

## 우리나라 항만 인센티브제도 개선방안 연구\*

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### A Study on Improvement of Korean Port Incentives

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#### Abstract

This study explores the incentive system in Korean ports to become a global logistics hub in Asia or to be competitive among Korean ports as a regional hub. First, we identified the types of port incentives in Korea and in overseas ports. We selected potential incentives applicable to Korean ports and compared whether they were meaningful, efficient, and effective in the short and long term. We selected IPA (Importance-performance Analysis) as an analytical method and surveyed users and experts. The results show that it is necessary and effective to provide incentives for new shipping companies, both export and import shippers, while setting criteria for reasonable incentives. Factors needed for improvement included simplifying and calculating the incentive request process, incentives for terminal operators, and new incentives, in addition to existing incentives. Policy-making organizations will also need to collect feedback on institutional improvements and raise awareness among users. Key factors for improvement include providing incentives for existing shipping companies. In particular, in order to actively manage systematic and efficient policies, incentive criteria for existing shipping companies need to be reconsidered.

*Key words: Port policy, Port competitiveness, Port incentive, Importance-performance analysis*

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## I. Introduction

Korea's dependence on foreign trade is high at 69% (2017). 99.7% of import and export logistics is by sea transportation; therefore, the maritime port logistics industry is very important in Korea. In this regard, port competitiveness is recognized as an essential factor in reducing logistics costs among related businesses. Because of geographic location, Korea has always been in competition with its neighboring countries, and competition for commodity transportation among ports is getting severe and port promotion is intensifying. Korea focuses on various policies and incentives to attract cargoes, especially containers at each port.

Therefore, this study examined the incentives for overseas ports in China, Japan, and Southeast Asia, and compared and analyzed the ten Korean ports and port incentive systems. It also examined ways to improve the incentive system to enhance the competitiveness of Korean ports. In addition, a survey was conducted for users using these ten ports. Based on previous studies, the questionnaire was designed using a five-point Likert scale to measure the importance and performance of nine variables required for data analysis.

Statistical methods, in addition to basic statistical analysis, including frequency analysis by SPSS 18.0, IPA (Important Performance Analysis) was conducted on the incentive system of the Korean container port to investigate the perception of importance and performance of the users.

Specifically, the direction of improvement and development of the Korean port incentive system was derived.

## II. Literature Review

Incentives are a financial benefit to users for achieving and motivating their goals. Incentives at the port are operated in the form of providing compensation for the use of the port by shipping companies and shippers, and through this, the effect of increasing the volume of cargo can be seen. The incentive system paid to port users is implemented according to the port rate, provides benefits to main customers who use the port, and plans and implements changes in port use. Ports are provided to users in accordance with port tariffs and beneficiaries are the main customers who use the ports. This scheme is used to plan and drive port usage changes. Major incentive schemes include volume incentives based on the quantity of goods shipped, service incentives for the efficient use of port facilities, usage incentives, profit sharing incentives, etc. (Gwang-su Gil, 2011).

As ports involve a combination of various functions, complex economic entities use them. Table 1 summarizes previous studies regarding factors for assessing port competitiveness, which may be classified by the followings: the scale and position of port facilities, entry/departure of port using vessels and related services, cargo unloading equipment and capabilities to utilize such equipment, port tariff and various administrative

services, port transportation facilities and related industry sectors, quantity of goods transported via ports, and so forth. Table 2 shows port incentive

schemes in domestic studies such as journal articles and research papers.

Table 1. Researches on port competitiveness assessment

Researcher	Factors of port competitiveness assessment
Wu-ho Kim · Gi-seop Shim · Jeong-inJang (2008)	Investment scale, level of infrastructure, port governance, rates, contribution to local and national economies, service level, quantity of goods transported at the port, background and location
Gil-yeong Park · Seong-dong Oh · No-gyeong Park (2005)	Relative rates of port information service, inner wall length, quantity of cargo handled, number of regular shipping companies in commission
Gi-ung Lee · Sang-ok Lee · Myeong-bae Lee (2010)	Analysis of logistics hub strategies based on the inner factors of competitiveness (technology, price, non-price factors) and external factors of competitiveness (demand condition, governmental support, marketing environment, market environment)
Sam-hyeon Jo · Gwang-bae Lee (2006)	Port location, port facilities, preference and logistics infrastructure, unloading capabilities, information communication and finance, politics/port labor service, port cost, transshipment rates, number of lines, and frequency of calls at the port
Hong-geol Lee (2006)	Regional connection, hinterland condition, port facilities, port tariff, operation and administration, service, availability, and quantity of goods transported
Bong-ho Choi (2007)	Regional industrial growth and industrial production indexes, quantity of cargo transported at each local port
Chung-hyo Lee (2008)	Analysis of connectivity among the port clusters and industry (manufacturing, transportation, warehousing service, etc.) clusters
Won Yang (1999)	Logistics cost, logistics service (port information systems, port logistics supporting service), location, facility condition, administrative operation type (port administrator and port operation type, labor service provision and rating system)

