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Gaps in Performance between the Levels of Inter-corporate Relationships in Port Logistics Processes *

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ABSTRACT

The objective of this research is to verify gaps in firm performance between the levels of relationships between international freight forwarders and port logistics service providers. To achieve the objective, this research developed the conceptual and operational definitions of the variables through prior research and the questionnaire was sent to the forwarders. The collected data were analyzed by cluster analysis, analysis of variance (ANOVA) and analysis of covariance (ANCOVA). The results are as follows. First, the high level of the inter-corporate collaboration is based on the high level of customer performance. In this regard, the forwarders have the need of operational collaboration with port logistics service providers and as a result, they achieve a high level of customer performance. Second, the high level of the inter-corporate commitment is connected to the high level of firm performance. The forwarders provide shippers with the quality of customer service through commitment with port logistics service providers and this is the cause of firm performance. Third, the high level of the inter-corporate communication is based on a gap in customer performance. The forwarders can achieve the needs of shippers through communication with port logistics service providers and this is connected with a high level of customer performance.

1. Introduction

Prior research has performed research on the relationships between shippers and port logistics firms (Bae, 2012). However, there is a lack of

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studying the relationships between international freight forwarders and logistics service providers in port logistics processes. On the basis of the characteristic of port logistics services, the forwarders or liners provide shippers with port logistics services. In this regard, shippers become customers of the forwarders and port logistics service providers become suppliers who provide real port logistics service to the forwarders. These are the characteristics of port logistics services, which are non-face to face services and the forwarders provide shippers with port logistics services through contracts with port logistics service providers on behalf of shippers. Hence, research on the relationship between international freight forwarders and port logistics service providers is needed for developing port logistics services.

Prior research on the relationship among firms was performed from various viewpoints. Prior research is approached as an inter-corporate relationship from the viewpoint of supply chains (Bae, 2012) and it is based on superior performance (Kang, 2012). In addition, inter-corporate collaboration in supply chains enhances performance (Bae and Ha, 2014). The relationships between inter-corporate relationships and performance can be explained as contingency theory. Logistics service providers in port logistics processes exist in the exterior of international freight forwarders and from the viewpoint of uncertainty, the forwarders treat port logistics service providers as external environment (Flynn et al., 2010). The forwarders can control the environment through making the high quality of relationships with port logistics service providers as external environment.

Despite the positive relationship between inter-corporate relationships and performance, prior research has limitations as follows. First, there is no research on the relationship between international freight forwarders and port logistics service providers in port logistics processes. Second, there is no research on the levels of the inter-corporate relationship in port logistics processes. Third, in port logistics processes, performance dimensions to reflect the inter-corporate relationship should be clearly verified. Therefore, the objective of this research is to analyze gaps in performance between the levels of the relationship between international freight forwarders and port logistics service providers.

2. Literature Review

International freight forwarders are treated as common carriers to provide shippers with international transportation services and accessory services in international logistics processes. On the basis of the characteristics of port logistics services which are non-fact to face services, they, as common carriers, provide shippers with services concerned with international logistics and they, as common carriers, make a contract of international transportation with a liner on behalf of shippers. Therefore, they are common carriers who have responsibility for the entire transportation from the viewpoint of shippers and they are common carriers who consolidate less than container loaded cargoes which are transported to the same destination from the viewpoint of liners.

Port logistics services are provided by international freight forwarders on behalf of shippers and contracts between the forwarders and port logistics service providers are based on providing port logistics services. There are various services such as loading/unloading, CY/CFS, bonded warehouse, bonded transportation, tally, cargo inspection, packing and customs clearance. The forwarders provide proper services to shippers through contracts with port logistics service providers on behalf of shippers. Therefore, the forwarders can be treated as common carriers for shippers.

International freight forwarders have no fixed assets concerned with logistics and have a role in providing proper services to shippers through contracts with port logistics service providers. In this regard, the forwarders make good inter-corporate relationships with port logistics service providers. As a result, they focus their core competence on international logistics management for shippers and the service providers focus their core competence on port logistics services. This is connected with core competence management. Therefore, the inter-corporate relationships of the forwarders can be approached from the inter-corporate viewpoints with port logistics service providers and this research needs to investigate the effect of the relationships on the performance of the forwarders.

Prior research has presented various studies concerned with inter-corporate relationships. The factors of inter-corporate relationships to have a positive effect on performance are extent of inter-organizational use (Chang et al., 2010), supply chain relationship quality (Fynes et al., 2004), supply chain relationship dynamics (Fynes et al., 2005), strategic buyer-supplier relationships (Paulraj and Chen, 2007) and information technology (Subramani, 2004). In addition, there are various research papers concerned with inter-corporate relationships such as integration between firms (Wong et al., 2011; Stevens, 1989) and collaboration in supply chains (Bae, 2012; Stank et al., 2001). Prior research concerned with inter-corporate relationships in supply chains ascertained that supply chain collaboration (Bae and Ha, 2014) and relationship collaboration (Bae, 2012) have a positive influence on performance. The relationships between inter-corporate relationships and performance in port logistics processes can be approached from various viewpoints. Port logistics firms make a strategy after grasping internal and external circumstances which they face. As a result of implementing the strategy, they change internal processes and the changed processes are based on enhanced performance. Moreover, the core of supply chain management is approached from the viewpoint of inter-corporate relationships and this can be explained by the information processing theory; that is, environmental factors are the cause of changed internal processes of firms, followed by a high level of performance. In addition, managers can choose strategic choices on the basis of the environmental variance in port logistics processes and this is based on gaps in performance. Therefore, the relationship between inter-corporate relationships and firm performance can be explained by strategic choice theory.

Despite the positive results between the inter-corporate relationships and firm performance above, prior research has three limitations. First, prior research did not clearly explain the inter-corporate relationships in port logistics processes. The inter-corporate relationships can be approached from various viewpoints. However, prior research has approached to the inter-corporate relationship from a simple viewpoint such as collaboration, integration or commitment. Therefore, this research will explain the inter-corporate relationship as collaboration, commitment and communication as a whole in port logistics processes.

Second, prior research has approached firm performance from the viewpoint of manufacturing firms. