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Co-opetition Strategy for the Balanced Development of Busan Port

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Abstract : *Busan North port is facing crisis due to the opening of the New port. The North Port and NewPort are competing for a limited volume of cargoes and this competition is leading after all to price competition, lowering cargo work fee that may result in the failure of both. This paper proposed the balanced development plans, which are the strategies of business tie-up and activation between the North Port and NewPort by introducing the strategy of "co-opetition" and the analysis for the success factor of co-opetition. to solve this operational problems on Busan port. It is found out that activation strategy is more successful co-opetition strategy than business tie-up strategy. The execution for the two co-opetition strategies will lead Busan Port to the balanced development as well as the enhanced competitiveness and will leap Busan port into global hub port as well.*

Key words : *Co-opetition strategy, balanced development, factor analysis, Structural Equation Model Analysis*

1. Introduction

Recently the environment surrounding the shipping and port market is changing rapidly. Competition is becoming overheated for enlarging ships to realize economy of scale and for being a hub port to attract super-size ships. With these environmental changes, M&A among shipping companies is being expanded, and the port industry is active in developing new ports for being hub port and concurrently integrating existing ports for overcoming the limitations of old ports. That is, ports in each country are forming the structure of cooperative competition to achieve the balanced development of old and new ports and to leap into global hub ports.

Korean government is pressing on the development of Busan NewPort in order to overcome the chronic congestion of ships resulting from the limited facility capacity of the existing North Port in Busan and to cope with the steady increase of cargo volume at North Asia. However, with the growth of Chinese ports, the volume of transshipment in Busan Port is decreasing and the construction of the hinterland logistics base and infrastructure of the NewPort is being delayed, and in this situation it is uncertain whether there will be new additional cargoes.

Accordingly, with the opening of the NewPort, the Nort Port and the NewPort are competing for a limited volume of cargoes, and the competition is leading after all to price competition, lowering cargo work fee that may result in the failure of both. Adding to failing to accomplish its intended goal of development, the NewPort has been criticized for being an overlapping investment. And the North Port of Busan is facing another crisis due to the opening of the new port. The current situation calls for a mutual win-win strategy that can help overcome the conventional concept of a zero-sum game and eventually enlarge the 'pie' of the market. The purpose of this study is to propose the strategy of Co-opetition for balanced development plan between Busan North Port and NewPort by introducing the management strategy of " Co-opetition", a compound word of cooperation and competition and the analysis for success factors of co-opetition between the two ports after the check of operational problems in the terminal of Busan Port.

2. Concept of Port Co-opetition Strategy

2.1 The concept of co-opetition

As part of a new paradigm for the 21ST, "co-opetition" is the compound word of 'cooperation' and 'competition'. It can be defined as a cooperative strategy(cooperation in

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competition), by which corporations, while maintaining their managerial independence and based on their core capabilities, enter into partnership with their competitions in the specific business areas where they compete, and try to secure competitive advantages by combining mutually complementary capabilities.

In 'co-opetition', making a 'pie' together amounts to cooperaton , while sharing the pie is equivalent to competition. Therefore, rather than being a zero-sum game that focuses on win or lose, it's a positive-sum game that pursues a win-win situation.

2.2 Co-opetition case in the port industry

Recently, cooperation cases as a notable change in maritime transport has increased among major ports of the world. From the conventional competitive relations, the scope of cooperation is expanding to such a wide range of aspects as technologies, marketing, equity participation, development of the supporting networks, and participation in construction works. The followings are the analysis of specific types and effects of co-opetition between major ports.

The first type relates to cooperation between ports through equity participation. In this type, they establish a new operator through equity participation, which will operate the terminals belonging to both ports. The examples include Hamburg/Bremen, Ningbo/Zhoushan, and Vancouver/Fraser ports. The integration of the operators between ports resulted in the connection of hinterland, sharing of technologies, knowhow, information system and terminal resources, joint handling of cargoes and marketing activities, etc., which eventually gave birth to the strengthened effectiveness of port operations, enhanced bargaining power against shipping companies, heightened market leadership and competitiveness.

