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Development and Policy of Proper Management Estimation of Domestic Service Industry in Comparison with OECD Countries for Advancement of Korean Service Industry*

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Abstract

Purpose – Considering that the governments' official statistics on the optimum scale of the domestic service industry will be crucial in future, this study's results will be used as an important benchmark to develop and verify the parameters in the government's official statistics.

Research design, data, and methodology – To identify the appropriate scale of Korea's service industry and its adequacy, I have determined them through estimation using a regression method involving panel data analysis on the panel data of 30 OECD countries.

Results – The regression coefficient provided indications of being non-linear. This means that a U-shaped curve relationship exists—that is, the level of the economic growth leverage decreases along with the service industry's growth up to the level of 70.9% in terms of the Korean service industry's adequacy; it increases along with the service industry's growth at a level higher than 70.9%.

Conclusions – While the current proportion of the size of the service industry among all industries in Korea stands at 50.7%, its proper proportion estimated by a regression analysis was 70.9%.

Keywords: Estimation, Service Industry, OECD, Korean, Panel data, GDP.

JEL Classifications: L83, L10, M14, M31, D12.

1. Introduction

Korea ranks as the rank 9th foreign trade country with one trillion USD of foreign trade scale a year; it has shown as successful economic development as being unparalleled and records a new history. However, in fact, it is required to develop the policies in new paradigm and implement the political projects of the government, for the development in service industry at a new angle to continue one trillion foreign trade times with no reduction. In the process of economic growth through manufacturing industries, the area that has been relatively less developed in Korea would be service area. It is pointed out that the interest in domestic service industry for simple strengthening in previous export-driven economy system is a pre-modern way of thinking (Jeon, Yoo, Choi and Yoon, 2005; Kang, 2010; Suh, Suh and Yoon, 2010).

Now, Korean economy has two growth axes consisting of export and domestic economy and boosting domestic demand has become an as important economic item as export. In terms of industrial structure, service industry and the self-employment area of small businessmen that takes the most parts in domestic service industry appear as social issues to be urgently solved as well as low-income class. When reviewing the actual status of domestic service industry, the actual status of small businessmen who are the main force of service industry is not future-development type and face survival crisis due to very low productivity, added values, and economical impact (Kim, 2001; Hong and Kim, 2003; Shim, 2005; Youn and Kim, 2005; Kim, 2006; Suh, Seo and Yoon, 2011a).

It will be required to identify the problems in domestic service industry and to suggest the solutions for advancement of service industry. Therefore, in the study, it was intended to benchmark the policies of foreign advance countries to support service and to identify the share of such service industry in GDP and the correlation of it with GDP. It was intended to review the shares of service industry in OECD countries and, based on this, to verify the method to analogize the optimum share of domestic service industry in comparison with OECD countries.

It will be possible to deduce the problems in and solutions of

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domestic service industry and the optimum level of domestic service industry.

It was intended in the study to prepare the panel data of 30 OECD countries in order to identify optimum number of domestic service companies using OECD data, to analyze optimum level of domestic service industry through analysis of panel data, and to identify the scale of service industry and the correlation with economic growth rate. As described above, it is deemed to be required in terms of temporal aspect to develop the estimation method for and to verify empirically the scale of domestic service industry and the correlation with economic growth rate. It was intended to make a new definition of the optimum management level needed for sustainable economic growth of Korea. It was thought that the guideline on optimum management scale of domestic service industry would be deduced in such process of the study. In the situation that the necessity for governments' official statistics on optimum scale of domestic service industry will appear in future, the result of the study will be used as an important axis to develop and verify the parameters in operation of governments' official statistics.

2. Theoretical background

Now, Korea faces dull economic growth after foreign currency crisis. In this aspect, the cause may be dull income growth of livelihood-type self-employed persons that take the major part in service industry and, in another aspect, the cause current growth rate of service industry does not reach the level in 1990's. Trade increase rate of world commodities was merely 6.6% from 1980 to 2010 but the increase rate of service trade was as high as 7.9% during the same period. The result of a study was reported that, if service industry has been developed in the trend of that in 1990's, the economic growth rate of Korea would be more increased than current level by about 0.6%(Kim, 2013).

The resolution for domestic industrial structure that service industry should find out a break through in global economy as production of manufacturing industry was internationalized. The service industry of medicine, education, and tourism should be deemed to have the foundation of new growth opportunities of domestic economy through international trade. Political and economical comparison of Korean service industry to that of OECD countries was reviewed for advancement of Korean service industry as shown below.

