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International Competitiveness of Korea Service Industry

[1]Yoon-Doo Kim, [2]Seok Yoon and [3]Ki Seong Lee
[1]Department of Food and Resource Economics, Konkuk University,
322 Danwol-Dong, Chungju-Si, Chungcheonbuk-Do, 380-701, Korea
[2]Korea National Assembly, 1 Yoido Dong, Youngdeungpo-Ku, Seoul, 150-703, Korea
[3]Department of Economics, Konkuk University,
1Hwayang-dong, Kwangjin-ku, Seoul, 143-701, Korea

Abstract: Problem statement: This study examines the competitiveness of Korean Service Industry through the empirical analysis based on the comparative advantage index and suggests the policy implications from the research results. **Approach:** The model of empirical analysis was set using the equation of ratio of Export and Import (EXIM) and net export (XM) for service industry. **Results:** The present study showed the estimation results of the EXIM and XM. **Conclusion:** With regard to the competitiveness of service industry, the analysis results suggested the policy implications: First, it was necessary to introduce an incentive system for skilled workers and invest more in research and development in order to increase the labour productivity of human capital. Second, government should implement the open market policy to liberalize the labour movement and induce low-paid labour.

Key words: Service industry, international competitiveness, South Korea

INTRODUCTION

In general, as economy has been developed steadily, the ratio of tertiary industry (service industry) to overall industries gets higher as compared with that of primary industry or secondary industry. This is called to be servicization of the economy. The servicization of the economy means that the production, consumption and employment of services account for an increasing percentage of the overall economy through the increase of production in service industry, the intensive capital and knowledge and the outsourcing of service work in the manufacturing industry. This phenomenon can be observed in most advanced countries including the United States.

The international discussion on trade liberalization has been limited to commodity trade under the existing GATT system. Especially, it focuses mainly on tariff reduction and removal of non-tariff barriers among other various issues. Moreover, there had not been many discussions on the service industry due to the industrial characteristics until the end of 1970s when servicization of the economy started. In 1986, Uruguay Round (UR) negotiation finally launched the first discussion on service trade in the GATT system. After that, the comprehensive discussion on service industry has been performed in the General Agreement on Trade Services (GATS) under WTO system.

As a result, the international competitiveness and export and import of service industry have been empirically studied since 1980. For example, the international competitiveness was studied by Sapir and Lutz (1980); Stern and Maskus (1981) and Giersch (1989). Also, in the Japan, Greenaway and Winters (1994) studied the international competitiveness. These studies were based on the classical trade theory such as comparative advantage theory of D. Ricardo and theory of factor endowment of E. Heckscher and B. Ohlin.

The empirical studies mentioned above focused on what determined the competitive advantages of service industry. The results showed that although there were some differences depending on the economic environment of each country, its comparative advantage of service industry was usually determined by human capital, intellectual capital, financial capital and cultural capital.

Also, the servicization of the economy has been shown in Korean. The empirical analysis similar to the above was conducted by Yoshizo (1991) in Korea. In recently, as service industry accounted for more than 50% in the Production (52.7% of GDP), consumption (58.9% of household consumption expenditure) and employment (59.8% of total employed persons) of the economy, the servicization of the economy has been rapidly developed.

In future, the discussion on Korean service industry has to consider the followings: First, international trade is liberalized and export and import are increased.

Corresponding Author: Seok Yoon, Korea National Assembly, 1 Yoido Dong, Youngdeungpo-Ku, Seoul, 150-703, Korea

Second, as the production, consumption, employment, export and import of service industry account for an increasing percentage of the overall economy; the percentage exceeds those of manufacturing industry. This trend reflects the increasing importance of service industry in the economy.

Considering the increase of interdependence among countries in trade and the acceleration of market opening, this study examines the competitiveness of Korean service industry through the empirical analysis based on the comparative advantage index and suggests the policy implications from the research results.

Concept and characteristic of service industry

Definition of service industry: It is not easy to study service industry because we have difficulty in defining the concept of service. According to the traditional economy theory, goods and services give utility. As services have been classified into the same category as goods in terms of utility, most economists have not felt the need to distinguish goods and services.

