

The Motivation of the Strategic Alliance between Ports Using AHP

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Abstract : *In recent years, shipping and ports industries are faced with enormous changes like globalization, market liberalization and borderless businesses. To cope with this competitive environment, a certain form of cooperation among ports is necessary to provide high quality of services and lower costs to establish their market power against shipping companies. The purpose of this study is to identify the motivation of the strategic alliances between ports and demonstrate the level of importance using Analytic Hierarchy Process(AHP). Among four motivations of the strategic alliances which are strategic motivation, economic motivation, operational motivation and marketing motivation, economic motivation is the most important factor for ports alliances than other factors. This is because economic motivation among strategic alliances allow ports in the same market to rationalize supply and demand, thus avoiding unnecessary over-supply and over-competition and also can reduce service costs by using comparative advantages of each partner which make costs cheaper.*

Key words : *Strategic Alliance, Alliance Motivation, AHP, Port Alliance*

1. Introduction

In recent years, market power of large shipping companies is intensifying amid the emergence of mega-carriers through coalition and mergers in shipping companies based on rapid changes, such as globalization and market liberalization of shipping and ports industries. Container terminal operations are strengthening time-to-market in global business strategy, and are making every effort to raise port competitiveness through building a collaborative system between ports. As the center of world economy is migrated to Northeast Asia region thanks to the high-growth of Chinese economy, the shipping service pattern of major large shipping companies is changing and competition of neighbor ports is deepening due to aggressive port development. Due to the intensified rate competition between terminal operating companies according to deepened bargaining power of shipping companies, the world-class terminal operators are forming collaborative relations and horizontal integration through the strategic alliances and M&A between major terminals, while establishing the strategic alliance with inland transportation operators, such as railway to promote vertical

integration.

With the changes of shipping and port environment at home and abroad, port authorities have commenced a new business strategy pertaining to port development and operations, such as seeking means to form cooperative relations through breaking the conventional competitive relations. Port authorities revealed that unlike individual ports, multiple ports are increasing the ways to improve business strategy, such as cost reduction through economies of scale, raise the competitiveness of ports through collaboration and engage in competition in good faith by breaking from the traditional competitive relations, according to the intensifying market power of mega-sized shipping companies.

In order to cope with the changes, this study identified the specific motivation factors, which would influence in forming the strategic alliance between ports. This study examined the significance and order of priority by items utilizing Analytic Hierarchy Process (AHP) and analyzed the outcome. This paper is intended to present a model, which facilitates obtaining successful strategic alliances between ports.

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2. Theory of the strategic alliance

2.1 The definition of the strategic alliance

The strategic alliance is a commitment that forms a strategic cooperative relation, while maintaining respective autonomy based on the elements of competitive advantage of a multiple number of firms. This is an unprecedented new management strategic attempts to secure a competitive edge. The strategic alliance signifies a continued cooperative relation of one or more firms throughout a period of time, or engagement of cooperative work or sharing of management resources such as assets, management ability, and technology aiming to raise competitive advantage.

The strategic alliance can be a new management organizational form, which coupled with the concept of alliance dubbed as medium conformation of internal and market trading, sharing of management resources of multiple firms and strategic factors, such as competitiveness reinforcement, mutual contribution or complementary and continuity.

The global strategic alliance can be formed as an official and relatively long-term affiliation by one or two different firms in various aspects of enterprise management by coupling management resources to raise global competitive advantage in the international market.

Glaister and Buckley(19996) asserted that hybrid arrangement is an arrangement between organizations to use a governance structure and resources of one or more existing organizations.

In addition, Pekar and Allio(1994) argued that unlike joint venture, which is a business type possessed by two or more entities sharing resources and technologies, the strategic alliance includes aforementioned indication, and further expands to stake relations.