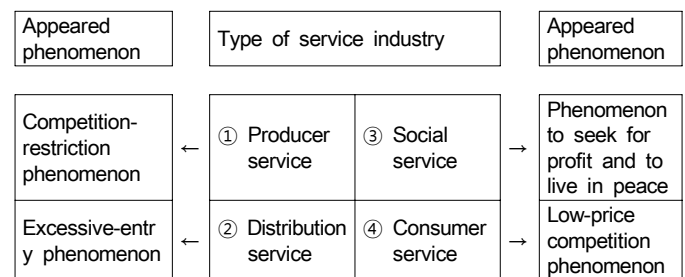
2.1. Policies of OECD countries to support service industry

It was intended to review the survey of OECD countries on the policies to support service industry in terms of the areas to be applied and benchmarked in Korea. If modernization of Korea is deemed to be lead by manufacture and export, the ways of living should be found at the level of activation low-income class economy and domestic economy in 21st century. In such a situation, the service policies of OECD countries will be

the objects for benchmarking to share the experiences and knowledge of advanced countries.

For this, political areas may be reviewed with classification into three kinds: horizontal politics, quasi-horizontal politics, and vertical politics. Horizontal politics are classified into R&D and integrated political area such as deregulation, etc. Quasi-horizontal politics may be classified into the political areas among industries focused in the correlation with industrial competitiveness at the level that whole industries of specific business show mutual ripple effects. Vertical politics are classified into the measures for industrial competitiveness, policies for development, and policies for cultivation to be implemented by corresponding departments of the government. According to a study conducted by Park and Choi (2013), major elements of OECD countries to be benchmarked to expand the infrastructure and support the internationalization of service industry, to cultivate professional manpower for services, and to activate business services may be classified as shown in <Table 1>.

The structural problems of Korean service industry are shown in <Fig. 1> compared with such industry. The structure of Korean service industry consists of knowledge-based service and labor-focused service. The former causes retro action to limit the development of markets as competition-limited profit is sought rather than innovation. The latter is labor-focused type and has the problem of excessive competition due to low entry barriers. As the solutions of such problems, stimulation of competition in knowledge-based service and training for job change from labor of labor-focused service is suggested. However, when seeking for the solutions at domestic level, in practice, the capability for service industry to absorb reduced manufacturing manpower is insufficient and, as strict certificate systems for the fairness of society rather act as entry barriers, growth of knowledge-based service is restricted(Suh, Hong, Choi and Suh, 2011b).



Source: Re-quotation of the importance and development policy of service industry, Kim (2013)

<Figure 1> Distribution chart of the concepts of Korean service industry

<Table 1> The policies of main advanced OECD countries for service industry

Country	Areas for political support	Contents of policies	Remarks
Luxemburg	Policies for finance and insurance business	<ul style="list-style-type: none"> - Application to overcome the crisis of steel industry in 1970 - Operation of an international financial center for investments, international finance, and e-business - Lower taxes compared with surrounding countries and opening through deregulation 	Vertical policies
Finland	Policies for service innovation technologies	<ul style="list-style-type: none"> - Improvement of values obtained by whole industries through innovation of service parts - Support of development of innovational and international business models - Programs fixed to each innovational process in each step(Construction of service models and business models) 	Horizontal policies
Sweden	Service industry innovation policies (SSI: The Service Sector Innovation index)	<ul style="list-style-type: none"> - Political support based on service sector innovation indexes by EU - Construction of innovational systems focused in colleges - Establishment of policies by the method to access service industry focused in problems 	Horizontal policies
GB	e-Business policies (UK Online Business)	<ul style="list-style-type: none"> - Goal to construct a country that has worldwide optimum environment for e-business - Establishment of the policies to cultivate service industry at the level of central government - Organization of a research committee for each area for basic researches - Establishment and implementation of strengthened quasi-horizontal policies 	Quasi-horizontal policies
France	Informatization project for local retail business	<ul style="list-style-type: none"> - Support of local retailers for implementation of e-business - Program implemented by a local chamber of commerce industry in Grenoble - Factor of success based on establishment of close relation with local retailers 	Quasi-horizontal policies
Ireland	Policies to invite investments in Information Communication Technology (ICT)	<ul style="list-style-type: none"> - Implementation by a multinational enterprise that invested in Ireland - Now, the largest export scale in the world in information communication area - Support by foreign enterprises in investment step - Aggressive connection between multinational enterprises and local production 	Quasi-horizontal policies
Netherlands	Policies of business service	<ul style="list-style-type: none"> - Finding out the policies to support business service focused in market functions - Access method of government for continuous deregulation and market-friendliness 	Vertical policies
Japan	Policies to cultivate political business for service industry	<ul style="list-style-type: none"> - Establishment and implementation of new-industry creation policies by central government - Selection of five major business such as content, health, machinery, and service and establishment and support of action plans - Leading role by central government in establishment of policies 	Vertical policies

Source: Re-quotation of a study on the policies of main advanced countries for service industry after correction, Park and Choi (2013)

According to Kim (2013), in order to solve such problems, first, the entry barriers of professional service industry such as law and medicine should be lowered. Second, a policy to leave from livelihood-type service such as wholesale / retail and food / lodging should be implemented. Third, education / training should be strengthened to gentrify service demands (Suh, Hong, Jin and Jo, 2012). Fourth, the importance of expanded export and internationalization of service should be emphasized. As described above, Korean service industry seems to have sufficient potential for development and growth. For example, service markets may be developed through medical hub of East Asia, educational hub of Northeast Asia, logistics industry, R&D, health & medicine, education, culture, cultural tourism, combination of sports, construction of integrated complexes to make fusion-type industrial clusters that have power competitiveness with combination of manufacturing industry and service industry, and making small businessmen the main axes of domestic economy.