Generally, there is no consensus among economists. Services are supposed to be the action that one economic subject changes the condition of himself and his property to support the economic activity of the other economic subject. Or services are considered to be the production activities that use the bad such as intangible economic goods. Though we define services as mentioned in the above, it is difficult to clearly discriminate the difference between goods and services. The reason is that when we conduct the economic activity, goods and services are mixed with other property. Also it is caused by the characteristics of services.

Characteristics of service industry: The concept of service is clarified by comparing the difference between goods and services and examining the characteristics of services. The fundamental difference between goods and services is as follows:

First, goods are tangible materials that can be transferred and exclusively used by economic units while services are intended to change goods belonging to economic units or status of human beings. That is, services are produced by the results of activities made by other economic units. Therefore, goods and services have different targets and theoretically belong to other categories.

Second, there is a difference in transferring ownership of goods and services as a means of economic exchange. Ownership of goods can be transferred to other economic units for economic purposes but that of services cannot be transferred. Service providers can provide their skills to other economic units and their members but cannot hand over ownership of their services.

Third, goods and services are different in the simultaneity of production and consumption. Services are simultaneously produced and consumed while goods are not. There is time interval between the production and consumption of goods.

Accordingly, services are impermanent and extinguished at the same time they are made due to their simultaneity of production and consumption, but not all services have such a feature. As there are durable and non-durable consumer goods, some services perish immediately after they are provided but others survive and affect their targets for a long time.

Dahringer (1991) of the United States classified the characteristics of services into four types: intangibility, inseparability, perishability and heterogeneity. Services have the marketing problems related to the four types. The four types are described in the followings:

First, intangibility means that services can not be tangible, stored, calculated and patented because they are not actual objects. Second, inseparability means that services usually involve outside consumers in their production and consumption processes. And services can not be mass-produced. Third, perishability means that services are immediately perished as soon as they are produced and provided to consumers. Fourth, heterogeneity means that it is difficult to standardize, distribute or resell services and to transfer their ownership. Also, services cannot exist by themselves.

Type of service industry: Traditionally, service industry was supposed to be non-trade commodity, so people did not show interest in them. As the production, consumption, employment, export and import of service industry account for an increasing percentage of the overall economy, it has gained more importance. Especially, as the ratio of export and import increases, the discussion on service industry has been conducted under the GATT or WTO.

And it is difficult to calculate the statistics of business activities. The reason is that some business activities statistically categorized in the manufacturing industry involve service activities. For example, if a company performs the market research to develop and sell the products, which is classified into manufacturing activities in the statistics even though the activities are related to the services. If the company hires an outside market research institution, which will be categorized as services.

The types of service industry vary according to the point of view on service, as follows.

First, if considering services in the point of view on demand and consumption, they can be classified into 3 types: personal service, corporate service and government service.

Second, if considering services in the point of view on international trade, they can be classified into 2 types depending on the geographical distance between demanders and suppliers and whether they need to move or not: short distance service and long distance service. Long-distance services require one party to move to the other while short-distance services do not.

Third, service industry can be statistically classified by International Standard Industrial Classification (ISIC) and Korean Standard Industrial Classification (KSIC). These classifications focus on final value added to distinguish goods and services. They make it easier to statistically analyze service industries, but they cannot include newly emerging services such as information or technology services.

MATERIALS AND METHODS

Methodology: This study analyzed the data on 62 service industry of 404 basic industrial sectors in 1995, 2000 and 2003 as specified in the Report on Industrial Census and the Input-Output Basic Sector Tables. The Report on Industrial Census and the Input-Output Basic Sector Tables has been published by the Bank of Korea on the basis of Korean Standard Industrial Classification (KSIC).

For the empirical analysis, we used the multiple regression analysis models for two dependent variables such as the ratio of Export and Import (EX/IM) and net Export (EX-IM) of service industry. These dependent variables indicated the index of comparative advantage in the service industry.