2.2 Motivation of the strategic alliance

According to the literature, the motivations for alliance are to avoid risks and excess competition, implement diversified investment, pursue economies of scale, share firm-specific competitive advantage assets, acquire technology, penetrate into a new market, and raise the possibility of success in businesses. The strategic alliance is in a steady increase in recent years, due to the development of new reformed products and improvement of process technology through technology innovation.

According to Kwon(1994), the alliance motivation attributes

to occupying the leading role in the global market, sharing of resources and risks, containment of competition risks in domestic market, response to rapid consolidation of technology and market, reduction of a product introduction cycle, location reservation and access to a major market, establishment of international standard specification and evasion of protection barrier.

Harrigan(1987) suggests that the alliance motivation attributes to reduction of R&D costs and risks, economies of scale realization, development and securing of new technology, market penetration and expansion, adjustment of competition and complimentary sharing of firm-specific competitive advantage.

In the study conducted by Ohmae(1989), alliances can be formed because of market internationalization, sharing of resources and risks, a new product development, market penetration, securing flexibility, and building of core competence.

2.3 Motivation of alliance in liner shipping

The alliance literature presents that the alliance motivation attributes to the improvement of customer services and competitiveness, cost and risks reduction, and market expansion. Liner shipping companies form alliances in order to maximize customer satisfaction through improving service quality, improve competitiveness by sharing competitive advantage factors, expand market position, avoid investment risks on vessel and new services, and implement barriers to entry of non-alliance or new shipping firms.

Ryoo(2000) stresses alliance motivation differs according to business strategy. In case of the market stabilization strategy, alliance motivation is to stabilize shipping freight and limit external competition. For the service differentiation strategy, he attributes the alliance motivation to expansion of service range and frequency, and offering multiple transportation service and total logistics service.

In cost reduction strategy, the attribution to alliance motivation includes profit attainment through economies of scale, maximization of financial and operational synergy, the efficiency in container box management, and risks reduction in providing new liner services and investing in ship. In case of market development strategy, he attributes alliance motivation to the increase of market share, development of liner service on a specific market, a prompt penetration to a new linear market and development of a marketing network with partners.

Table 1 Motivation for the strategic alliance according to business strategy

Business Strategy	Motivation for Strategic Alliance
Market Stabilization Strategy	<ul style="list-style-type: none"> • Freight Stabilization • Restriction of outside competition
Service Differentiation Strategy	<ul style="list-style-type: none"> • Expansion of service range • Expansion of service frequency • Offer multiple transport service • Offer total logistics service
Cost Reduction Strategy	<ul style="list-style-type: none"> • Profit attainment through economies of scale • Financial synergy • Efficiency of contain box management • Risk sharing in new liner service • Capital reduction in purchase of vessels • Reduce financial burden in equipment investment
Market Development Strategy	<ul style="list-style-type: none"> • Increase of a market share • Development of liner service for specific market

Source : Ryoo(2000).

Table 2 Alliance motivation for liner shipping

Author	Alliance Motivation				
	Cost Reduction	Risk Reduction	Client Satisfaction	Market expansion	Increase of Competitiveness
Sim(1996)		●		●	●
Baek(1998)	●		●	●	
Song(1996)	●		●		●
Kadar(1996)	●		●		●
Lee(1999)	●	●	●		●
Ryoo(2000)	●	●	●	●	●

Source : Lim(2003).

3. The case analysis of the strategic alliance in the port industry

3.1 Background of the strategic alliance between ports

In the recent years, the port operators are endeavoring to build a collaborative system with competitors in various fields and intensify control power in connection with an overall logistics chain, aiming to increase profits and reduce port competition. In the case of shipping companies, it is a trend to set up not only collaborative relations in the industry through the strategic alliance and freight conference, but also expand their operations in terminal operation and inland logistics services. In case of terminal operating companies, they have been focusing their operation on local cargo handling. However, since 1990s they are growing as

global terminal operators pursuing a world-wide network due to the continued development of deregulation and port privatization.