2.2. Analysis method of service industry

As of 2013, the shares of service industry of OECD countries in GDP and employment are 77.4% and 80.9% in the USA and are 75.0% and 80.9% in GB, respectively. The productivity of service industry is same with that of manufacturing industry. However, according to the data of the Bank of Korea (2010), the share of service industry in Korean economy is the lowest in high-rank 20 countries in OECD in terms of added values. In contrast, the share of manufacturing industry is the highest in 21 high-rank 21 countries in OECD and is higher compared with Germany, Turkey, Mexico, and Japan in which manufacturing industry is active. As described, when reviewing the status of domestic service industry, small businessmen who are the main axes of service industry face serious risk of survive due to very low productivity, added values, and economical ripple effect.

In addition to comparison of OECD countries, the academic

studies on international comparison of Korean service industry may be classified into five areas: International comparison area to analyze service industry, area to analyze the inter-structure between service industry and manufacturing industry, area to analyze the business potential of detailed service industry, influences of development of service industry to economic development, and adequate industrial structure and scale.

The first is international comparison of service industry. Kang(2011) conducted a study on the analysis of service industry of OECD countries and analyzed the economical effect of service industry in OECD countries. Service industry has high shares in total output, added values, and employment in OECD countries and the shares showed gradually increasing trend from 2000 to 2005. However, in case of Korea, the shares of service industry in total output and added values are significantly lower compared with other OECD countries and the share in employment is only similar with the average level of OECD countries, indicating the problem of Korean service industry. When reviewing producer service, corresponding industry of OECD countries has high shares in total output and added values and low share in employment, indicating relatively high labor productivity compared other service industries. The second is analysis of inter-structure between service industry and manufacturing industry. Min (1998) analyzed the structure of relation between service industry and manufacturing industry by the application analysis method of inter-industry analysis. Servitization of economy, servitization of production processes, ripple effect of service industry, causes of changes in total output, and productivity of service industry were compared with those of some OECD countries such as the USA, Japan, and Germany. As the result of analysis, it was found that servitization of consumption was not clear as the result of elevated income level in Japan but the share of consumption of service was continuously increased as the result of elevated income level in the USA and Germany. It had been known through previous studies that the cause of increased expenditure on consumption of service was elevated relative prices of service but, according to Min (1998), the share of service in expenditure on consumption was increased although the prices were not changed in the USA and Germany. Also, in terms of production inducement between service industry and manufacturing industry, the effect of service industry to manufacturing industry was found to be larger than the influence of manufacturing industry to service industry. However, it was definitely different from Korea which has high employment effect that the changes in technologies in such countries have labor-focused property in whole manufacturing industry and service industry and that the direct effect of employment was reduced in both two areas. It was found that the direct effect of employment was larger incase of service industry but related productivity considering the whole ripple effects to other industries was lower incase of service industry compared with manufacturing industry and further expanded difference between the two might result in reduced productivity caused by advancement of servitization. The third is the area to analyze the business potential of detailed service industry. Hong and Kim (2003) analyzed IT industry of Korea, USA and Japan us-

ing an input-output tables. As the result, it was found that the share IT industry in GDP was continuously increased in Korea, USA and Japan and that IT industry was a new growth industry in such three countries. When riffle effects were analyzed, IT industry was found to be the manufacturing industry that had high rate of intermediate input and production inducement coefficient of IT industry was higher than that of service industry. In such situation, production inducement coefficient of manufacturing industry was higher than that of service industry in Korea compared with USA and Japan but the productivity of IT service industry excluding computer-related service was smaller in Korea compared with USA and Japan indicating in sufficient ripple effect. The fourth is influences of development of service industry to economic development. Kim (2006) performed empirical analysis of the influence of development in service industry to economic growth caused by increased share of service industry through internal comparison. As the result, it was found that Korea has very low share of service industry compared with OECD countries and that the share of employment was more rapidly increased compared with the increase of share of service industry in GDP and the productivity was rather low. Although, the share of service inputted in manufacture and production was increased in Korea, the share of service industry was merely one half of that of the Western and the correlation between manufacturing industry and service industry was also relatively low compared with OECD countries.

The fifth is adequate industrial structure and scale. The studies on this area were conducted to identify adequacy of the scale of specific business and, in terms of development of the policies for advancement of service industry in Korea, this area is deemed to have large ripple effect in the respect to deduce the implication of structural improvement and political directions, of the service area of small businessmen's self-employed business.