Before any analysis, reviewing the assumptions applied to the metric model for multiple regression analyses should be considered. First, multicollinearity problems occurred if a higher correlation was present among the independent variables when cross section data were used. Second, homoscedasticity problems occurred when the error term was homoscedastic. If these assumptions were not met in the process of estimation, the bias of estimation rises and it was hard to expect a good estimation (BLUE). Therefore, it was necessary to conduct a correlation test on the independent variables to check the multicollinearity and the Spearman's rank correlation test to check the homoscedasticity.

As a test for the multicollinearity, the Spearman's rank correlation test was conducted to detect the presence of Pearson's correlation coefficient or heteroscedasticity. Any statistical significance, however, was not observed in the Spearman's rank correlation test that might run counter to the assumptions. Thus, the heteroscedasticity and multicollinearity problems were ignored in this study.

Model: If analyzing the comparative advantage, traditional theories should be considered. This study set an analysis model that used the comparative advantage index such as ratio of Export and Import (EX/IM) as dependent variable. The model showed that the more the ratio of Export and Import (EX/IM) increased, the more the comparative advantage of service industry improved.

In the existing analysis, the net export (Export-Import; EX-IM) and revealed comparative advantage have been mainly used as the index of comparative advantage. This study used net Export (EX-IM) applied to the study of Branson and Junz (1971); Baldwin (1971) and Branson and Monoyios (1977). This model indicated that whether the comparative advantage was improved according to the increase of net Export (EX-IM). The regression equations for the ratio of Export and Import (EXIM) and net export were as followed Eq. 1 and 2:

$$EXIM = \alpha o + \alpha 1\ EP + \alpha 2\ CE + \alpha 3\ DFC + \alpha 4\ GDO + \alpha 5\ RDQ + \alpha 6\ KRQ + \mu \quad (1)$$

$$XM = \alpha o + \alpha 1\ EP + \alpha 2\ CE + \alpha 3\ DFC + \alpha 4\ GDO + \alpha 5\ RDQ + \alpha 6\ KRQ + \mu \quad (2)$$

EX: amount of export, IM: amount of import

EXIM: ratio of export and import (index of comparative advantage)

XM: net export

EP: ratio of employed persons

CE: ratio of compensation of employees to average annual wages of mining and manufacturing workers

DFC: ratio of depreciation of fixed capital

GDO: ratio of gross domestic output

RDQ: ratio of R and D

KRQ: ratio of required capital requirement

Selected variables and data

Dependent variables: The dependent variables indicated the ratio of Export and Import (EXIM) and net Export (XM) were measured using the ratio of service industry to 404 basic industries in 1995, 2000 and 2003 on the basis of the Report on Industrial Census and the Input-Output Basic Sector Tables published by the Bank of Korea:

$$EXIM = EX / IM\sqrt{XM = EX - IM}$$

Independent variables: We selected the independent variables such as human capital (EP, CE), physical capital (DFC), industrial scale (GDO), technology level (RDQ) and economies of scale (KRQ) that determines the comparative advantage in export and import. These independent variables were adopted according to the comparative advantage theory. A proxy variable was applied to economies of scale because it was difficult to calculate the variable correctly. The details for selecting the independent variables were as followed:

First, the ratio of Employed Persons (EP) and ratio of Compensation of Employees (CE) were used as the variables of human capital. The ratio of Employed Persons (EP) indicated the ratio of employed persons in the service industry to economically active population in entire industries. And the employee's compensation ratio was the ratio of Compensation of Employees (CE) to average annual wages of mining and manufacturing workers. The ratio was measured using the Report on Industrial Census and the Input-Output Basic Sector Tables in 2000 and 2003.

Second, generally, it was reasonable to estimate total stock of tangible fixed assets in each industry and convert the estimation to a flow variable in order to obtain more precise results. But it was not possible to perform the above work because there were no data of tangible fixed asset in the Report on Industrial Census and the Input-Output Basic Sector Tables.

Therefore, the Depreciation of Fixed Capital (DFC) was used as proxy variable of physical capital. That is, we used the ratio of depreciation of fixed capital to gross domestic output.