Haewendonck et al (2000)	Large-scale port facility, port laborer productivity, flexibility
Notteboom (1997)	Large-scale containers transported, high rates of transshipment, regular calls at the port from various parts of the world
McCalla (1994)	Investment into port facilities, safety of laborers at the port, geographical location, inland railroad transportation
UNCTAD (1992)	Port service availability and efficiency, port service price, socio-economic stability of ports, information and communication (financial industry), geographical location, transportation in connection with hinterland

Table 2. Korean studies on port incentive schemes

Researcher	Content
Yang-yeon Won · Do-geun Kim (2013)	Problems regarding control of the quantity of goods transported by shipping companies in relation to incentives at Busan Port and Gwangyang Port are clarified and alternatives are proposed
Myeong-shin Ha · Cheol-min Kim · Byeong-gi Jang (2011)	Changes in the transshipment cargo quantity of goods transported at Busan Port as a result of introducing incentive schemes are analyzed by means of ARIMA-type models.
Byeong-in Park (2016)	Major port incentive schemes in Korea are analyzed, and their implications in relation to the development and introduction of incentive schemes in Korean ports are presented
Byeong-in Park (2016)	Port incentive schemes at Gwangyang Port are modeled using a form of linear programming modeling, and actual cases are analyzed in order to propose rational distribution methods of incentive budgets
Gwang-su Gil (2011)	Port incentive schemes at home and abroad are analyzed, and proposals for restructuring of Gwangyang Port incentive schemes are presented
Jong-shil Baek (2012)	Material effects of introducing port incentive schemes are analyzed
Incheon Port Authority (2013)	Based on the results of a survey conducted among Incheon port users, suggestions for improvement of incentives at Incheon Port are presented

IPA analysis is a method of comparing customer expectations and corporate performance. By analyzing importance and achievement in coordinates on the second plane, improvement priorities and over-investment factors can be identified according to location (Taeyeon Won, 2010). Through this analysis, the answer to which factors to prioritize and focus on competency can be identified for customer satisfaction (Duke and Rersia, 1996). The importance and achievement of the evaluation factors are measured and displayed on a two-dimensional drawing to give each meaning according to the position of the quadrant. The central point in IPA analysis is very important because it is a decisive factor that distinguishes which areas the evaluation factors will belong to. In this study, based on the research of Mengak et al. (1986), the overall mean value (Mean) of each factor of importance and achievement was used as the central point.

### III. Port Incentive Scheme

#### 1. Port Operation and Incentives in Korea

In Korea, the port master plan is the highest national plan associated with the ports, as determined by the Ministry of Maritime Affairs

and Fisheries under the Port Act. The port master plan is the very standard in the development and operation of Korean ports. It specifies the mid-to-long term development direction of 60 ports, including 31 trading ports and 29 coastal ports nationwide, as well as each port development plan. The Ministry of Maritime Affairs and Fisheries has established and announced its first port master plan (1992-2001), second port master plan (2002-2011), third national port master plan (2011-2020) in 2011, and amendment of the third national port master plan (2016-2020) in September 2016.

The revised third plan aims to improve the competitiveness and efficiency of ports as national infrastructure to handle cargo and meet various needs regarding port space and functions, incorporating relevant industry sectors, marine tourism, redevelopment, environment, security, and so forth. As shown in Table 3, the government plans to continually promote institutional improvements and expansion of private investments by allotting the total budget of 7.4 trillion won and attracting 7.3 trillion won from private sectors by 2020 so that ports can be widely recognized as a promising business for private investors. The policy will be implemented by 2020 to realize high value-added ports where logistics, leisure, and culture thrive.

Table 3. The third master plan for port development (unit: trillion won)

Classification	3rd master plan		Revised 3rd master plan		Remarks (2015)
	2011-20	2011-2015 investment performance (estimated)	2016-20	Average annual investment	
Finance	19.5	5.2	7.4	1.48	0.91
Private investment	22.2	6.4	7.3	1.46	1.32
Total	41.7	11.6	14.7	2.94	2.23

Source: Ministry of Maritime Affairs and Fisheries (2016)

Depending on the investment plans of the above, policies are implemented with the goal of increasing the total quantity of goods transported through ports to 1.71 billion tons, added values of ports to 40 trillion won, and employees in the port industry to 600,000 as shown in Table 4. To this end, the following policies are

promoted: strengthen logistics functions in line with characteristics of each port; expand the logistics base as a core national industry; support energy supplies and local logistics in a stable manner; establish sustainable and eco-friendly port systems; and support overseas advancement of port industries.

Table 4. Port policy goals

Total quantity of goods transported through ports	(2010) 1.21 billion ton	→	(2015) 1.46 billion ton	→	(2020) 1.71 billion ton
Added values of ports	(2009) 20 trillion won	→	(2014) 27 trillion won	→	(2020) 40 trillion won
Employees in the port industry	(2009) 480,000	→	(2014) 500,000	→	(2020) 600,000

Source: Ministry of Maritime Affairs and Fisheries (2016)

All ports handling containers in Korea have incentives. With respect to Busan Port, Busan city government and the port authority spend 20,3 billion won each year. The port authority spends 1.05 billion won at Incheon port and 13,2 billion won is

spent for Gwangyang Port. All other ports also implement incentive systems that compete with one another. In 2018, the total amount of incentives at ports in Korea increased to 43,6 billion won.