Taylor (1996) and Dennis (1996) considered unemployment rate to be the core parameter to find out the factors to select the business in small businessmen's self-employed business in whole structure of industry and tried to define unemployment rate. They tried to verify unemployment push hypothesis to explain positive (+) relation and prosperity hypothesis to explain negative (-) relation in terms of the relation between unemployment rate and share of business selected by small businessmen. Unemployment push hypothesis is that, in the situation individuals voluntarily start or are pushed to self-employed business depending on the situation of economy, the opportunities of wage labor are reduced due to high unemployment rate and the individuals select small businessmen's business and explains positive (+) relation between the two. In terms of domestic studies, according to Ryoo and Choi (1999), inverse relation exists between the level of economic development and the share of self-employed businessmen. Jeon (2005) asserted that negative (-) relation exists between the share of business of small businessmen and per capita GDP.

The study is related with estimation of adequate Korean service industry compared with OECD countries for advancement of Korean service industry and it will be possible to provide more

clear scale of standard and suggest the direction in relation to the measures for management innovation of and political support for Korean service industry.

3. Design of empirical analysis and measurement of parameters to be analyzed

3.1. Parameters to be analyzed for determinants of adequate domestic service industry compared with OECD countries

In the study, it was intended to integrally expand and re-organize the parameters of economic growth rate, unemployment rate, income tax, consumer prices, amount of export, amount of import, dishonored bill rate, and interest rate, as the parameters to estimate adequate Korean service industry compared with OECD countries. Also, it was reviewed what parameters, among such parameters, influence the determinants of adequate Korean service industry. It was identified what influence is given to the level of economic development depending on the scale of Korean service industry and how to estimate adequate Korean service industry compared with OECD countries. The data used in the study was used as the basic analysis method of inter-industry analysis and production inducement effect and employment inducement effect of service industry of OECD countries were reviewed. The input-output tables of OECD countries are officially provided by the statistics authority of corresponding government and, as they are based on lots of collected data, benchmark tables are prepared and reported every five years. However, input-output tables were unavailable in case of Chile in 2000, Mexico in 2000, New Zealand in 2005 and Swiss in 2000 and 2005 and such countries were excluded from statistics.

The items of input-output tables of OECD consist of three large classification items and 23 sub codes. The first large classification item is agriculture/forestry/fishery/mining item and consists of two industrial codes: agriculture/forestry/fishery and mining. The second large classification item is manufacture and consists of 10 industrial codes: food, textile/clothes, wood/paper, petrochemical, nonmetallic minerals, metal & metallic products, machinery, electric/electronic precise devices, transportation devices, and other manufacture. The third large classification item consists of 11 industrial codes: electricity/gas/tap water, construction, wholesale/retail, food/lodging, communication/transportation/storage, finance/insurance, real estate business service, public national defense, education, health/medicine, and others. The classification method is different from the method to classify service industry into manufacture, service, food, and wholesale / retail in Korea and analysis should be performed in considering of the interpretation of analysis result.

National averages of 30 OECD countries were analyzed to identify adequate scale of Korean service industry and analyze the economic determinants of the share of service business in

order to achieve the goal of the study and the share of service industry was found to be in the range from 50.5% to 73.7% and the average was 64.8%. Economic growth rate was in the range from -0.3% to 10.6% and the average was 3.3%. Unemployment rate was in the range from 10.5% to 3.2% and the average was 7.09%. Regression was estimated using the national panel data of 30 OECD countries. However, the analysis to estimate adequate service industry was performed for 26 countries because statistics data was unavailable in case of some countries. Pooled OLS Regression Estimation Method was applied with use of STATA statistics analysis programs for easy analysis of panels.

3.1.1. Share of service industry based on total output

When reviewing the shares of industries in total output of Korea, the share of service industry was found to be increased from 50.5% in 2000 to 50.75% in 2005 by 0.2%. Average change in share of service industry in OECD countries is 2.5% and Korea shows smaller change in total output compared with OECD countries. The details are shown in <Table 2>.

3.1.2. International comparison of service industry

When reviewing the share of producer service of service industry in total output of Korea, it was reduced from 21% in 2000 to 20% in 2005 by -1%. Average change in share of service industry in OECD countries is 1% and Korea shows smaller change in total output compared with OECD countries. Based on added values, the share was reduced from 32.3% in 2000 to 29.4% in 2005 by -2.9%. Based on added values, average change in share of service industry in OECD countries is 0.7% and Korea shows smaller change in total output compared with OECD countries. Based on employment, the share was increased from 16% in 2000 to 18.4% in 2005 by 2.5%. Based on added values, average change in share of service industry in OECD countries is 0.8% and Korea shows larger change in total output compared with OECD countries. The details are shown in <Table 3>.

