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A study on Regional Economic Impacts Due to Launch of International Ferry Terminal at Seosan-Daesan Port

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Abstract

The regional industry promotion system, which seeks to link the characteristics and resources of the region to its core strategic industry, is spreading the industrial resources in the form of an organic network. The Seosan-Daesan Port is the only port in the Chungcheong provinces that is equipped with international passenger dock and terminal, and it will soon have a ferry service operating to the Longyan port in Rongcheng, China in 2018.

The study focuses on effects of the first international ferry operation in the provinces that are being realized with the aim of developing the regional industry. The study also analyzes the ripple effects on the tourism and port industries in the provinces by tapping into the 2013 regional inter-industry table. The analysis shows that the scheduled ferry operation will generate 47,815 million won in production and 23,423 million won in added value for the region's tourism industry. It will also generate total revenue of 12,567 million won for the port industry driven by the locally handled freight containers and the added value.

Currently, the Korea-China ferry operation in other regions exhibits greater dependence on the cargo than the passengers. Thus, for the international ferry operation to and from Seosan ,generating maximum employment in tourism from the passengers of the international ferry operation will require strategic marketing to attract tourists. At the same time, a steady supply of cargo needs to be sustained by maintaining a balance between import and export cargoes. Furthermore, greater efforts should be made to create more sea routes than other regions or to increase voyages for the purpose of generating more added value.

Key words: Seosan-Daesan Port, Regional economy, Car ferry industry, Input-Output Analysis

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Ⅰ. Introduction

Opened in 1991 as the state-managed trade port, Seosan-Daesan Port has since been nurtured to support the hinterland petrochemical industrial complex and as a hub in the middle region of Korea for export to China. It also has upgraded its port infrastructure and facilities consistently to meet the sharply increasing container cargo volumes. Particularly, it is preparing to serve as a hub port for passengers to China by offering an international sea route and it is expected to be opened soon between South Korea and China.

The regional industry promotion system can connect the region's resources to the region's core strategic industry and may spread the region's industrial resources through an network, which can cause spill-over effects on surrounding regions.

In this study, we aim to figure out the economic effects of the ferry business that Seosan City implements for the regional industry through input-output (I-O) analysis. Many I-O Analyses through inter-industry analysis were introduced in previous studies, but this study focuses on the newly selected strategic industries with industry classification system. Furthermore, we carried out qualitative and quantitative analysis with secondary data, which presented the current status of logistics, economic effects, and policy directions.

Ⅱ. Theoretical Background And Research Framework

1. Current Status of Seosan-Daesan Port and Korea-China Sea Route

Seosan-Daesan Port lies in the middle west of the Korean Peninsula and in the northwest of Chungcheong South Province. Seosan-Daesan is the only port in the Chungcheong provinces that is equipped with an international passenger terminal and berth. After the 18th Korea-China Shipping Conference in 2010 the two countries agreed to open a sea route with Longyan Port in Rongcheng, China and started the construction of the international ferry terminal and dock, which were completed in 2016. The type of ships was changed from ocean greyhound to ferry in August 2016 and the two countries in the conference agreed that after two years operation of a 25-years-old ship, it would be replaced by a newly built ship.

The distance would be 339㎞, as the shortest path between South Korea and China and a 25,000-ton ship can carry about 1,000 passengers. Meanwhile, the population of Rongcheng is 667,150 in 2016.

Fig. 1 Seosan-Daesan - Longyan Sea Route.