Table 5. Incentives schemes of Korean ports

Port	Budgets as of 2018
Busan Port	20,3 billion won (City: 3,2 billion / Port authority: 17,1 billion)
Incheon Port	1,05 billion won (spent all by the port authority)
Gwangyang Port	13,2 billion won (City: 0,65 billion / Province: 0,65 billion / Port authority: 11,9 billion)
Pyeongtaek Port	2,1 billion won (City: 0,9 billion / Province 1,2 billion)
Seosan Daesan Port	1 billion and 175 million won (City: 0,822 billion / Province: 0,353 billion)
Gunsan Port	1,9 billion won (City: 0,95 billion / Province: 0,95 billion)
Pohang Port	2 billion (City: 1 billion / Province: 1 billion)
Ulsan Port	0,35 billion won (spent all by the port authority)
Mokpo Port	0,3 billion (spent all by the City)
Donghae Port	1,2 billion won (City: 0,6 billion / Province: 0,6 billion)
Total: 43,575 billion won	

Source: Based on data of personal contacts by authors (2019)

2. Global trends of incentives at major ports

Major ports in East Asia, including China and Japan, compete with Korean ports in securing quantities of transported goods. Particularly among major ports in China, the quantity of goods imported or exported is increasing; but the country continues to invest in construction and expansion of ports at a large scale, in order to increase the quantity of goods transported by shipping companies, also by utilizing incentive schemes. As a result, 7 out of the world's top 15 ports are in China, and the number is expected to increase as Chinese ports continue to grow. Ports in Japan, as well, implement policies to increase the quantity of goods transported by utilizing various incentive schemes. Ports in Southeast Asia, including Kaohsiung Port and Singapore Port, also implement their own incentive schemes (Yeosu Gwangyang Port Authority, 2012).

1) China

Major ports in China include Shanghai Port, Ningbo Port, Guangzhou Port, Qingdao Port, and Tianjin Port. Incentive schemes at each port are presented in Table 6. In general, the incentive schemes are based on the rate at which the quantity of goods transported through ports in China in comparison with the previous year increases. Incentives include savings in handling fees and additional incentives for amounts in excess of the basic standard for the quantity of goods shipped. In addition, more incentives are provided for transshipment cargoes than export/import cargoes in order to promote transshipment. Since transshipment cargoes contribute to increasing the quantity of goods transported, each port is active in attracting transshipment cargo.

Table 6. Incentives schemes of major ports in China

Port	Major content
Shanghai Port	<ul style="list-style-type: none"> <li>• Unloading fees are charged only once in each transshipment cargo loading/unloading process</li> <li>• 20% discount is applied when the transshipment cargo increase is 20% or less compared to the previous year</li> <li>• 30% discount is applied when the cargo increase exceeds 20%</li> <li>• For empty containers (no unloading fees charged; facility fees exempted for 4 days)</li> </ul>



Ningbo Port	<ul style="list-style-type: none"> <li>• Unloading fees are charged only once in each cargo loading/unloading process</li> <li>• 5% rate discount is applied to top 15 shipping companies</li> <li>• 5% additional discount for 1 to 19% increase compared to the previous year; 1% additional discount for 20% increase compared to the previous year</li> <li>• 2% additional discount for 30% increase compared to the previous year</li> </ul>
Qingdao Port	<ul style="list-style-type: none"> <li>• Transshipment cargo: discount as much as 70% of the basic rates; fees are charged only once in each transshipment cargo loading/unloading process               <ul style="list-style-type: none"> <li>- Import/export cargo: 1 to 17% discount of unloading fees is applied to shipping companies whose quantity of handling cargo has increased 10% compared to that of the previous year (differentiated application depending on the quantity of goods transported)</li> </ul> </li> <li>• Opening of new routes: 20% discount to unloading fees</li> </ul>
Tianjin Port	<ul style="list-style-type: none"> <li>• Fees are charged only once in each transshipment cargo loading/unloading process</li> <li>• Unloading fee discount depending on the quantity of goods transported compared to that in the previous year: 50,000 TEU+: 5% discount</li> <li>• New route opening: 15% discount to unloading fees</li> </ul>
Guangzhou Port	<ul style="list-style-type: none"> <li>• New (shipping company, route opening) service: 45 million dollars in cash; tax cut (2017-2018)</li> </ul>

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Source: Byeong-in Park (2016)

## 2) Japan

Major ports in Japan include Tokyo Port, Kobe Port, and Yokohama Port. Incentive schemes in these ports, in general, reflect policies to actively promote investments into port facilities and cargo transportation. In addition, Japanese ports are advantageous as they are adjacent to main trunk routes. However, their competitiveness is weakening as shipping companies are reluctant to call them due to natural disasters such as earth-

quakes, tsunamis, volcanic eruptions, and so forth. Incentive policies adopted by three major ports in Japan are presented in Table 7. Typically, incentives include discounts of port charges and dockage fees, to attract large vessels and promote volume growth, and new port openings.