The alliance strategy between ports has enabled port operators to penetrate into a new market without difficulty, and promote international diversification. In addition, ports can improve port services through the alliance between partners, and enables balancing bargaining power in response to the strategic alliance between large shipping firms. Moreover, port operators can upgrade their service level for port users through expanding their cargo handling facility.

In general, the ultimate goal of alliance in port operators is to increase profits through sales enhancement, while the goal of port authorities is to acquire economies of scale.

3.2 The case of port alliances

Recently alliances between ports are considered to be an important a business strategy from the viewpoint of terminal operating companies and port authorities. There are a few studies about port alliances. Sim, et. al.(2006) have identified several cases on port cooperation in China, New Zealand, Australia, Germany, Belgium, Sweden, and Denmark. For example, Hong Kong port and Shenzhen port in China have set up collaborative relations through joint venture. Through the collaborative strategy of the two ports, they were able to collaborate in connecting hinterland of Shenzhen port to Hong Kong port.

Since 2006, Zhejiang Ninbo port and Taizhou port have established 'Ninbo-Zhoushan Container Terminal Limited Co.' for consolidated operation. The consolidation of the two ports, Ninbo and Zhousha, can be interpreted as an effort to raise port competitiveness against Shanghai port which operates Yangshan Deep Water port since 2005.

Port of Tauranga of New Zealand and Brisbane Port of Australia has concluded an agreement to ensure a competitive edge of ports and network establishment. The agreement is concluded as part of port unification strategy, and it shares port technology, marketing, trading information and expertise.

In 2000, the Port of Hamburg and Bremen in Germany have commenced a joint operation through private companies for the purpose of raising port efficiency and competitiveness, as well as service expansion. For this, Euroka, the operator of the Port of Hamburg and BLG (Berman Lagerhaus Gasellschaft), the operator of the Port of Berman had established a new Eurogate and have developed into the best terminal operator in Europe through sharing core competence and technology know-how.

The Port of Antwerp, in Belgium, and the Port of Zeebrugge of port authorities has mutually agreed to jointly handle container cargo in a specific region. This agreement has promoted the establishment of economic collaboration organization such as ESV (Economisch Samenwerkings Verband).

The Copenhagen Malmo port was consolidated through Malmo port in Sweden and Copenhagen port in Denmark in the early 2000. A new port operating company was founded on December 14th in 2000, and the Department of Transportation of the two countries permitted the establishment of Copenhagen Malmo Port(CMP). As a result of that, CMP, a merged enterprise between Denmark and Sweden was officially launched on 1st January 2001.

The alliance strategy between foreign ports is to raise a competitive edge of ports through sharing terminal resources and new technology know-how, and joint promotion of marketing activities between respective ports. In addition port industry is pursuing an alliance strategy to maximize economic profits through raising efficiency of port operation.

Table 3 The case of port alliances in the world

Port	Goals	Fields of Collaboration
Tauranga/ Brisbane	<ul style="list-style-type: none"> · Build network · Raise port competitiveness 	<ul style="list-style-type: none"> · Port technology and marketing · Information processing system
Hamburg/ Bremen	<ul style="list-style-type: none"> · Raise competitive edge and efficiency · Service expansion 	<ul style="list-style-type: none"> · Joint cargo handling
Antwerp/ Zeebrugge	<ul style="list-style-type: none"> · Promote economic cooperation 	<ul style="list-style-type: none"> · Joint cargo handling
Rotterdam/ Flushing	<ul style="list-style-type: none"> · Pursue economic profit 	<ul style="list-style-type: none"> · Port sector joint development
Le Harve/ Rouen	<ul style="list-style-type: none"> · Raise port efficiency 	<ul style="list-style-type: none"> · Port technology and EDI · Hinterland transport connection and pilotage
Copenhagen/ Malmo	<ul style="list-style-type: none"> · Offer integrated service · Raise competitive edge 	<ul style="list-style-type: none"> · Manpower allocation · Hinterland transport connection · Port support sharing
Ninbo / Zhousha	<ul style="list-style-type: none"> · Offer integrated service 	<ul style="list-style-type: none"> · Joint port process · Sharing terminal resource
Vancouver / Fraser	<ul style="list-style-type: none"> · Offer integrated service · Raise competitive edge 	<ul style="list-style-type: none"> · Joint port operation · Sharing terminal resource
Hong Kong/ ShenZhen	<ul style="list-style-type: none"> · Build network · Secure competitive edge 	<ul style="list-style-type: none"> · Sharing New technology know-how · Sharing terminal resource