Table. 1 Passengers Carried by Korea-China International Ferries

(Unit: 1,000 persons)

Division		2012	2013	2014	2015	2016
South Korea - China	Total	1,661	1,506	1,594	1,441	1,524
	Incheon-Weihai	145	147	157	132	139
	Incheon-Qingdao	117	128	108	70	76
	Incheon-Tianjin	104	10	31	66	73
	Incheon-Dalian	94	103	101	54	91
	Incheon-Qinhuangdao	42	47	37	46	51
	Incheon-Yantai	81	73	94	76	88
	Incheon-Dandong	146	164	174	148	154
	Incheon-Shidao	148	145	149	122	150
	Incheon-Yingkou	48	46	59	53	50
	Incheon-Lianyun	59	56	57	48	50
	Pyeongtaek- Rongcheng	175	188	168	131	12
	Pyeongtaek-Lianyun	63	65	36	26	1
	Pyeongtaek-Weihai	148	159	151	128	172
	Pyeongtaek-Rizhao	135	18	76	79	98
	Pyeongtaek-Yantai	-	-	61	130	151
	Gunsan-Shidao	156	157	135	132	168
	Other	-	-	-	-	-

Source: Ministry of Oceans and Fisheries (2017)

As of the end of 2015, 29 ships of 23 international ferry operators were in service on 22 sea routes, with 16 ships of 14 operators in service on 16 routes between South Korea and China. The Chinese ports that have ferry operations both to Incheon and Pyeongtaek are Weihai, Yantai, and Lianyungang, and the Chinese port which has ferry operations to Incheon and Gunsan is Shidao. For passenger transportation, Huadong Shipping Corp.'s Huadong Pearl VIis is the biggest, carrying 1,000 persons, and for cargo transportion, Weihai's Weidong Ferry's New Golden Bridge Vis is the biggest, carrying 325 TEU.

The Korea-China international ferry route is serviced by joint Korea-China ventures, most of them making three voyages a week. Table 1 shows the passengers carried by the Korea-China international ferries.

2. Literature review

The early studies on the spillover effects on the regional economy are carried out by an inter-industry analysis (I-O analysis).

Kim Sang-choon, Jang Heung-hoon and Kim Seung-chu (2015) classified the Gwangyang bay area shipping and port logistic Industry mainly into a shipping industry and port logistic industry. They derived the association between shipping and port logistic Industry and regional industries using an input and demand structure of shipping industry and port logistic industry.

Kim Sang-choon and Choe Bong-ho(2015) analyzed the economic effect of Busan shipping and port logistic industry on the regional economy. On the other hand, research related to Gwangyang port was made based on the policy research such as the development method of Gwangyang port according to the two-ports development policy of the government.

Yoo Hong-sung et al. (2010) classified into 16 industries including shipping logistic industry to analyze the economic effect of development of a new port on the economy of Incheon region. The riffle effect of development of the port logistics complex of the Incheon New Port stage I was analyzed based on the inter-industry analysis.

Bae Gi-hyeong (2008), who studied the economic effects that logistics industry, has on the economy reclassified the logistics industry, using the 2003 industrial input-output table, to analyze the economic effects that the logistics industry has on the economy of a country. The analysis showed that the logistics industry registered 1.433 in production inducement coefficient, 0.782 in influence coefficient, 0.997 in responsiveness coefficient, 0.601 in added value inducement coefficient, and 0.018 in employment inducement coefficient.

Yun Gab-sik (2007), who focused on the correlations among the industries in Incheon, analyzed the connections among industries and regions in Incheon by drawing on '2003 Incheon Industrial Input-Output'. The analysis shows that Incheon's industries with a high production inducement coefficient are transport equipment

and machines in general and those with a high added value inducement coefficient are services such as real estate, business services, finance, and insurance, while employment inducement coefficient was biggest for retail & wholesale, social and other services. The analysis of the interregional upstream and downstream industrial connection, which comprises the production and sales of goods, showed that Incheon registered the bigger downstream relevance than Seoul and Gyeonggi Province, which registered the bigger upstream relevance than Incheon.