<Table 2> Shares of industries in total output

	Nation	Total	2000 Year			2005 Year			Change in share (%)		
			Agriculture, fishery, and mining	Manufacture	Service	Agriculture, fishery, and mining	Manufacture	Service	Agriculture, fishery, and mining	Manufacture	Service
1	Australia	100	7.5	20.5	72.1	6.6	18.2	75.2	-0.9	-2.3	3.1
2	Austria	100	2.5	29.2	68.3	2.1	28.7	69.1	-0.4	-0.5	0.8
3	Belgium	100	1.5	32.7	65.8	1.1	30.1	68.8	-0.4	-2.6	3
4	Canada	100	7.3	30.5	62.2	8.7	26.7	64.6	1.4	-3.8	2.4
5	Czech Republic	100	4.5	39.4	56.1	3.5	40.6	55.9	-1	1.2	-0.3
6	Denmark	100	5	23.8	71.3	4.6	21.6	73.9	-0.4	-2.2	2.6
7	Finland	100	3.5	39.7	56.8	2.9	35	62.1	-0.5	-4.7	5.2
8	France	100	3.1	29.2	67.7	2.7	27.5	69.7	-0.4	-1.7	2.1
9	Germany	100	1.7	34.6	63.7	1.4	35	63.6	-0.3	0.4	-0.1
10	Greece	100	6.3	20.5	73.1	5	18.6	76.4	-1.3	-2	33
11	Hungary	100	5.1	43.2	51.7	4.4	38.3	57.3	-0.7	-4.8	5.6
12	Ireland	100	3.7	44.5	51.8	2.7	32.1	65.2	-1	-12.5	13.4
13	Italy	100	2.4	34.2	63.4	2	31.5	66.5	-0.4	-2.7	3.1
14	Japan	100	1.7	31.8	66.6	1.5	33.8	64.7	-0.2	2	-1.8
15	Korea	100	3	46.4	50.5	2.2	47.1	50.7	-0.8	0.6	0.2
16	Luxembourg	100	0.6	13.1	86.3	0.4	11	88.6	-0.2	-2.1	2.3
17	Netherlands	100	4.5	27.8	67.7	4.3	24.8	70.9	-0.2	-3	3.2
18	Norway	100	17.7	20	62.3	18.4	18.3	63.3	0.7	-1.7	1
19	Poland	100	6.5	30.8	62.6	6.3	32	61.7	-0.2	1.1	-0.9
20	Portugal	100	3.7	29.1	67.2	3.1	25.9	71	-0.6	-3.3	3.8
21	Slovak Republic	100	4.9	36.7	58.4	3.8	38.5	57.7	-1.1	1.8	-0.7
22	Slovenia	100	3.7	37.7	58.6	3	35.9	61.1	-0.7	-1.8	2.5
23	Spain	100	3.8	31.7	64.5	2.8	27.4	69.8	-1	-4.3	5.3
24	Sweden	100	1.9	34.2	63.9	1.6	31.7	66.7	-0.2	-2.5	2.7
25	Switzerland	100	1.8	28.6	69.5	na	na	na	NA	NA	NA
26	UK	100	3.1	23.2	73.7	2.6	18.9	78.5	-0.4	-4.3	4.7
27	USA	100	2.6	24.1	73.3	3.1	21.4	75.5	0.5	-2.7	2.2
	OECD AVE	100	4.2	31	64.8	3.9	28.9	67.2	-0.3	-2.1	2.5

Source: An Analysis of OECD Countries' Service Industries: Industrial Structure, Linkage Effects, and Productivity in Input-Output Framework, Kang (2011)

<Table 3> Share of producer service

	Nation	Based on total output			Based on added value			Based on employment		
		2000 Year	2005 Year	Change	2000 Year	2005 Year	Change	2000 Year	2005 Year	Change
1	Australia	32.3	32.9	0.6	36.9	37.9	0.9	22.3	22.1	-0.2
2	Austria	26.4	27.7	1.3	30	30.4	0.4	19.3	20.8	1.6
3	Belgium	29.2	31.7	2.6	34.9	37	2.1	25.2	26	0.8
4	Canada	26.7	24	-2.7	31.7	29.3	-2.4	22.1	23	0.9
5	Czech Republic	20.8	22.6	1.8	26.4	26.8	0.4	17.6	18.9	1.3
6	Denmark	30	32.3	2.3	30.7	32.9	2.2	19.7	21.1	1.4
7	Finland	23.3	25.1	1.8	31.2	30.6	-0.6	18.4	19.2	0.8
8	France	30.7	30.3	-0.4	36.6	36.1	-0.5	23.8	24.5	0.7
9	Germany	28.3	29.9	1.6	33.1	35.3	2.2	20.3	21.8	1.6
10	Greece	24.3	24.9	0.6	28.5	28.3	-0.2	14.1	14.2	0.1
11	Hungary	19.9	21.9	2	29.3	29.8	0.6	15.6	16.5	0.8
12	Ireland	22.6	30.6	8	27.7	33.4	5.7	18.7	19.4	0.7
13	Italy	24.7	26.8	2.2	31.9	34.3	2.4	18.2	19.3	1.1
14	Japan	27.1	26.4	-0.7	32	34.8	2.7	18.6	19.9	1.4
15	Korea	21	20	-1	32.3	29.4	-2.9	16	18.4	2.5
16	Luxembourg	63.6	65.3	1.7	54.3	55.1	0.9	34.3	33.8	-0.5
17	Netherlands	27.8	30.5	2.8	33.5	34.9	1.4	26.4	26.2	-0.2
18	Norway	28.4	28.3	-0.1	26.5	26	-0.4	20.9	21	0.1
19	Poland	20.1	22.1	2	23.9	25.8	2	12.7	14	1.3
20	Portugal	21.6	23.3	1.7	27	28.4	1.4	10.9	11.7	0.8
21	Slovak Republic	21.6	19.7	-1.9	27.4	26.3	-1.1	16.7	16.9	0.2
22	Slovenia	21.1	22.9	1.9	25.8	29	3.1	15.5	18.4	2.8
23	Spain	22.3	22.7	0.4	27.1	28.4	1.3	15.5	16.7	1.2
24	Sweden	30.2	31.2	0.9	33.1	33.3	0.3	20.6	20.9	0.3
25	Switzerland	32.6	NA	NA	38.2	NA	NA	22	NA	NA
26	UK	31.7	33	1.3	34.8	37.2	2.4	24.8	26.1	1.3
27	USA	31	31.7	0.7	34.6	35.1	0.5	23.9	23.4	-0.4
	OECD AVE	27.4	28.4	1	31.8	32.5	0.7	19.8	20.5	0.8