Third, the ratio of Gross Domestic Output (GDO) to GNP at constant price was used as the variable to measure the scale of service industry.

Fourth, the ratio of Research and Development (RDQ) was used as the index of technology level. The reason was that it was very difficult to measure the technology level of services because services usually included intangible know-how and business proprietary information and had many indefinable characteristics as explained above.

Fifth, mostly, the minimum efficiency scale has been used as the variable for economy of scale. But this study applied the ratio of fixed capital formation in private and public sectors to gross domestic output. And the ratio of required capital Requirement (KRQ) was used as the proxy variable of economy of scale. The data and equation for measuring the independent variables were described in the appendix A.

RESULTS

Empirical results: The ratio of Export and Import (EXIM) and net export (XM) were selected as the dependent variables to measure the international competitiveness of Korean service industry. This study analyzed comparative advantages of service industry by considering positive or negative correlation and statistical significance between the variables.

Estimation results of ratio of Export and Import (EXIM): Table 1 showed the estimation results of ratio of Export and Import (EXIM). The details of the results were as followed: First, there was a positive correlation (+) between the ratio of Employed Persons (EP) and the ratio of Export and Import (EXIM) in 1995, 2000 and 2003. The ratio of Employed Persons (EP) was the index of human resource employed in service industry.

And there was no statistical significance between the ratio of employed persons (EP) and the ratio of Export and Import (EXIM). As the ratio of employed persons increased, the competitiveness of service industry increased.

The study of Greenaway and Winters (1994) showed that there was a positive correlation (+) between the number of human resource and the competitiveness of service industry. Also, in the study of Sapir and Lutz (1980), the analysis result indicated that human capital was the important factor of insurance and transport service. Accordingly, we could think that the ratio of Employed Persons (EP) was the important factor of the competitiveness of service industry in Korea.

Second, there were a negative correlation (-) and statistical significance between the ratio of Compensation of Employees (CE) and the ratio of Export and Import (EXIM) in 1995, 2000 and 2003. The result showed that as the ratio of compensation of employees decreased, the comparative advantage of service industry increased. Therefore, we could think that the comparative advantage of export and import was determined by the competitiveness of labor cost for export and import due to the characteristics of human capital in the service industry.

Third, there was a negative correlation (-) between the ratio of Depreciation of Fixed Capital (DFC) and the ratio of Export and Import (EXIM) in 1995, 2000 and 2003. Therefore, we could think that the fixed capital did not play an important role in securing the comparative advantage of service industry. That is to say, the comparative advantage of service industry was not determined by ratio of depreciation of fixed capital.

Table 1: Estimation result of ratio of export and import (EXIM)

	Ratio of Export and Import (EXIM)		
	1995	2000	2003
EP	2.73 (0.402)	2.848 (0.421)	3.095 (0.405)
CE	20.368	21.396122	13.308688
DFC	-1.04 (-0.91)	-1.095 (-0.963)	0.698 (0.457)
GDO	33.01* (1.65)	32.38* (1.645)	36.428* (1.704)
RDQ	-	-6.351 (-1.069)	-20.041 (-0.631)
KRQ	7.255* (1.645)	8.045* (1.671)	12.318** (2.152)
Constant	0.4*** (3.32)	0.429*** (3.487)	0.368** (2.317)
R^2	0.89	0.926	0.935
F	12.223	13.125	13.277

Note: (1) Figures in parentheses are t values. (2) In the t-test, * is significant at 10%, ** at 5%, and *** at 1% (The same significance levels apply correspondingly to the following).