Lee Eun-seok and Bu Sang-don (2007) used the region-specific input-output table to analyze the economic structure and interregional inter-industry effects for all the six regions. According to the regional industrial structure analysis, Seoul metropolitan region and Gangwon Province had a larger portion of services whereas other regions had a larger portion of manufacturing, as expected. They reported that notably, chemical products registered a high portion in the Chungcheong provinces and the Jeolla provinces while power and electronics, transport equipment, and food and beverage each took up a large percentage in Gyeongsang North Province, Gyeongsang South Province, and Gangwon Province. Furthermore, when it tried to identify the interregional dependence through decomposing the production inducement coefficients on the interregional I-O table, the same study showed that the Chungcheong provinces registered the largest dependence on the other regions.

They further analyzed the region's upstream and downstream relevance to the other regions registered through the trading of intermediate goods among the industries of the regions, which showed high upstream and downstream relevance for Gyeongsang North Province, the Chungcheong provinces, and Gangwon Province but a lower relevance for Seoul metropolitan region and Gyeongsang South Province.

Kim Hyeon-cheol, Lee Don-jae, and Go Seong-bo (2005) upgraded the industrial input-output model for Jeju based on the on-going market prices and thereby created an input-output model in total 42 sectors including agriculture, forestry & fishing, manufacturing, tourism, and other services. Their analysis based on the input-output table thus created for Jeju showed that the region's most production-inducing industries were ocean farming, pig farming, potato, tourist transport service etc. and that the region's most employment-inducing industries were wholesale & retail, restaurant, lodging, travel services, and tourist transport service.

Heo Jae-yong, Yu Seung-hoon, and Gwak Seung-joon (2008) analyzed the economic effects that the IT industry has on the economy. After updating the inter-industry table to 2006 based on the 2003 input-output table and with the RAS technique, they analyzed the various economic effects including the IT industry's production inducement effect, the supply shortage effect, and the economic effects on the general price level.

Using the nationwide input-output table disclosed by the Bank of Korea, they created

Incheon's inter-industry table to analyze the economic effects that the city's logistics industry has on its economy. Their inter-industry analysis showed that Incheon might consider fostering such industries as aircraft rental and sales and aircraft repair and maintenance in the other transport services, food service for ships, ship supplies, ship fueling, and ship repair and shipbuilding in the water transport support services.

Kim Sang-choon and Choe Bong-ho (2008) analyzed the economic effects of the port industry in Ulsan. They used the 2003 28-sector inter-industry table for Ulsan to reclassify the port industry and other major regional industries into specific industries and then created 31-sector inter-industry table to analyze the ripple effects on the regional economy. The analysis showed that the effects that the final demand for Ulsan's port industry in 2003 has about 6.823 trillion won in production inducement effect, about 1.723 trillion won in added value generation effect, and 21,514 persons in employment inducement effect. And the ripple effects that the production activities of the port industry has on the regional economy in 2003 reported nearly 2.51 trillion one in production inducement effect, 67.4 billion won in added value generation effect, and 8,895 persons in employment inducement effect.

Im Jeong-deok (2008) used the input-output (I-O) table to analyze the effects that Busan's port and port-related industries had on the city's economy. The analysis revealed that the port and the port-related industries had the influence of minimum one-fifth of the city's gross regional domestic product and added value and minimum one-seventh the regional employment.

Jeong Tae-won and Lee Kwon-hyeong (2006) analyzed the economic spillover effects of Incheon's logistics industry. Using the nationwide input-output table disclosed by the Bank of Korea, they created Incheon's inter-industry table to analyze the ripple effects that the city's logistics industry has on its economy. Their inter-industry analysis showed that Incheon might consider fostering such industries as aircraft rental and sales and aircraft repair and maintenance in the other transport services, food service for ships, ship supplies, ship fueling, and ship repair and shipbuilding in the water transport support services.

EconSearch (2007) analyzed the economic effects of Port Kembla near Sidney, Australia. The study, using the method for port impact studies that was developed by the Bureau of Transport Economics (2000), indicated that its effects on the regional economy of Illawarra included $557.5 million in total production, $303.4 million in added value, $165.7 million in household income and 2,845 persons in employment.