Source: An Analysis of OECD Countries' Service Industries: Industrial Structure, Linkage Effects, and Productivity in Input-Output Framework, Kang (2011)

3.1.3. Analysis parameters (unemployment rate, consumer price, and interest rate)

The representative that identifies the change in economy based on the indexes of industrial production is GDP. GDP is determined as the amount of added values of goods and services produced by the economic subjects of a country for a certain period and main industrial trends including consumption, investments, and export, etc. may be identified.

Many studies have been conducted in relation to the correlation between economic growth and unemployment. According to Okun's Law advocated by Okun, an economist of the USA, if unemployment rate is increased by 1%, actual GNP is reduced by about 3% in the USA (Malley and Molana, 2008). It was found in common studies that negative (-) correlation exists between economic growth rate and unemployment rate in G7 countries and such method has been accepted as a highly reliable one to measure the cost of production loss caused by unemployment. However, actual unemployment rate has been recently found to be higher than estimated unemployment rate in EU. Also, the unemployment rate of Korea has been found to be higher when it was analyzed by potential GDP growth, circulatory approach method, and vector auto-regression model method, etc. This result seems to be caused when the flexibility of labor market and economy-sensitivity of unemployment is weak in a country (Mally and Molana, 2008; EU, 2010; Han, 2009; Ahn, 2011).

Ahn (2011) found that Okun's Law is applied between macro unemployment rate and economic growth rate in Korea and that, when economic growth rate is increased by 1%, unemployment rate is reduced by 0.1% using a model equation, i.e. $Y = \alpha X + b$, Relation 1, i.e. $Ut = a + b * (\text{Real GDP})$, and Relation 2, i.e. $Ut^2 = a + b * (\text{Real GDP})$.

Economic growth and consumer price index are the indexes to measure average living expenses or change in purchasing power of urban households. They have been used in empirical analysis to identify the influence of the scale of service industry to industrial production indexes and consumer prices which are domestic macro economic parameters. Cunado and Gracia (2005) showed that consumer indexes of oil prices and interest rates may be used as the economic parameters to estimate economic activities as parameter-adjusted industrial production indexes in Korea and Japan.

3.2. Setting the issues of study and the models of analysis

It was intended to analyze adequate Korean service industry, which was the goal of the study, using a calculation equation shown below based on calculated result of production inducement effects, added values, and employment inducement effects by country and by industrial structure of OECD countries using input-output tables.

[Issue 1 of study] What influence is given by the shares of service industry in OECD countries to economic growth rate?

It was intended to set <Model 1> as the analysis model to verify [Issue 1 of study] suggested for adequacy of Korean service industry. In the study, <Model 1> is a means to estimate the adequacy of Korean service industry using the data of 26 OECD countries.

<Model 1>

$$\text{GDP growth rate} = \alpha + \beta_1 \text{SER} + \beta_2 \text{UNEMP} + \beta_3 \text{RATE} + \beta_4 \text{CPI} \quad (1)$$

Where, SER = Share of service industry in whole industries
GDP = Actual growth rate
UNEMP = Unemployment rate
RATE = Interest rate
CPI = Consumer price

<Model 2> and <Model 3> were verified with addition of square of the share of service industry and cube of the share of service industry for nonlinear analysis of the influence of service industry to economic growth rate.