Table 7. Incentive policies of major ports in Japan

Port	Major content
Tokyo Port	<ul style="list-style-type: none"> <li>• 30% discount is applied to the mooring facility fees when the quantity of loading/unloading exceeds the basis</li> <li>• When a large vessel (50,000GRT+) enters the port: port charge reduction for 50,000GRT or larger vessels</li> <li>• 100% exemption of the first port charge for vessels using a newly established route</li> <li>• Feeder transportation: 100% exemption of port charges for registered coastal container ships</li> </ul>
Kobe Port	<ul style="list-style-type: none"> <li>• Inner harbor feeder promoting policies: compensation for fees upon a business operator's proposal to strengthen feeder functions</li> <li>• Container ships using a new route during the designated period: 2 million yen per call / 1 million yen per call in cases where the quantity of cargo of each call is at least 500TEU, or at least 15,000TEU of cargo per year is expected to be transported through the new route</li> <li>• For outport transshipping containers: 5,000 yen per TEU in the case of less than 2,000TEU / 7,500 yen per TEU in the case of 2,000TEU or more</li> </ul>
Yokohama Port	<ul style="list-style-type: none"> <li>• Port entry of large-size container ships (50,000GRT+): port charge reduction for 50,000GRT or larger vessels</li> <li>• New route opening: full exemption of port charges and inner wall use fees</li> <li>• 30% discount on port charges when 1,000 to 1,500 containers are handled in each port entry; 50% discount when more than 1,500 containers are handled</li> <li>• For docking on the day before the start of unloading, the inner wall use fees are exempted until 8:30 am on the date of unloading. When facilities of a certain scale designated by the mayor are used in the container terminal, 50% of the port land use fee is discounted in order to promote efficient handling of container cargo.</li> </ul>

Source: Byeong-in Park (2016)

## 3) Southeast Asia

Major ports in Southeast Asia are not in direct competition with Korean ports due to the long distance of ship navigation; but the incentive schemes of Singapore Port and Kaohsiung Port, two of the top 20 ports in the world (see Table 8), are also examined in this study to compare the competitiveness with Korean ports in transshipment. Relatively high standards are applied to shipping companies in regard to incentives. Singapore Port applies higher incentives to transshipment cargo, and incentives are limited to the benefit of offering seven days of free time for advance contractors. Kaohsiung Port applies incentives to the terminal for shipping

companies that handle 330,000TEU per year. With respect to transshipment cargo, there is a certain amount of incentives for every 10,000TEU increase. Relatively high incentives are offered for increases of cargo carried.

## 4) USA

The western ports of North America in Table 9 are actively investing in the competitiveness of each port infrastructure, and mainly provide environmental incentives to ships. When offering green incentives, the amount depends on Environmental Sustainability Index (ESI).

Table 8. Incentive policies of major ports in Southeast Asia

ort	Major content
Singapore Port	<ul style="list-style-type: none"> <li>• Phase-out incentives: 48-66% discount to official rates per container unit</li> <li>• Transshipment cargo: 7 days of free time</li> <li>• Discount of unloading fees: Advance contracts with PSA</li> </ul>
Kaohsiung Port	<ul style="list-style-type: none"> <li>• Transshipment cargo: For every 10,000TEU increase compared to the previous year, 90,000 dollar discount of subleasing fees <ul style="list-style-type: none"> <li>- \$15,000 to \$24,000 discount depending on the transshipment rates (50-80%)</li> </ul> </li> <li>• (The terminal for shipping companies) 90,000 dollar discount of subleasing fees when the cargo of at least 330,000TEU is handled per year. <ul style="list-style-type: none"> <li>- When the target is exceeded (0.45~2 million TEU), 5-11% discount of subleasing fees per section</li> <li>- 1st rank based on the total quantity of goods transported: 90,000 dollar, 2nd rank: 60,000 dollar, 3rd rank: 45,000 dollar, 4th rank: 30,000 dollar incentives</li> </ul> </li> </ul>

Source: Byeong-in Park (2016)