Source : Sim, G. S., et. al.(2006).

4. AHP method and a hierarchic structure model

4.1 The concept of Analytic Hierarchy Process(AHP)

Analytic Hierarchy Process(AHP), developed by Tomas L.

Saaty in the early 1970s is a new decision making methodology, designed to perceive knowledge, experiences and intuition of an appraiser through a decision, in accordance with pairwise comparison between properties, which forms a hierarchic structure in decision making. AHP attributes a decision making problem to mathematical theory, and it is widely used in various fields, such as optimal location selection, marketing planning and policy making with the respective merits of accuracy, convenience and versatility of theory applications, in accordance with relative comparison from the user aspects.

AHP is a method to reach rational decision making by deriving order of priority utilizing a mathematical technique in a situation, where a complicated decision is required in the absence of certainty against various measures. The technique implements hierarchy analysis to a provided decision making problem, and measures the significance or weight value according to pairwise comparison, which is relative to standards in immediate low-layer in the upper-layer aspects. Ultimately it facilitates obtaining alternative weight value or order of priority in the least significant-layer.

Hence, AHP can process not only the quantitative assessment standard, which cannot be expressed in value but also, it processes the qualitative assessment which is difficult to handle but must be considered in a decision making problem.

4.2 A model for motivation of port alliances

1) Selection of motivation factors

This study is designed to analyze the order of priority and the significance pertaining to motivation for the strategic alliance between ports. Song(2004) classified motivation for the strategic alliance between ports into strategic, financial, economic, operational and marketing factors. This study selected motivation factors based on Song(2004)'s study and literature survey. In connection with decision making for the strategic alliance between ports, this study has finalized the category in 12 motivations based on the collected data, reflecting redundancy and selection bias.

Also this study has conducted interview to ensure objectivity and reliability of the selection of motivation factors. Reflecting experts' opinions, the collected motivation are derived in four motivations: strategic motivation, economic motivation, operational motivation and marketing motivation.

2) Building a hierarchic analysis structure

The most important factor to solve the multipactor decision making problem in accordance with AHP is an

analysis of evaluation factors to assess alternatives, and the creation of hierarchic structure. This study illustrated a hierarchic analysis structure in Fig 1, which was established after a number of corrections through converge with the opinions of experts in ports and AHP.

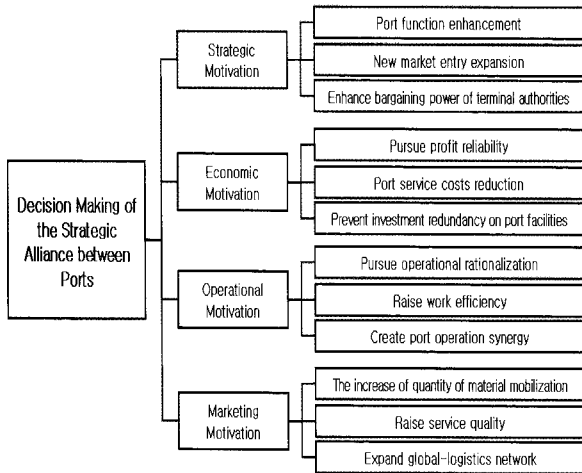


Fig. 1 Hierarchic analysis structure on the determinants of the strategic alliance between ports

5. Result of AHP analysis

5.1 Survey respondents

The study employed the geometric average method, which re-generalizes the survey after evaluation. The major reason in employing the geometric average method is that the method is the only procedure that satisfies the characteristic of a reciprocal number of the pairwise comparison. Hence, all comprehensive opinions were gathered, and calculated the weight value via applying each matrix value of the pairwise comparison matrix on the 1, 3, 5, 7 and 9. The survey was implemented targeting experts in port, and the survey details were prepared to use the pairwise comparison evaluation designed for calculating the significance of AHP analysis.