Table 2: Estimation result of net export (XM)

	Net Export (XM)		
	1995	2000	2003
EP	0.7067	0.068 (0.446)	0.589984
CE	0.383 (1.408)	-0.85*** (-3.516)	-0.212 (-0.73)
DFC	-0.075 (-0.409)	-0.75*** (-5.423)	-0.093 (-0.433)
GDO	-0.628** (-2.24)	-0.603*** (-2.556)	-0.394 (-1.295)
RDQ	-	-0.099 (-0.765)	-0.007 (-0.039)
KRQ	-0.204 (-1.28)	-0.01 (-0.076)	-0.107 (-0.584)
Constant	0.001 (0.68)	0.006 (0.018)	0.005 (0.256)
R^2	0.874	0.959	0.838
F	11.102	15.215	10.217

Note: (1) Figures in parentheses are t values. (2) In the t-test, * is significant at 10%, ** at 5%, and *** at 1% (The same significance levels apply correspondingly to the following).

And as the ratio of Depreciation of Fixed Capital (DFC) required for production activity decreased, the comparative advantage of service industry increased.

Fourth, there were a positive correlation (+) and statistical significance between the ratio of Gross Domestic Output (GDO) and the ratio of export and import. And the ratio of Gross Domestic Output (GDO) indicated the scale of service industry. That is, as the ratio of industrial scale to national economy increased, the comparative advantage of service industry increased.

Fifth, the development and introduction of new technology were the important factors for securing the comparative advantage of service industry. During the analysis, we expected that there was a positive correlation (+) between the increase of investment in research and development and the comparative advantage of service industry. But the result showed that there was a negative correlation (-) between the ratio of Research and Development (RDQ) and the ratio of export and import in 2000 and 2003.

Through above result, we could think that the investment in research and development did not play an important role in securing the competitiveness of service industry. That is, the investment was not required for the competitiveness of service industry. And this was related to the characteristics of services such as intangible skill and business proprietary.

On the other hand, the study of Yoshizo (1991) showed that in case of freight transport industry, there was a significant positive correlation (+) between the investment in research and development and the comparative advantage of service industry. This result was supposed to be caused by the expectation that the comparative advantage would be improved by the investment in research and development.

Sixth, there were a positive correlation (+) and statistical significance between the ratio of required capital Requirement (KRQ) and the ratio of export and import in 1995, 2000 and 2003 (The ratio of required capital requirement indicated the economy of scale). This result showed that as the ratio of required capital Requirement (KRQ) increased, the comparative advantage of service industry increased. That is, the industry whose barriers to entry were high had a high comparative advantage in export and import through economy of scale.

Estimation results of net export (XM): The estimation results of net export (XM) were described in the Table 2. The details of the results were as followed.

First, there was a negative correlation (-) between the ratio of Employed Persons (EP) and net export in 1995 and 2003. But there was a positive correlation (+) between the ratio of Employed Persons (EP) and net export in 2000. Unlike the estimation results of ratio of Export and Import (EXIM), the results of net export varied according to the years. The above showed that if considering the positive correlation (+), when the employment structure of service industry was labor-intensive, the comparative advantage increased.

Second, there was a negative correlation (-) between the ratio of Compensation of Employees (CE) and net export in 2000 and 2003. And there was statistical significance between the ratio of Compensation of Employees (CE) and net export in 2000. The result showed that as the ratio of Compensation of Employees (CE) decreased, the comparative advantage of service industry increased. But there was a positive correlation (+) between the ratio of Compensation of Employees (CE) and net export in 1995. Therefore, we could think that the above results did not show statistical consistency.

Also, the estimation results of ratio of Compensation of Employees (CE) before the Korean market was open (in 1995) were the reverse to those after the Korean market was open (in 2000 and 2003). The negative correlation (-) after the market opening in Korea showed that as the low-paid labor was supplied

through the market opening, the comparative advantage of service industry increased.

Third, there was a negative correlation (-) between the ratio of Depreciation of Fixed Capital (DFC) and net export in 1995, 2000 and 2003. And the estimation result in 2000 was statistically significant. These results showed that as the ratio of Depreciation of Fixed Capital (DFC) decreased, the competitiveness of service industry increased. Therefore, the consistent results were estimated in net export rather than in ratio of export and import.