Table 9. Incentive policies of North American, South American Ports

Port	Major content								
Los Angeles Port	<ul style="list-style-type: none"> <li>• As a port with world-class infrastructure, Port of Los Angeles focuses on terminal and transportation improvements.</li> <li>• Data sharing incentive \$10 discount per TEU for each unit that exceeds overall market growth in the trans-Pacific trades. \$5 discount per TEU for each additional container it ships through the port.</li> <li>• Environmental Ship Index Program (ESI program) 40~49 points: \$750 discount per call 50 points or greater: \$2,500 discount per call</li> </ul>								
Long Beach Port	<ul style="list-style-type: none"> <li>• Focuses on developing and maintaining state-of-the-art infrastructure that enhances productivity and efficiency in goods movement.</li> <li>• By fully implementing 2017 Clean Air Action Plan Update, the port aims to facilitate the transition to zero-emissions Port operations.</li> <li>• Green Flag Program incentive Vessel operators receive dockage rate reductions for slowing to 12 knots or less within 40 nautical miles of Point Fermin. Operators who bring the newest, cleanest vessels to the Port of Long Beach can receive up to \$6,000 per ship call under this program.</li> </ul>								
Vancouver Port	<ul style="list-style-type: none"> <li>• The port is connected to every key market in North America through three Class 1 railways</li> <li>• Actively doing businesses with Asia, Latin America and Oceania. Recently, set up a new Asia headquarters in Shanghai, China.</li> <li>• Container Vessel On Time Performance Incentive For container vessels, the port recognizes vessel on-time arrival within eight hours of the start of the scheduled terminal berth window.</li> </ul> <table border="1" data-bbox="384 1181 849 1311"> <thead> <tr> <th>% On Time</th> <th>Incentive Rates</th> </tr> </thead> <tbody> <tr> <td>≥ 90%</td> <td>15%</td> </tr> <tr> <td>75~89%</td> <td>5%</td> </tr> <tr> <td>≤ 74%</td> <td>0%</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• Green Incentive For vessels using cleaner fuels and technologies, the port authority offers 47% discount on the port authority's basic harbour due rate.</li> <li>• ECHO program Vessels meeting new engine noise reduction standards receives 47% discount on docking fees.</li> </ul>	% On Time	Incentive Rates	≥ 90%	15%	75~89%	5%	≤ 74%	0%
% On Time	Incentive Rates								
≥ 90%	15%								
75~89%	5%								
≤ 74%	0%								

Source: Port of Los Angeles·Long Beach·Vancouver (2018)

Vessel Speed Reduction(VSR) points, and offers incentives accordingly. Northeastern Ports in Table 10, like other Central America in Table 11 offers ports, offers green incentives, offers a incentives related to tourist attraction,

Table 10 . Incentive policies of Eastern North American Ports

Port	Major content
New York · New Jersey Port	<ul style="list-style-type: none"> <li>• Vehicle import/export incentive program Offers manufacturers that are new to the port a 50% discount on every eligible vehicle that they import or export</li> <li>• Clean Vessel Incentive Program Rewards ocean-going vessels with Vessel Speed Reduction (VSR) points for streaming at 10 knots or less than 20 nautical miles (nm) outside of the Territorial Sea Line. Additional points are rewarded to vessels that exceed current international vessel emissions standards represented through Environmental Ship Index (ESI)</li> </ul>
Savannah Port	<ul style="list-style-type: none"> <li>• 29 port-related projects came to Georgia in 2018, bringing more than \$1 million in investment.</li> <li>• Mason Mega Rail project doubles the Port of Savannah' s rail lift capacity to 1 million containers per year.</li> <li>• Georgia provides targeted, highly competitive tax incentives.</li> </ul>

Source: Port of New York·New Jersey (2018)

Table 11. Incentive policies of Central American Port

Port	Major content
Colon Port	<ul style="list-style-type: none"> <li>• Serves to the regional markets of the Caribbean, North, South and entral America with shipments mainly originated in the Far East.</li> <li>• Colon Free Port With the regime of Colon Free Port, foreigners can make their unlimited duty-free purchases.</li> </ul>

Source: Port of Colon (2018)

Incentives for Korean ports mainly include volume, transshipment cargo, new routes, and year-on-year increase in container handling. The payment method of incentives appears in the form of lowering or refunding usage fees such as loading and unloading fees. In the case of Japan and China, which are located nearby and compete directly, loading and unloading charges for transshipment cargo and the year-on-year increase are the main factors, and discounts and

additional days of use of the storage facility are the main incentives. In Japan, there are incentives for linking coastal transportation (feeder) and large ships, and in China, incentives for large ships are also impressive. Singapore ports are characterized by free use of storage facilities for transshipment cargo over certain volume, while Kaohsiung ports are also characterized by higher rank benefits. North American ports are characterized by incentives according to environmental regulations and discounts based on punctuality. In the case of Korea, incentives,

mainly based on competition between domestic ports, can be viewed as a zero-sum game, and incentives for transshipment cargo do not appear to be differential in Northeast Asian ports

#### IV. Importance-Performance Analysis on Port Incentives

##### 1. Survey data and IPA analysis

As part of this study, surveys were conducted both online and offline for 11 days between November 20 and December 1, 2018 and port users and policy-related entities (e.g.; shipping companies, cargo handling companies, forwarders, logistics companies, and professionals) participated in order to improve competitiveness of Korean port incentive schemes. In total, 40 questionnaires collected were analyzed. Statistical characteristics of the participants are summarized in Table 12, and their work experience was 11.1 years on average.

Table 13 shows the results of port incentive

port use rates was 4.03, on average, which is considerable. The impact on port revitalization was 4.00, on average, which indicates that incentive schemes were influential. Some viewed that although port incentives might not contribute 100%, they were effective as inducement. The level of satisfaction with current policies was 3.30, on average. Considering the fact that it takes about 20 to 25 years until port operation stabilizes, some viewed that incentives should be offered at least for 10 to 15 years, and up to 20 years if possible, in order to secure independent operations in the long run. As to suggestions for this institution, some viewed that incentives for opening new routes would increase the quantity of goods transported through the port, and that rather than foreign shipping companies, domestic shipping companies should be the major beneficiaries of such incentives. Some also viewed that port operations should be promoted with incentives for service improvement until the port operations of cargo handling companies stabilize. In addition, some respondents believe that in consideration of gradual

Table 12. Statistical characteristics of respondents

Area of occupation	Classification						Remark
	Shipping company	Cargo handling company	Forwarder	Logistics company	Professional	Policy maker	Total
Frequency	7	6	3	13	6	5	40
Career	11.1 years on average						

scheme analysis. The impact of incentive schemes on

improvements through regular opinions collected from

logistics companies as well as general costs, it would be necessary to expand incentives further for shippers of shipping companies. Such opinions from policy-related entities and users need to be reflected in future policy-making procedures.

