	21		114.361

<Table 19> Duncan's test of y1 with u's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
13	37	11644.6	
14	13	12595.6	
15	21		28293.3

<Table 20> Duncan's test of y3 with u's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
13	37	9.8027	
15	11	11.2818	
14	20		22.2300

<Table 21> Duncan's test of y4 with u's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
13	37	1.0541	
15	13	1.6923	1.6923
14	21		1.8952

<Table 22> Duncan's test of y5 with u's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
14	21	1.2571	
13	37		3.8432
15	13		4.0846

<Table 23> Duncan's test of y7 with u's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
13	37	3.3297	
15	11	12.1727	
14	20		29.4850

<Table 24> Duncan's test of y8 with u's levels

Subsector	n	p =0.05 subgroup mean	
		1	2
13	37	1.8378	
14	21	2.4762	2.4762
15	13		3.0769

7. Conclusion

Since service industry is directly related to people's welfare and life and is so important, advanced countries have developed and maintained service industry. Korea must also develop it and strengthen competitiveness power of service industry because Korea is now striving to become such an advanced country. This paper analyses by descriptive statistics which service industry and which service industry sector attain higher management performance from the data of best 400 business firms in the world, identifies significant findings by analysis of variance method, and derives concrete comparison of management performance means in sub-sectors in service industry. Thus, people could have some useful information who are interested in policy making, investment, commencement of an enterprise, affiliation, and benchmarking in service industry. For example, dividend yield is highest in utilities industry among three service industries; EPS growth is highest in oilfield sector among business industry; five year average ROC is highest in media & entertainment sector among consumer industry; market value is lowest in energy sector among public industry; etc. Next studies could consider other additional variables that influence management performance so that they can be more inclusive, and they could view other important industries and their sectors as research target to be even more inclusive.

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