The second pattern is a type of business cooperation of ports involving sharing of technologies, marketing, and trade information, joint development of port areas, cooperation in the areas of port-related technologies as well as EDI, etc. Within this category come such ports as Antwerp/Zeebrugge, Rotterdam/Flushing, and Le Havre/Lorient. The cooperation in a wide variety of business areas has effects on establishing networks and generating economic profits, as well as enhancing competitiveness.

The third type involves joint participation and support for the activation of ports. This type of cooperation is made possible by the establishment of a joint commission composed of the personnel from both of the two ports and the operator, which works to secure finance and support for, and participation in its projects. The ports in this category include Seattle/Tacoma, and LA/Long Beach. This type allows the participation in a variety of transport network development and construction works intended to link support facilities of the two ports, which provide services that are capable of timely transporting cargoes, helping enhance their combined competitiveness.

Table 1 Co-opetition cases and types & success factors among major ports in the world

Port	Type, Success factor of Co-opetition
Hamburg/Breman,Ningbo/Zhoushan,Vacouver/Fraser	Equity participation (Terminal operator's integration)
Antwerp/Zeebrugge,Rotterdam/FlushingLe Havre/Lorient	Business tie-up(Joint-development of port areas, cooperation n the areas of port-related)
Seattle/Tacoma, LA/Long beach	Port activation(Participation in the development and construction of hinterland transport network)

Source : Re-prepared by the author based on KMI(2006)

2.3 Co-opetition type between the North Port and NewPort

As a result of case study, three types of general port co-opetition strategy are generated. There are the business cooperation in the areas of technology, production, and sales, the integration of operators through equity participation, and the joint participation and support for the activation of the ports.

On the basis of these types and considering equity participation as a type of capital alliance, it has been categorized into the business cooperation type involving the alliance of technology, manufacturing, sales, and capital, and the port activation type. Based on these two types, this paper tried to come up with co-opetition strategies that will help the North Port and NewPort accomplish a balanced development.

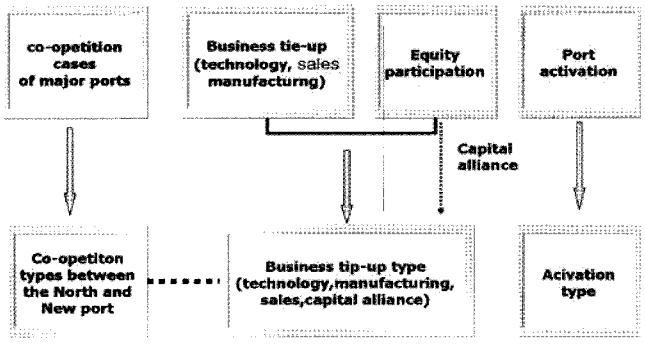

Fig. 1 Co-opetition type between North Port and NewPort

3. Literature review of Co-opetition Strategy

In a previous case study, business tie-up and port activation as two respective co-opetition strategies for this research are represented.

3.1 Business Tip-up Strategy

As for business strategies, it categorizes them into technology, manufacturing, sales (marketing) and capital alliance, along with their specific plans.

The first plan relates to sharing technologies and operational knowhow between the North Port and NewPort as part of the technological strategy.

The second one concerns the exchange of specialized personnel between the two ports as an advanced form of the manufacturing alliance strategy.

The third one is sharing the operating system and information as part of the technological strategy. The specific plan for this category calls for the joint establishment of a nation-wide integrated port logistics operational information system, which will handle integrated logistical management based on the sharing of the operating systems of the two ports.

The forth one is the sales alliance strategy that takes advantage of the marketing capabilities of the counterpart. In order to attract transshipment cargoes, this strategy requires joint marketing activities either between the North Port and NewPort, or between the Busan Port Authority and the Ministry of Land, Transport and Maritime Affairs.

The fifth one is to attract global shipping companies terminal operators to help increase container cargo.