In this study, we responded to the overall issues without specifying any kind of incentive for each port. In other words, unlike Busan Port and Gwangyang Port, which deal with transshipment cargo, other ports mainly responded with the incentives for new routes, new services and

continuous use. Against this background, it is not possible to exclude the possibility that the respondent has already responded in favor of the respondent himself or the company to the expected incentive. However, due to the nature of this system, there is a side that cannot guarantee the reliability of answers even if the public or related work is not professional. In view of the above limitations, input from policy-related agencies and users should be incorporated into future policy-making processes.

Table 13. Respondents' answers on port incentive schemes

Classification	Average	Reason of selection	Remarks
Effects of port incentive policies on port use	4.03	<ul style="list-style-type: none"> <li>• As incentives can compensate for any loss that might result from port use, these could be effective inducements for shippers of shipping companies, particularly in the case of ports where a relatively small quantity of goods is transported, or the frequency is low.</li> <li>• In case of marine transport recessions, compensation for shipping companies' deficit needs to be secured in order to maintain the routes.</li> <li>• It turned out that although shippers and cargo handling companies were aware of incentive schemes, they doubted the material effectiveness.</li> <li>• Financial support should be offered for the decision-making process regarding loading ports among business entities including shipping /cargo handling companies, as well as shippers. At certain ports, interests among adjacent businesses may also increase.</li> <li>• As to ports securing a large quantity of marine transport and in-out demands, inducement through incentives may be necessary only for certain ports at strategic positions to attract supply and</li> </ul>	1. Not at all 3. Normal 5. Very much

	<p>demand of maritime cargo transportation, unlike other leading ports that are competitive and advantageous in securing a large quantity of shipments.</p> <ul style="list-style-type: none"> <li>• Since the unit price of cargo services decreases as incentives are applied, ports applying such incentives are advantageous.</li> <li>• As routes are secured owing to port incentives, the quantity of goods transported is expected to increase gradually.</li> <li>• Although port incentives might not contribute 100%, they were effective as an inducement.</li> <li>• As port use rates increase, the use of additional facilities at the port, and logistics in general, can be promoted.</li> <li>• As the persuasive power of management is improved, it is possible to manage major KPIs -) and to increase keen interests among hands-on staff.</li> <li>• Incentives are offered based on market share.</li> <li>• Insufficient resources available for domestic shipping companies handling a limited quantity of cargo</li> <li>• It is hoped that the amount of incentives for routes operating at a deficit is increased.</li> <li>• In consideration of the fact that it takes about 20 to 25 years until a port operation is firmly established, some viewed that incentives should be offered at east for 10 to 15 years, and up to 20 years if possible, in order to secure independent operations in the long run.</li> <li>• Mid/long-term concentration failure may occur due to an incentive decrease in the future, particularly among shipping /cargo handling companies that are highly vulnerable.</li> <li>• Incentives tend to be based solely on the quantitative characteristics of the cargo. In order to promote new route openings, a weight may have to be applied to new routes, such as ocean liner routes, as an approach to qualitative aspects.</li> </ul>	4.00	
Effects of port incentive policies on port revitalization			
The level of satisfaction with current incentive policies		3.30	<p>1. Not at all 3. Normal 5. Very much satisfied</p>



	Maintaining current status	5%	<ul style="list-style-type: none"> <li>• The current condition is thought to be appropriate. In the long run, the current incentives need to continue until a stable operation is secured.</li> </ul>
Possibility of modification to policies flexibly depending on the situation of the national economy	Modification on depending on the situation	95%	<ul style="list-style-type: none"> <li>• Various types of incentives need to be applied depending on the situation.</li> <li>• As the recession of the Korean marine transport market weakens the business profitability among shipping companies, the amount of incentives needs to be changed for quality maritime service. Incentive applications need to be flexible depending on each port's conditions.</li> <li>• Rather than uniform, across-the-board support, differentiated incentives depending on the conditions need to be applied (weights depending on the use rates, etc.)</li> <li>• Differentiated and competitive port operations need to be secured in consideration of the actual need for incentives and the target level of each port. The amount may be decreased later accordingly.</li> </ul>
Suggestions and requests regarding incentive policies			<ul style="list-style-type: none"> <li>• It is expected that as incentives are expanded for new route openings, the general quantity of cargo transported through the port will increase.</li> <li>- Supporting schemes primarily for domestic shipping companies, rather than foreign ones</li> <li>- Support for shipping companies by increasing the amount of incentives</li> <li>• Continued provision of incentives until the business operations of a cargo handling company are stabilized so that ultimately, service quality improvement leads to port revitalization.</li> <li>• It should be possible to check details of the current condition by strengthening the promotion of incentive schemes.</li> <li>• Additional benefits for users (incentives, priorities, etc.)</li> <li>• Continued improvement is sought by collecting opinions from shippers on a regular basis.</li> <li>• It is difficult to expect cooperation in areas where transportation service is provided in an exclusive manner since the local community holds the authority.</li> <li>• In consideration of the total expenses, incentives for shippers of a shipping company need to be expanded.</li> </ul>