Fourth, there was a negative correlation (-) between the ratio of Gross Domestic Output (GDO) and net export in 1995, 2000 and 2003. The estimation result in 2000 was highly statistically significant. The estimation results of net export were the reverse to those of ratio of export and import. These results showed that as the scale of service industry decreased, the comparative advantage increased. Therefore, it was not possible to say which estimation results were more correct.

Fifth, there was a negative correlation (-) between the ratio of research and development (RDQ) and net export in 2000 and 2003. This result was similar to that of ratio of export and import.

Sixth, there was a negative correlation (-) between the ratio of required capital Requirement (KRQ) and net export in 1995, 2000 and 2003. This result showed that as the ratio of required capital Requirement (KRQ) increased (or as the barriers to entry of industry got higher), the comparative advantage of service industry decreased. And the estimation results of net export were the reverse to those of ratio of export and import. Therefore, the ratio of required capital Requirement (KRQ) did not consistently have an effect on the comparative advantage of service industry.

DISCUSSION

The empirical studies mentioned above focused on what determined the competitive advantages of service industry. The results showed that although there were some differences depending on the economic environment of each country, its comparative advantage of service industry was usually determined by human capital, intellectual capital, financial capital and cultural capital.

In future, the discussion on Korean service industry has to consider the followings: First, international trade is liberalized and export and import are increased. Second, as the production, consumption, employment, export and import of service industry account for an increasing percentage of the overall economy; the percentage exceeds those of manufacturing industry. This trend reflects the increasing importance of service industry in the economy.

CONCLUSION AND POLICY IMPLICATIONS

In this study, the international competitiveness of Korean service industry was examined by the index of comparative advantage such as the ratio of export and import and net export. With regard to the competitiveness of service industry, the analysis results suggest the following policy implications:

First, government should implement the policy to improve the labor productivity rather than to increase the number of human resources. And service industry must hire more skilled workers with professional knowledge and know-how to improve its competitiveness. Therefore, it is necessary to introduce an incentive system for skilled workers and increase investment in R and D sector in order to increase the labor productivity.

Second, the analysis on the ratio of Compensation of Employees (CE) shows that as the ratio of wage of employed person's decreases, the competitiveness of the service industry increases. In other words, the competitiveness of service industry depends on how much liberalized the labor market is and how many labors are induced at low wages. Therefore, government should prepare the open market policy to liberalize cross-border labor movement and to induce low-paid labor.

Third, the fixed capital does not play an important role in securing the comparative advantage of service industry. But the fixed capital is necessary to secure the business proprietary information and know-how, which are intangible and essential assets to make service businesses more competitive. Besides fixed capital, professionalism of each company is also required to differentiate their services.

Fourth, there is a positive correlation (+) between the ratio of Gross Domestic Output (GDO) and the ratio of export and import in the estimation equation (1). Also, there is a negative correlation (-) between the ratio of Gross Domestic Output (GDO) and net export in the estimation equation (2). These two results contradict each other because the former suggests that services become more competitive as their scales expand while the latter suggests that competitiveness and scales are in inverse relationship. Therefore, further studies are required to obtain a clearer result.

Fifth, it is a widely accepted that the increase in R and D investment leads to the increase in the sales as

well as competitiveness of products, but the estimations in this study show the opposite results and suggest that this R and D variable is not as important as expected.

Finally, the result of ratio of required capital requirement showed that as the barriers to entry of service industry get higher, the comparative advantage increases in the ratio of export and import. On the other hand, the result of net export (XM) indicates the negative correlation (-). In summary, the estimation of ratio of required capital requirement does not provide the clear results about correlation and comparative advantage.

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Appendix A: Definition of variables and data

Variables and measurement methods	Data source
EP=number of persons employed in service industry/ economically active population	(1), (2)
CE=compensation of employees/average annual wages of mining and manufacturing workers	-1
DFC=depreciation of fixed capital/gross domestic output	-1
GDO=gross domestic output/GNP at constant price	(1), (2)
RDQ=research and development by industry/ gross domestic output	-1
KRQ=fixed capital formation/gross domestic output	-1

Source: (1) The Bank of Korea (2003), (2) Korea National Statistical Office (2002).

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