Part of the sales alliance, this is closely associated with the joint marketing activities.

The sixth one is a type of capital alliance strategy, by which we are going to propose the integrated operation of the terminals of the North Port by establishing a new operator through equity participation.

3.2 Port Activation Strategy

As the second co-opetition strategy for the balanced development between the North Port and NewPort, the activation of the two ports are suggested. The strategy requires the establishment of a joint venture company or a joint committee in partnership with the Busan Metropolitan City, and the maritime transport-related entities like BPA, with its personnel mostly composed of those from the terminal operators of the North Port and NewPort, and we are going to propose the following measures that are intended to promote the voluntary activation efforts and their linkage activation of the two ports.

The first measure is the introduction of the low limit system for the port service charges.

The second one is the support for the linkage means and time spent for transshipment cargoes passing through the North Port and the NewPort.

The third one is the early development and construction of the hinterland logistics base and the inland transportation network in the NewPort including the roads, railways, and so on.

The fourth one is the active support for the new investments in the existing service facilities and equipment in the North Port and their timely replacement.

Table 2 Literature review for Business Tie-up Strategy

Business Tie-up Strategy		Supporting literature
Technology alliance	Sharing of technology and operational know-how	Hung,C.L(1992) D.W.Song(2004) C.H.Han(2005)
	Sharing of operating system and information	K.S.Sim(2000)
Manutacturing alliance	Exchange of specialized personnel	K.S.Sim(2006)
Sales alliance	Joint marketing of the port	D.W.Song(2004) K.S.Sim(2006) H.S.Bang(2004)
	Attraction of Global shipping company and operator	K.M.Ahn(2008)
Capital Alliance	Integrated operation of the terminal of the north port	H.T.Kim(2004)

Table 3 Literature review for Activation Strategy

Activation Strategy	Supporting literature
Introduction of the low limit system	Sim,K.S. (2006)
Support for the linkage means and cost for transshipment between the North and New port	Kang.Y.S(2004) Kim.H.T(2005)
Support for the cost for the feeder's concurrent calling to the North and New port	
Early development and construction of the inland transportation network and the hinterland of the New port	Kil.K.S.(2001) Kim.H.T.(2006)
Active support for facility and equipment of the North port	Kim.H.T.(2006)

4. Empirical Analysis

4.1 Research model and Research hypothesis

Based on the case study and literature review, research model is shown as fig 2.

Fig. 2 Research Model

The ten research hypotheses for research Model are identified as below.

1) The relationship between Operational problems of terminals in Busan and Success factor of Co-opetition.

H 1. Operational problems of terminals in Busan are related to Business tie-up strategy..
H 1-1. Strategic vulnerability is related to Business tie-up strategy.
H 1-2. High competition is related to Business tie-up strategy.
H 1-3. Lack of connectivity is related to Business tie-up strategy.
H 2. Operational problems of terminals in Busan are related to Activation strategy..
H 2-1. Strategic vulnerability is related to Activation strategy.
H 2-2. High competition is related to Activation strategy.
H 2-3. Lack of connectivity is related to Activation strategy.

2) The relationship between Success factor of co-opetition and Effect factor of co-opetition

H 3. Business tie-up strategy affects Effect factor of co-opetition.
H 3-1. Business tie-up strategy affects Balanced development.
H 3-2. Business tie-up strategy affects Competitiveness enhancement.
H 4. Activation strategy affects Effect factor of co-opetition.
H 4-1. Activation strategy affects Balanced development.
H 4-2. Activation strategy affects Competitiveness enhancement.

4.2 Operational definition and Measuring for research valuables

1) Operational problems of terminals in Busan

In this study, independent variables are the three factors of strategic vulnerability, high competition, the lack of connectivity as the problem factors in the operation of terminals at Busan and eight variables in Table 6. Measurement method is conducted by a 7 point Likert scale in the survey.

2) Success factor of the Co-opetition

Co-opetition success factor as mediator variables to more explain the effect of co-opetitoin are the two factors of business tie-up and activation with nine variables in Table 7. Measurement method is conducted by a 7 point Likert scale in the survey.