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## 2. Results

In order to verify the research question on the assumption that there is a difference between the importance and performance of port incentive schemes in Korea, the importance-performance analysis (IPA) was conducted as part of this

study. First of all, the differences between the importance and performance (satisfaction) of the nine factors of incentive policies are presented in Table 14. The general average of these factors is determined by the median.

Table 14 . The result of importance–performance analysis of incentive scheme factors

Factor	Factor Items	Importance		Performance		I-P	t-Value	p-Value
		Mean	SD	Mean	SD			
Factor1	Simplification of incentive claim procedures	3.80	0.56	3.35	0.74	0.45	3.636	.001
Factor2	Computation of incentive claim procedures	3.88	0.76	3.38	0.74	0.50	3.732	.001
Factor3	Incentives for shipping companies opening a new route	4.25	0.74	3.53	0.93	0.73	4.318	.000
Factor4	Incentives for shipping companies maintaining an existing route	4.10	0.71	3.40	0.90	0.70	5.014	.000
Factor5	Incentives for export shippers	4.05	0.78	3.53	0.88	0.53	4.069	.000
Factor6	Incentives for import shippers	3.98	0.89	3.43	0.96	0.55	4.113	.000
Factor7	Incentives for terminal operating companies	3.50	0.91	3.23	0.83	0.28	1.921	.062
Factor8	Establishing standards for rational incentive application	4.40	0.63	3.75	0.93	0.65	3.823	.000
Factor9	Extra incentives in addition to existing incentives	3.88	0.88	3.15	1.05	0.73	3.827	.000

Correspondence sample T-test was conducted to analyze the differences by measuring importance and satisfaction for each item. Looking at the analysis results in detail, it was found that there were statistically significant differences in all factors except Factor 7 (Incentives for terminal operating companies) in the incentive policy. Based on the results above, the strategic zones are derived in the four quadrants as shown in Figure 1. In the zone of maintenance (Keep Up the Good Work), the levels of both importance and performance are high, and the differentiating superiority factors are involved. Thus, it is necessary to continually secure a relatively superior position. Incentives are offered to shipping companies who open a new route, export shippers, and import shippers. Four factors, including standards for rational incentive application, are arranged in this zone. In the zone of excessive investment (Possible Overkill), the level of performance is high, but that of importance is low. The effect would have been better if the efforts for this factor had been put into another area. The investment is viewed as relatively excessive. Such factors were not observed in this study. The zone of concentration for improvement (Concentrate Here) indicates that the level of performance was low, even though consumers

viewed the factors as important. Efforts need to be concentrated on these factors to increase the level of performance. In this study, incentives were offered to shipping companies maintaining an existing route. In the zone of factors necessary for improvement (Low Priority), the levels of both importance and performance are low. The need to allocate additional resources is relatively low, and additional investment may be applied depending on the availability of resources. In this study, the following factors were arranged in this zone: simplification and computation of incentive claim procedures, provision of incentives to terminal operating companies, and provision of extra incentives in addition to existing incentives.