The questionnaire was distributed to total 44 respondents in 2008 and among them 27 responses were returned. Of them, five responses showing critical value of more than 2.0 point were eliminated from sample selection, and total 22 responses were used for the survey analysis.

Table 4 Survey details

Survey Target	Number distributed	Number Responded	Response ratio
Government Organization	8	5	63%
Port Authority	6	6	100%
Port Operating Agency	20	11	55%
Research Institutes	10	5	50%
Total	44	27	61.4%

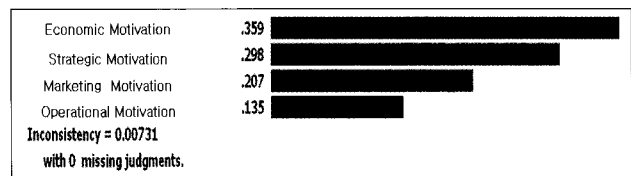
5.2 Data analysis

1) The significance of major motivation

The significance of major evaluation factors for decision making of the strategic alliance between ports was derived as Table 5, in the order of economical motivation(0.359), strategic motivation(0.298), marketing motivation(0.207) and operational motivation(0.135).

Table 5 The significance of major motivation of port alliance

Type	Government Organization	Port Authority	Port Operating Agency	Research Institute	Overall (Ranking)
Strategic motivation	0.353	0.209	0.243	0.383	0.298(2)
Economic Motivation	0.430	0.336	0.422	0.377	0.359(1)
Operational Motivation	0.120	0.115	0.160	0.153	0.135(4)
Marketing Motivation	0.097	0.340	0.176	0.088	0.207(3)



2) The significance of detailed motivation

(1) Strategic motivation

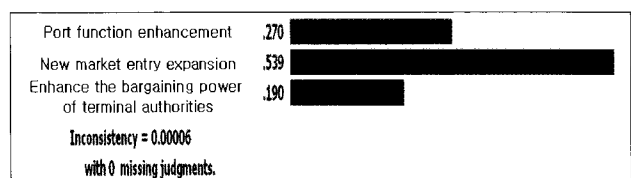
The significance of detailed factor of strategic motivation is shown as Table 6, in the order of net market entry expansion(0.539), port function enhancement(0.270) and the bargaining power of the terminal authority(0.190).

Table 6 Relative significance of strategic motivation

Type	Government Organization		Port Authority		Port Operating Agency		Research Institute		Overall	
	L	G	L	G	L	G	L	G	L	G
Port Function Enforcement	0.402	0.142	0.302	0.063	0.244	0.059	0.257	0.221	0.270	0.081
New Market Entry Expansion	0.392	0.139	0.533	0.111	0.533	0.142	0.577	0.098	0.539	0.161
Bargaining power of the terminal authority	0.206	0.073	0.165	0.034	0.173	0.042	0.165	0.063	0.190	0.057
Sub-Total	1	0.354	1	0.208	1	0.243	1	0.382	1	0.298

Note: 1) L : Internal ratio according to local items

2) G: The ratio that takes up the total gross



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(2) Economic motivation

The significance of detailed factor of economic motivation is shown as Table 7, in the order of port service cost reduction(0.427), reliable profit pursuing(0.346) and the prevention of investment redundancy on port facilities(0.228).