3) Effect factor of the Co-opetition

As shown in Table 8, Dependent variables as the effect of coopetition are total 6 variables and they were divided into the two factors of the effect of balanced development and enhanced competitiveness. They were measured a 7 point Likert scale by a questionnaire survey.

4.3 Data collection and Research object

The present study conducted a questionnaire survey with the employees of terminal operators and shipping companies in the Busan Port. The table 4 and table 5 below show the questions and outline of the survey. A total of 227 questionnaires were distributed to the companies, and 183 effective questionnaires were collected. Using the recovered questionnaires, this study made empirical analyses according to the objectives of this study.

Table 4 Measurement Variables and Survey Items

Variables		Question		Remarks
		Part	No.	
Operational problem in Busan port terminal		I	1-8	Interval scale
Co-opetition success factor		II	1-10	Interval scale
Co-opetition effect factor		II	1-8	Interval scale
Generals	Participants' company, position, age	III	1-4	Nominal / Ratio scale

Table 5 Valid Sample number

	Respondent	Frequency
Terminal	PNC, PECT, HBCT, HGCT, UTC	109
Shipping Company	Hanjin, HMM, ZIM, APL, HEUNG-A, Korea Ferry, Donjin, Sinokor, STX	74
Sum		183

4.4 Validation and Reliability Test for the factor of operational problem of the terminal on Busan Port

The problem factor of independent variable in this study was divided into the three factors with the total of eight variables. Table 6 shows the factor analysis results for these valuables.

The explanatory power of the factors was 24.015%, 23.882% and 19.640%, respectively, so the total explanatory power of the three factors were 67.537%. In addition, KMO was 0.626 and the significance probability of Bartlett's spherically test was 0.000, proving that the variables were independent from the one another.

Table 6 Factor Analysis Result on operational problem factor for Busan Port

Factors	Variables		Factor loading F1	F2	F3	Communality
Strategic vulnerability (F3)	insufficient attraction of cargo volume	P1	-.020	.135	.862	.762
	low bargaining power	P2	.016	.090	.850	.731
High competition (F2)	Price competitiveness loss in the Nort port	P3	-.005	.808	-.005	.653
	Dispute for rate competition by the opening of the New port	P4	.062	.854	.079	.740
	Dispute for attraction competition of cargo volume in the domestic ports	P5	.143	.656	.285	.533
Lack of connection (F1)	low connecting transport network between the North and New port	P6	.779	.252	-.096	.680
	insufficient hinterland logistics base and inland connecting transport network in the New port	P7	.822	.044	.004	.678
	Excessive inland transport cost	P8	.783	-.070	.087	.626
Explanatory power	Eigenvalue		2.375	1.770	1.258	
	Index of dispersion (%)		24.015	23.882	19.640	67.537
Fitness	Kaiser-Meyer-Olkin : .626, $\chi 2$: 315.251, df : 28, p : .000					

Note : 1. Factor extraction method ;Principal component analysis ; rotation method : Varimax with Kaiser
2. Factor rotation converged in a-5 repeated calculation
Note : coefficient(Cronbach α) was 0.718 for Factor 1, 0.704 for Factor2, and 0.686 for Factor 3, and the overall reliability coefficient of the three factors was 0.650

4.5 Validation and Reliability Test for Co-opetition success factor

As shown in table7, co-opetition success factor of the independent variable was the total of two factor and nine variables. Only one variable of early construction of the hinterland logistics base and infrastructure of the new port (factor loading : 0.398) was deleted among the ten variables.

The explanatory power of the factors was 35.782%, 26.238% respectively, so the total explanatory power of the two factors were 62.020%. In addition, KMO was 0.832 and the significance probability of Bartlett's sphericity test was 0.000, proving that the variables were independent from the one another.