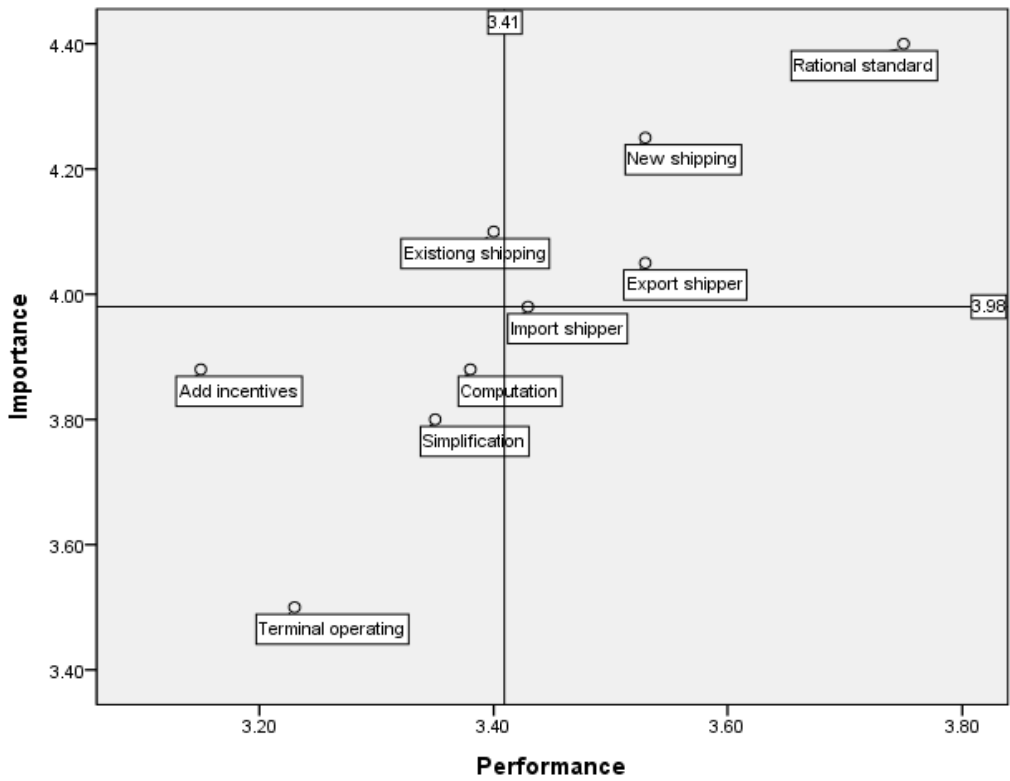


Figure 1. IPA analysis grid

## V. Conclusions and Further Research

### 1. Conclusions

This study analyzed the surveys and results of actual port users to derive ways to improve container port incentive schemes in Korea. The objective of this study is to compare the port incentive system of container ports in Korea in order to secure competitiveness as a logistics port hub in Northeast Asia, and seek ways to support ports for competitiveness improvement considering the importance of service quality and actual

service that users perceive.

The results of IPA analysis of the incentive scheme factors indicate that it is necessary to offer incentives to new shipping companies, exporting shippers, and importing shippers and to establish standards for reasonable incentives. It turned out that the factors necessary for improvement included simplification and computation of incentive request procedures, incentives for terminal operators, and new incentives required in addition to existing ones. In addition, policy-making organizations should collect opinions for institutional improvement and raise awareness

among users. Key factors to be improved include the provision of incentives to existing shipping companies. Specifically, the standards for incentives to existing shipping companies need to be reconsidered for active management with more systematic and efficient policies.

Asian ports have been criticized as a zero-sum game in their country because they mainly focus on incentives to attract ships and cargo. In the case of transshipment cargoes, competition with foreign ports is also criticized for being too dependent on the carrier's strategy. Apart from these volume-oriented incentives, there are incentives due to changes in transportation modes and incentives due to improvements in environmental aspects. Ports in North America and Europe are expanding these incentives.

In the case of river ports connected to the inland, incentives for the mode transition are targeted. In the case of seaports, air pollutants can be reduced according to the change of the energy sources of the ship fuel or of ports, so incentives for those actions and incentives for noise reduction can be included. Domestic ports need to shift from incentives for volumes and carriers to strengthen incentives for environmental improvement and transport transitions, which will be a strategy to avoid bleeding competition between ports in line with international trends.

## 2. Further Research

Measurement factors were selected based on the relationships between the factors indicated by

the survey. This is insufficient to analyze the correlation with the actual quantity of containerized cargo transported in relation to incentive schemes. The survey respondents were limited to Korean port users and professionals. Therefore, it is thought that the findings have limitations in presenting representative methods for improving all container ports. Future research will also need to specifically examine areas where port policy makers need to improve their relevant services.

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# 우리나라 항만 인센티브제도 개선방안 연구

윤경준 · 안승범

## 국문요약

세계 주요 허브항만이 되기 위한 각국의 치열한 항만 물동량 싸움에서 한국이 동북아시아 및 글로벌 물류 중심지로 발돋움하기 위해 현실적이며 효율적인 정책 필요성이 강력히 요구된다. 본 연구의 목적은 동북아시아 물류 중심지화를 위한 우리나라 항만들의 경쟁력 확보정책의 일환인 항만 인센티브 제도를 비교·분석하고 이를 이용자가 느끼는 서비스품질의 중요도와 성취도를 비교 분석함으로써 항만의 경쟁력제고를 위한 항만지원방안을 모색하고자 하는데 있다. 따라서 본 연구에서는 우리나라 항만의 인센티브제도 개선방향에 대해 연구 및 이용자 및 전문가를 대상으로 한 설문을 바탕으로 IPA분석을 실시해 보았다. 결과적으로 신규 기항선사 및 수출화주, 수입화주에 대한 인센티브 지급과 합리적인 인센티브 부여 기준 마련에 대한 요인은 유지 관리해야 한다고 나타났다. 인센티브 청구절차의 간소화, 전산화, 터미널 운영사 인센티브 및 기존 인센티브의 부가적 인센티브 부여는 개선대상영역으로 나타났으며, 이는 정책을 결정하는 기관에서 제도개선을 위한 의견수렴과 이용자들의 관심을 높이도록 고려해야 할 것이다. 중점개선 영역 요인은 기존기항 선사에 대한 인센티브 제공이며, 이는 기존기항 선사들에 대한 인센티브 제공기준을 재검토하여 좀 더 체계적이며 효율적인 정책으로 적극적인 관리가 필요하다고 볼 수 있다.

주제어: 항만정책, 항만 경쟁력, 항만 인센티브, 중요도성취도 분석