Meanwhile, EconSearch (2005) analyzed the effects that Geelong Port near Melbourne had on the regional economy. The total effects on the economy of Victoria in 2004 and 2004 included $328 million in production, $167.9 million in added value, $77.7 million in household income, and 1,385 persons in employment.

In summary, the previous studies mostly used the inter-industry analysis to analyze the effects

that specific industries had on specific regions. Accordingly, the study will utilize the inter-industry analysis to examine the effects that the operation of an international ferry from and to Seosan-Daesan Port will have on the economy in the Chungcheong provinces.

Ⅲ. Research Methodology

1. The Basic Structure of the Inter-Industry Table

Various industry sectors constitute the economy of a country produce goods and services by purchasing intermediate goods such as raw materials and fuel from other sectors and combining them with fundamental factors of production such as labor and capital. The produced goods and services are either sold as intermediate goods to other industry sectors or sold as consumer goods or capital goods to end users. The inter-industry table is a comprehensive statistical table that records all the transactions, which occur in the production and disposal of such goods and services in the matrix form based on a certain principle for a specified period (usually one year). Currently, the Bank of Korea creates and discloses total 4 inter-industry tables in accordance with the specification of the industry classification.

The inter-industry table is divided into the closed model and the open model. The closed model has all the sectors of the economy endogenized. Goods and services are exchanged among them, and all the sectors are engaged in production and consumption. On the contrary, the open model distinguishes the distribution of goods and services as the interim and final demand and the input as an interim input such as raw materials for production and original input such as labor. In the open model, final demand and original input factors are treated as open sectors and are thereby endogenized. Currently, the inter-industry tables created in many nations of the world are mostly the open model, and the South Korean inter-industry table is also made as an open model basis.

2. The Scope

We used the 2013 regional inter-industry table (for 16 cities or provinces) compiled through the indirect estimation by the Bank of Korea to analyze the economic effects that the operation of an international ferry between Korea and China on the economy in the Chungcheong provinces. For the purpose of analyzing the economic effects, we assumed that the arrival and departure of international ferries and the handling of container cargos will have on the port and tourism industry. We reclassified the industries and came up with the coefficients inducing production, added value, import, and employment, respectively.

For this study, we used the 2013 regional inter-industry table to reclassify the industries, identify various inducement coefficients, and reorganize the 30 sectors into 28 sectors for the

purpose of integrated categorization. We could not get the regional standard solely for Seosan City due to limited data and reorganized the previous 30 sectors into 28 sectors in the Chungcheong South Province for analysis.

(1) Tourism Industry

To investigate the economic spillover effects of the arrival and departure of international ferries, we drew on the earlier studies and reorganized the wholesale and retail services, transport services, and restaurant and lodging services as tourism industry for integrated categorization.

Table 2. Classification of Tourism Industry

Integrated Categorization (28 sectors)		Industrial Reclassification
19	Wholesale & retail services	Tourism industry
20	Transport services	
21	Restaurant and lodging services	

(2) Port Industry

To examine the economic spillover effects of the arrival and departure of container ships, we drew on the earlier studies and reorganized transport equipment and transport services as port industry for integrated categorization, as the regional inter-industry table is disclosed by the Bank of Korea.

Table 3. Classification of Port Industry

Integrated Categorization (28 sectors)		Industrial Reclassification
14	Transport equipment	Tourism industry
20	Transport services	

IV. Empirical Analysis

This study, as the inter-industry one, aims to analyze the economic effects that Seosan-Daesan Port has on the regional economy. We drew on the 2013 regional inter-industry table (for 16 cities or provinces) which the Bank of Korea compiled through indirect estimation to come up with the input-output table for the tourism industry of Chungcheong South Province. The arrival and departure of ferries and the handling of container cargoes will have impacts on the tourism industry. We have reclassified the industries and identified the coefficients inducing production, added value, income and employment, respectively.