<Model 2>

$$\text{GDP growth rate} = \alpha + \beta_1 \text{ser}^2 + \beta_2 \text{ser}^1 + \beta_3 \text{UNEMP} + \beta_4 \text{RATE} + \beta_5 \text{CPI} \quad (2)$$

Where, SER = Share of service industry in whole industries
GDP = Actual growth rate
SER² = Square of share of service industry
UNEMP = Unemployment rate
RATE = Interest rate
CPI = Consumer price

<Model 3>

$$\text{GDP} = \alpha + \beta_1 \text{ser}^3 + \beta_2 \text{ser}^2 + \beta_3 \text{ser}^1 + \beta_4 \text{UNEMP} + \beta_5 \text{RATE} + \beta_6 \text{CPI} \quad (3)$$

Where, SER = Share of service industry in whole industries
GDP = Actual growth rate
SER³ = Cube of share of service industry
SER² = Square of share of service industry
UNEMP = Unemployment rate
RATE = Interest rate
CPI = Consumer price

As shown above, [Issue 1 of study] required the analysis of influence of OECD service industry to economic growth rate using <Model 1>, <Model 2>, and <Model 3>.

4. Result of empirical analysis

Therefore, it was intended in the study to prepare the panel data of 26 OECD countries in order to identify optimum number of domestic service companies using OECD data and to estimate optimum scale with regression through analysis of panel

data. It was intended to identify the correlation between service industry scale and Korean economic growth rate as well as analysis of optimum level of Korean service industry by comparing the data of OECD countries. For this, OECD data was used and regression analysis was performed. The purpose to survey Korean service industry is to deduce adequate number of domestic service industries for economic growth of Korea and possible adequate competition in and support of service industry. If governments' official statistics on optimum scale of domestic service industry will be provided, the result of the study will be used as an important axis to develop and verify the parameters in operation of governments' official statistics. As described above, it is deemed to be required in terms of temporal aspect to develop the estimation method for and to verify empirically the scale of domestic service industry and the correlation with economic growth rate.

4.1. Descriptive statistics of each parameter

The most important purpose of the study was to deduce adequate number of domestic service industries for economic growth of Korea and possible optimum competition in service industry compared with OECD countries. If it is possible to deduce adequate scale of number and verify input parameters, governments' official statistics will be provided for optimum scale of domestic service industries and the parameters developed by the study will take important roles in governments' official statistics. In order to achieve such purpose of the study, the basic statistics of OECD Factbook 1999-2008 of OECD (2010) were reviewed to identify the optimum scales of service industry of advanced countries and Korea and the economical determination factors of the share of service and the result is as described below.

When reviewing average descriptive statistics of each OECD country, GDP growth was in the range from 0.007% to 0.094% and the average was 0.0371%. Share of Service Industry 1 was in the range from 0.505% to 0.86% and the average was 0.6592%. Share of Service Industry 2 was in the range from 0.255% to 0.784% and the average was 0.6592%.

Consumer price was in the range from 0.4409% to 0.12% and the average was 0.0281; unemployment rate was in the range from 0.005% to 0.188% and the average was 0.712%. Interest rate was in the range from 0.005% to 11.31% and the average was 0.5784%.

Average of each OECD country is shown in <Table 4>.

The regression coefficients obtained through comparative analysis of <Model 1>, <Model 2>, and <Model 3> of regression analysis to identify optimum Korean service industry show non-linear pattern. Such result indicates that U-curve relation exists and the level of leverage of economic growth rate is reduced when service industry is increased until optimum level of service industry becomes 70.9% and, at higher level, leverage rate of economic growth rate is increased when service industry is increased.

The share of service industry in whole industries of Korea is

now 50.7% but optimum share obtained through regression analysis is 70.9%. It is estimated through regression analysis models that service industry is now short by 20.2% in whole industries of Korea. Such result of the study seems to be meaningful in the respect that the change in optimum rate is obtained through calculation using the input parameters compared with OECD countries. The details are shown in <Table 5>.

<Table 4> Average descriptive statistics of each OECD country

	Number of observed values	Average	Standard deviation	Minimum	Maximum
GDP Growth rate	52	.0371	.0183	.007	.094
ser12	52	.4409	.1090	.255	.784
ser1	52	.6592	.0806	.505	.86
Consumer price(<i>Cpi</i>)	52	.0281	.0224	-.007	.120
Unemployment rate	52	.0712	.0377	.022	.188
Interest rate	52	.5784	2.123	.005	11.31

<Table 5> Analysis result of adequacy of service industry

Variable	[ser1 Model 1]	[ser2 Model 2]	[ser3 Model 3]
<i>CONS</i>	0.0692***(2.46)	0.7274***(5.92)	1.1821(1.44)
(SER1)	-0.0440	-1.9545***(-5.55)	-3.9433(-1.11)
(SER2)		1.3766***(-5.44)	4.2373(0.83)
(SER3)			-1.3533(-0.56)
<i>UNEMPLOY</i>	-0.1101(-1.39)	-0.0662(-1.05)	-0.0561(-0.85)
<i>RATE</i>	0.0013(0.96)	-0.0024(-1.87)	-0.0029(-1.85)
<i>CPI</i>	0.1410(1.13)	-0.0933(-0.87)	-0.1152(-1.00)
F Value	1.97	8.46	7
Number of Sample	52	52	52
<i>R</i> ²	0.1435	0.4790	0.4826

Note) 1) Inflection point is 0.709997695.