Table 7 Relative significance of economic motivation

Type	Government Organization		Port Authority		Port Operating Agency		Research Institute		Overall	
	L	G	L	G	L	G	L	G	L	G
Reliable profit pursuit	0.389	0.167	0.367	0.123	0.471	0.199	0.280	0.105	0.346	0.124
Port service cost reduction	0.443	0.190	0.490	0.166	0.532	0.140	0.513	0.193	0.427	0.153
Prevent investment redundancy on port facility	0.169	0.072	0.143	0.048	0.197	0.083	0.207	0.078	0.228	0.082
Sub-total	1	0.429	1	0.336	1	0.422	1	0.376	1	0.359

Pursue profit reliability	.346	
Port service costs reduction	.427	
Prevent investment redundancy on port facilities	.228	
Inconsistency = 0.00478		
with 0 missing judgments.		

(3) Operational Motivation

The significance of detailed factor of operational motivation is shown in Table 8, in the order of synergy effect in port operation(0.537), pursue rationalization in port operation(0.248) and the raise of work efficiency(0.215).

Table 8 Relative significance of operational motivation

Type	Government Organization		Port Authority		Port Operating Agency		Research Institute		Overall	
	L	G	L	G	L	G	L	G	L	G
Pursue rationalized operation	0.216	0.025	0.244	0.028	0.229	0.037	0.200	0.031	0.248	0.034
Raise work efficiency	0.168	0.020	0.122	0.014	0.289	0.046	0.188	0.029	0.215	0.029
Create port operation synergy effect	0.616	0.074	0.835	0.073	0.482	0.077	0.612	0.094	0.537	0.073
Sub-total	1	0.12	1	0.115	1	0.16	1	0.154	1	0.135

Pursue operational rationalization	.248	
Raise work efficiency	.215	
Create port operation synergy	.537	
Inconsistency = 0.02		
with 0 missing judgments.		

(4) Marketing Motivation

The relative significance of detailed factor of marketing motivation is shown in Table 9, in the order of the increase of quantity of material mobilization(0.528), global logistics network expansion(0.294) and the raise of service quality (0.178).

Table 9 Relative significance of marketing motivation

Type	Government Organization		Port Authority		Port Operating Agency		Research Institute		Overall	
	L	G	L	G	L	G	L	G	L	G
increase of quantity of material mobilization	0.614	0.060	0.885	0.227	0.569	0.105	0.564	0.050	0.528	0.109
Raise service quality	0.147	0.014	0.128	0.043	0.216	0.038	0.189	0.017	0.178	0.037
Expand global logistics network	0.239	0.023	0.177	0.060	0.185	0.033	0.247	0.022	0.294	0.061
Sub-total	1	0.097	1	0.34	1	0.176	1	0.089	1	0.207

The increase of quantity of material mobilization	.528	
Raise service quality	.178	
Expand global-logistics network	.294	
Inconsistency = 0.02		
with 0 missing judgments.		

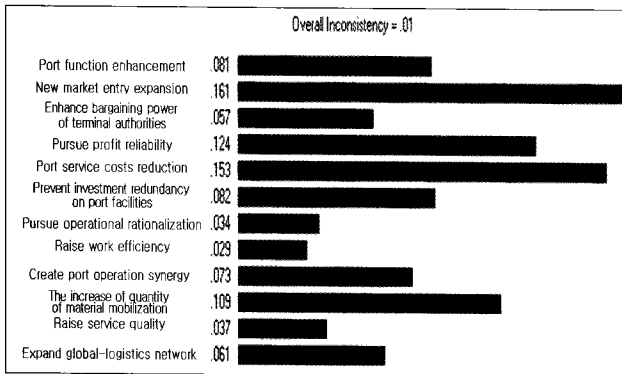
3) Comprehensive significance evaluation

In combining the relative significance of major motivations to obtain total ranking of factors by motivation group, the result shows the significance in the order of economic motivation, strategic motivation, marketing motivation and operational motivation. In the total significance of detailed motivations, the result was shown in the order of penetration expansion into a new market, port service costs reduction, reliable profit pursue, the increase of quantity of material mobilization, the prevention of redundant investment in port facility, port function enhancement, synergy effect in port operation, global-logistics network expansion, the bargaining power of the terminal authority, raise of service quality, operational rationalization and raise work efficiency.

In forming the strategic alliance between ports, ports attribute the most critical motivation factor to the expansion of new market penetration, and the least important motivation factor was the raise of work efficiency.

Table 10 The overall significance of alliance motivation between ports

Type	Significance	Detail Items	Significance	Ranking
Strategic Motivation	L : 0.298 G : 0.298	Port function enhancement	L : 0.270, G : 0.081	6
		New market entry expansion	L : 0.539, G : 0.161	1
		Enhance bargaining power of terminal authorities	L : 0.190, G : 0.057	9
Economic Motivation	L : 0.359 G : 0.359	Pursue reliable profit	L : 0.346, G : 0.124	3
		Port service costs reduction	L : 0.427, G : 0.153	2
		Prevent redundant investment of port facilities	L : 0.228, G : 0.082	5
Operational Motivation	L : 0.135 G : 0.135	Pursue operational rationalization	L : 0.248, G : 0.034	11
		Raise work efficiency	L : 0.215, G : 0.029	12
		Create synergy effect of port operation	L : 0.537, G : 0.073	7
Marketing Motivation	L : 0.207 G : 0.207	The increase of quantity of materials mobilization	L : 0.528, G : 0.109	4
		Raise service quality	L : 0.178, G : 0.037	10
		Expand global-logistics network	L : 0.294, G : 0.061	8



6. Conclusion

In these days of severe competitive environment, global ports are aggressively promoting strategic alliances with neighbor ports, as part of a survival strategy. The initial drive behind this move is a radical change in shipping environment, such as the increase of port functions as a comprehensive logistics hub, expansion of global terminal operators, intensification of M&A, as well as the strategic alliance between shipping firms and the greater competition between major ports.

Hence, this study has categorized major alliance motivations that require special consideration in decision making of the strategical alliances between ports into four sectors: strategic motivation, economic motivation, operational

motivation and marketing motivation, and conducted a comparison analysis according to the order of priority and the significance in connection with detailed motivations.

This study found economical motivation was the most important determinant to be considered in forming the strategic alliances between ports. Such attribution could be thanks to the pursuit of reliable profits through reduction of service costs by utilizing comparative advantage of partners and lead market rationalization through reducing competition and oversupply between ports, including preventing redundant investment on port facilities. The next significance was in the order of strategic motivation, marketing motivation and operational motivation. In order to establish port alliances, it is vital to create synergy effect in port operation through broadening the understanding of one another based on mutual reliance, raise efficiency as well as operational rationalization. Also, we determined that the strategic alliance should be promoted by expanding a global logistics network, such as joint service development, entry to a new market and raising efficiency.

In addition, expansion to a new market was the priority factor to be considered in terms of detailed evaluation factor, and subsequently in the order of port service cost reduction, the pursuit of reliable profits, the increase of quantity of material mobilization and the prevention of redundant investment in port facility. Judging from the fact that three out of five items among the detailed evaluation factor are the items pertaining to economical factors. It appears that the output has better reflected the motivation to form strategic alliances, and it seems to be a wise attempt to overcome the risk of shipping and ports industries, which has come at the same time with the global financial stagnation, with the creation of synergy effect through alliance between ports.

The survey conducted in this study was based on the data obtained from major users using Busan Port and we believe there were restriction and insufficient number of participants for the analysis. Therefore, a study reflecting a population group with a great number of opinions should be implemented in the future. In addition it is necessary to investigation the differences of port alliance motivation between global terminal operators and local terminal operators.

Moreover, while this study can find its meaning in suggesting the order of priority and the significance according to motivations in forming the strategic alliance between ports, further studies should be focus on deriving collaborative factors among actual ports, in order to establish

a thrusting strategy of the strategic alliance, as well as optimal partner selection.

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