1. The Economic Effect of the Operation of International Ferries on Tourism Industry

By reclassifying the tourism industry of Chungcheong South Province and integrating wholesale and retail services, transport services, and restaurant and lodging services, we have created the coefficients inducing production, added value, income, and employment, respectively.

According to the ferry passengers forecast in the third Port Basic Plan Revised, the tourism revenue can be estimated as stated in Table 5.

Table 4. Inducement Coefficients of Tourism Industry

	Product-ion Induce-ment	Added Value Induce-ment	Income Induce-ment	Employ-ment Induce-ment
Tourism Industry	1.200	0.588	0.099	21.0

Table 5. Tourism Revenue from the Operation of International Ferries (estimated)

	Estimated No. of Persons	Estimated Tourism Revenue (1 mil. won)
Chinese	15,200	21,606
Domestic Passengers	60,800	18,240
Total	76,000	39,846

The tourism business from the Chinese and South Korean passengers arriving from the operation of international ferries will have the effects on the regional economy (Table 6).

Table 6. The Effects That the Tourism Business from the Operation of International Ferries Will Have on Regional Economy

(Unit: 1 mil. won, person(s)/1 bil. won)

Tourism Business	Production Inducement	Added Value Inducement	Income Inducement	Employment Inducement
Chinese Passengers	25,927	12,701	2,135	454
Domestic Passengers	21,888	10,722	1,802	383
Total	47,815	23,423	3,938	837

Table 7. Inducement Coefficients of Port Industry

	Production Inducement	Added Value Inducement	Income Inducement	Employment Inducement
Port Industry	1.277	0.337	0.154	5.0

Table 8. Handled Container Cargo and Added Value Revenue from the Operation of International Ferries (estimated)

	Cargo Volume (TEU)	Estimated Container Revenue(1 mil. won)
Revenue from Handling Container Cargo	46,800	7,300
Added Value Revenue from Containers		2,541
Total		9,841

Table 9. The Effects of the Port Industry on Regional Economy through Handling International Ferry Cargoes

(Unit: 1 mil. won, person(s)/1 bil. won)

Port Industry	Production Inducement	Added Value Inducement	Income Inducement	Employment Inducement
Revenue from Container Handling	9,322	2,460	1,122	37
Revenue from Added Value	3,245	856	390	13
Total	12,567	3,316	1,512	50

2. The Economic Effect of Port Industry Involved in Handling the Container Cargo of International Ferries

By reclassifying the port industry of Chungcheong South Province and integrating wholesale and retail services, transport services, and restaurant and lodging services, we have created the coefficients inducing production, added value, income, and employment, respectively.

According to the ferry passengers forecast in the third Port Basic Plan Revised, the cargo container volume on international ferries will be 46,800TEU, and the estimated volume of handled container cargo and added value revenue are in Table 7.

With its revenue from handled container cargo and added value revenue, the port industry of Seosan-Daesan Port will have the effects on the regional economy, which is stated in Tables 8 and 9.

5. Conclusions

This study shows the economic effects with the operation of international ferries from and to Seosan-Daesan Port, on the regional economy, basically from the tourists and containers handled. The concerns of the central and local governments of the Republic of Korea are to find out what economic effects can be expected from investing funds in specific industries. Besides output, added value, and economic effects on the other industries, the Korean government is recently more interested in the direct employment effect when it comes to a port. As tourism seems to register a huge job creation effect, the project needs a strategy for attracting tourists with the operation of international ferries and increasing their operation.

Port authorities in foreign countries show the economic effects such as total product, added value, employment through their homepage. It is distinct that they show the effects using direct, indirect and induced effects and especially they more focused on generating jobs in the regions. They conduct surveys to collect the information and publish reports on a regular basis. In Korea, Busan and Incheon published similar reports on an irregular base, but they more focuses on general impacts and effects from maritime and port industry on a macro-economic base. Moreover, it is rare, covering car-ferry industry separately.

We interviewed three car-ferry companies in Korea, offering services and operating currently. They have information of the companies themselves, for example, employment and sales in the companies. They rather suggested to us to carry out a study with a survey on regional effects from tourists and container handling business. Therefore, it is recommended to conduct a survey and comparative study after the service in Seosan-Daesan port is offered.

It is suggested for this project to benchmark the recent case of Gunsan, which decided to increase the ferry operation and had a permission from the central government with a conditional base. Cruise ships with frequent operation are able to attract more and better facilities.

International ferry operators are composed of two participating parts from the countries (Korea, China, respectively), investing 50% each in equity and handle both passengers and cargoes. As the Korea-China ferries are competitive due to fast customs clearance compared to container ships, Korea-China ferry lines generate more profits from cargoes than those with passengers.

While the competition with container ships and allocation of routes remain uncertain, local governments and port authorities prefer to attract international ferry lines with a view to expanding the tourism in their regions. Even though revenues are obtained through cargoes, a stable supply of passengers is essential. The recent

political entanglement over THAAD between the Republic of Korea and China has reduced the overall passengers, thus affecting as negative.

Seosan City may want to operate a matrix organization structure or temporary task force linked to port operation, tourism, industrial complex, or urban development. Such arrangement will be suitable for launching or completing a project with a certain purpose within limited time. The project may consider establishing a short-term cooperation with the tourism division for attracting passengers for the international ferries operating to and from Seosan-Daesan Port or cooperation with the port, tourism, and city-related divisions regarding the hotel and tourism business in the urban regeneration.

Furthermore, the project may consider launching separate public corporations such as Seosan Port Tourism Corporation, Seosan Port City Authority, and Seosan Urban Port Development Authority (all tentatively named), which focus on re-invigorating the international passenger and container terminals of Seosan-Daesan Port and handling the functions of tourism, urban development, and facility management. In this study, the economic effects are estimated on Chungcheong South Province due to limited data. When the location quotient is applied, the results show diminished for these specific regions. To recover these limitations and get more reliable results, direct survey and a different type of analysis is required. Thus, coefficient readjustment is recommended through the future direct survey, which can create an inter-industry table, solely focusing on Seosan City.

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서산 대산항 국제여객선 취항에 따른 지역경제 유발효과 연구

윤경준 · 김성영 · 안승범

국문요약

지역이 가진 특성과 자원을 그 지역의 핵심전략산업으로 연결하는 지역산업추진체계는 지역의 산업자원을 유기적 네트워크 형태로 확산시키고 있다. 충청권 항만 중에서 국제여객터미널과 부두가 완비된 곳은 서산 대산항이 유일하며 2018년 룽청시 룽엔항과 취항을 앞두고 있다.

본 연구는 지역산업발전을 위해 충청권에서 최초로 진행 중인 국제여객선 취항이 지역경제에 미치는 영향에 대해 2013년 지역산업연관표를 활용하여 충남지역 관광산업과 항만산업에 대한 파급효과를 분석하였고, 분석결과 관광산업과 관련하여 연간 생산유발 47,815백만원과 부가가치 유발 23,423백만원에 대한 효과가 있는 것으로 나타났으며, 항만산업에서는 컨테이너 화물 처리와 부가가치 수입을 합하여 12,567백만원의 효과가 나타나는 것으로 분석되었다. 현재 타 지역 한중 항로 국제여객선의 특성상 여객보다는 화물에 대한 의존도가 높은 편으로 서산에 국제여객선이 취항되면 우선 여객을 통한 관광에 따른 고용창출효과의 극대화를 위해 관광객 유치를 위한 전략적인 마케팅이 요구되며 수입화물과 수출화물의 균형을 유지하는 등 꾸준한 화물의 확보도 필요하다. 또한 더 큰 부가가치의 창출을 위해 다른 지역과의 신규항로 개설이나 취항횟수를 늘리는 등의 노력도 요구된다.

주제어: 서산 대산항, 지역경제, 카페리산업, 산업연관분석