2) **, *** indicates significance at 5% and 1 % of significance levels, respectively.

The influence of service industry to GDRP was analyzed for 16 metropolitan city / province of Korea. When reviewing the meaning of regression coefficients that <Model 4>, <Model 5>, and <Model 6> of regression analysis were comparatively analyzed, significant result was shown by linear type, <Model 4>, and <Model 6>. In case of <Model 4>, the share of service was found to give negative (-) influence to GRDP <Model 6> was found to have N-shape nonlinear model. That is, service industry was found to give linear and nonlinear influence to GRDP in 16 metropolitan city / province of Korea.

<Table 6> Analysis result of adequacy of service industry

Variable	[ser1 Model 4]	[ser2 Model 5]	[ser3 Model 6]
<i>CONS</i>	-0.0023(-0.04)	-0.0358(-0.19)	-4.5771***(-2.78)
(SER1)	-0.0522*(-1.89)	0.0423(0.08)	19.1242***(2.77)
(SER2)		-0.0652(-0.18)	-26.5631***(-2.78)
(SER3)			12.1558***(2.77)
<i>UNEMPLOY</i>	-0.2276(-0.87)	-0.2316(-0.88)	-0.2134(-0.83)
RATE	1.0720*** (3.32)	-0.2316(-0.88)	1.1290*** (3.58)
<i>CPI</i>	0.0005(0.94)	0.0005(0.94)	0.0005(0.98)
F Value	4.84	3.84	4.68
Number of Sample	112	112	112
R^2	0.1532	0.1534	0.2112

Note) 1) Inflection point is 0.709997695.

2) **, *** indicates significance at 5% and 1 % of significance levels, respectively.

5. Conclusion

5.1. Result of study and strategic implication

When reviewing the industrial structure of Korea, in relation to creation of job that is discussed as the solution for polarization of layers and requirements for expanded welfare, jobs in manufacturing industry were reduced by as many as 1,060,000 jobs for 21 years indicating that export-focused manufacture, which has been insisted by Korea, faces a limit. Service industry, which takes about 70% in whole employment, may be an alternative to create jobs and to lead future growth of Korea in future.

However, the studies/surveys on adequacy of service as an alternative and the studies on political alternatives are still quite insufficient. The service industry of Korea is still focused in domestic economy and most of it consists of small companies that have low productivity. In order to solve this problem, various endeavors should be made to change high value-added service industry to export industry, activate R&D of service linked with foreign demand, and promote large/middle/small service companies to expand to foreign countries together.

In such a situation, the study may be meaningful as described below. First, the solutions for the problems of small businessmen's self-employed business may be naturally obtained in the process to seek for optimum scale and management efficiency of Korean service industry in the service area of small businessmen which has been academically neglected. That is, the models for measurement and analysis to make political decisions were developed to identify the scale at country level.

Second, most of past studies on service industry consisted of the studies on the specific features and correlation of service industries in relation to the area of international comparison for simple analysis of service industry, the area of inter-structure analysis among manufacturing industries, and the area on the influence of development of service industry to economic growth. However, the study was conducted in empirical study type using

panel data of OECD countries; independent variables such as scale of service industry, working hours, and labor productivity, etc. which have not been handled in past studies but give new influences were found and the analysis of influences of independent variables to productivity, added values, and employment effect will help the development of Korean service industry.

Third, exact adequacy of Korean service industry will be identified through adequately verified regression formula for estimation of the adequacy of service industry. If Korean service industry that has low efficiency is expanded to food industry, whole/retail industry, service industry, and construction industry, etc. and is segmented for each area, adequate industrial structure of each business category and the measures for advancement of adequacy will be deduced. The measures for advanced management structure of adequacy which are newly suggested in the study will make large contributions in the policies to cultivate service industry in Korea.

5.2. Contribution and limit of the study

The contribution made by the study is that improvement of foundation and management by small businessmen was approached at the level to estimate adequate scale of service industry of small businessmen and to develop the analysis models rather than traditional political and financial support of small businessmen or traditional management consulting and guide. Such different approaching method will make large contributions in development of the self-employed business of small businessmen. Also, the analytical formula to estimate adequate scale and the variables developed in the study will make many contributions in academic studies in future.

However, lots of performances were obtained by completing the continuous analysis models for local economic growth rate and economic development levels by the method to expand and develop the analysis methods of previous studies at the level of a successive study but total empirical survey to compare two GMM panel types as well as fixed and probable effect models could not performed due to limited time and budget. If comparative surveys including country-unit analysis models such as GMM panel, etc. are conducted to develop the method to estimate adequate scale of service industry of small businessmen more precisely to meet the situation of Korea, successive discussions will be made and more indications will be obtained. In addition, if detailed studies are conducted to remove the endogeneity of statistics, the precision levels of studies will be further elevated.

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