Table 7 Factor Analysis Result for Co-opetition Success factor

Factors	Variables		Factor loading F1	F2	Communality
Business tie-up (F1)	Sharing technology and operatinal knowhow and professional manpower	B1	.656	.340	.546
	Joint establishment of integrated port logistics system	B2	.801	.208	.685
	Joint marketing of the port	B3	.853	.191	.764
	Attraction of Global shipping company and operator	B4	.880	.109	.786
	Integrated operation of the terminal of the north port	B5	.640	.216	.457
Activation (F2)	Introduction of the low limit system	S1	.118	.730	.547
	Support for the linkage means and cost for transshipment between the North and New port	S2	.264	.787	.689
	Support for the cost for the feeder's concurrent calling to the North and New por	S3	.375	.720	.659
	Government's active support for facility and equipment of the North port	S5	.111	.662	.450
Explanatory power	Eigenvalue		3.220	35.782	
	Index of dispersion(%)		35.782	26.238	
Fitness	Kaiser-Meyer-Olkin : .832, χ^2 : 717.573, df : 36, p: .000				

Note : 1. Factor extraction method ;Principal component analysis ; rotation method : Varimax with Kaiser
2. Factor rotation converged in a-3 repeated calculation
Note : coefficient(Cronbach α) was 0.858 for Factor 1, 0.757 for Factor2, and the overall reliability coefficient of the two factors was 0.858

4.6 Validation and Reliability Test for Co-opetition effect factor

As shown in table 8, co-opetition effect factor of the independent variable in this study was divided into the total

of two factors and six variables. Two variables, such as attraction increase of transshipment cargo (factor loading : 0.471) and enhancement of operation efficiency (factor loading : 0.346), were deleted among the eight variables.

The explanatory power of the factors was 35.353%, 25.350% respectively, so the total explanatory power of the two factors were 60.703%. In addition, KMO was 0.791 and the significance probability of Bartlett's sphericity test was 0.000, proving that the variables were independent from the one another.

Table 8 Factor analysis result for Co-opetition Effect Factor

Factors	Variables		Factor loading		Commu nality
			Factor 1	Factor 2	
Balanced development (Factor2)	Prevention of excessive competition	R1	.174	.803	.676
	Establishment of connections	R2	.199	.789	.662
Enhancement of competitiveness (Factor1)	Maximumizing cost saving and profitablility	R3	.700	.189	.526
	Providing for One-Stop integrated logistic service	R4	.752	.275	.641
	Production Increase	R5	.805	.049	.650
	facilitating bargaining power against shipping company	R6	.590	.372	.486
Explanatory power	Eigenvalue		2.121	1.521	
	Index of dispersion(%)		35.353	25.350	60.703
Fitness	Kaiser-Meyer-Olkin : .791, χ^2 : 234.614, df : 15, p : .000				

Note : 1. Factor extraction method :Principal component analysis ; rotation method : Varimax with Kaiser
2. Factor rotation converged in a-3 repeated calculation
Note : coefficient(Cronbach α) was 0.738 for Factor 1, 0.547 for Factor2, and the overall reliability coefficient of the two factors was 0.763

4.7 Analysis model and Hypothesis testing

This study is to analyze the relationship between operational problem factor of the terminal in Busan port and co-opetition success factor and effect factor in the NortPort and the New Port by introducing the strategy of co-opetition to propose the balanced development plan of the two ports. Structural equation model analysis was used to achieve the purpose of this study.

1) The goodness of Fitness of the Analysis model

Table 9 presents the results of the structural model tested. Overall model fit indices are as follows: goodness of fit index(GFI)=0.915, the normed and non-normed fit indices(NNFI)=0.974 and incremental fit index(IFI)=0.97. All the coefficient alphas approaches 1.0. Collectively these statistics lead us to judge the overall measurement model fit as satisfactory.

Table 9 Statistics of SEM Analysis Result

GFI	IFI	NNFI	AGFI	χ2	df	p
0.915	0.983	0.974	0.864	200.720	173	0.05

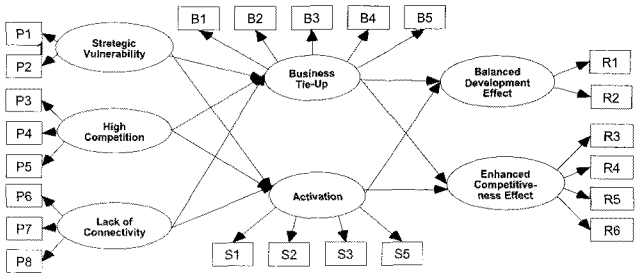

Fig. 3 Analysis Model

2) Hypothesis Testing by Path Analysis

① Hypotheses Testing between Problem factor and Co-opetiton success factor

In the results of testing hypotheses on the problem factors and the co-opetition success factors : Hypothesis 1-2 'the high competition factor will be related with the business tie-up factor' showed significance probability of 0.214, deviating from significance level $p< 0.05$, so it was rejected. However, all hypotheses on the problem factors and the co-opetition success factors were accepted as they met significance level $p<0.005$.

On the other hand, according to the results of path analysis between the problem factors and the co-opetition success factors, Hypothesis 2-1 'The strategic vulnerablitiy factor will be related with the activation factor' showed the highest correlation as 3.783, which was followed by Hypothesis 1-3 'The lack of connectivity factor will be related with the business tie-up factor' and Hypothesis 2-2 ' the high competition factor will be related with the activation factor'.

② Hypothesis testing for co-opetition success factor and effect factor

Hypothesis testing for success factor and effect factor of

the co-opetition is significant at the P<0.005 level and these hypotheses were supported by the data.

According to the path analysis results on the co-opetition success factor and effect factor, the correlation of the activation factor with the balanced development effect was the highest as 4.100, which was followed by the correlation of the business tie-up factor with the balanced development effect(2.837), and the correlation of the activation with competitiveness enhancement effect the correlation of the business tie-up factor with the competitiveness enhancement effect.

Table 10 Path Coefficient between terminal operational problem factor and co-opetition success factor

Sec-tion	H.P	P.C.	S.E.	C.R.	P	Results
H 1-1	Strategic vulnerability → Business tie-up	0.261	0.101	2.574	0.010	Y
H 1-2	High competition → Business tie-up	0.149	0.120	1.242	0.214	N
H 1-3	Lack of connectivity → Business tie-up	0.375	0.115	3.247	0.001	Y
H 2-1	Strategic vulnerability → Activation	0.426	0.113	3.783	0.000	Y
H 2-2	High competition → Activation	0.423	0.139	3.041	0.002	Y
H 2-3	Lack of connectivity → Activation	0.288	0.125	2.309	0.021	Y

Table 11 Path Coefficient between Co-opetiton success factor and effect factor

Section	H.P.	P.C.	S.E.	C.R.	P	Res ults
H 3-1	Business tie-up → Balanced development	-0.313	0.110	-2.837	0.005	Y
H 3-2	Business tie-up → Competitiveness enhancement	0.179	0.086	2.090	0.037	Y
H 4-1	Activation → Balanced development	0.708	0.173	4.100	0.000	Y
H 4-2	Activation → Competitiveness enhancement	0.182	0.080	2.268	0.023	Y

5. Conclusion

Summing up the results of hypothesis test and path analysis, the terminal operators and shipping companies in the Busan Port perceived that strategic vulnerability factors such as insufficient attraction of cargo volume and low bargaining power against shipping companies are the most urgent problems. In order to solve these problems, they thought that activation strategies such as the introduction of the lower limit of cargo work fees and the support of transportation network connecting the North Port and the NewPort are more successful co-opetiton strategies than business tie-up strategies. With regard to these activation strategies, it was found that the balanced development effect such as the prevention of excessive competition and the establishment of connections are expected to be the higher than the enhanced competitiveness effect.

Consequently, this study proposed the strategy of Business tie-up and the strategy of Activation as the balanced development plan between Busan North Port and NewPort in Busan and the execution for the two co-opeition's strategies will lead to the balanced development between the North Port and the NewPort in Busan and leap into a Northeast Asia hub port.

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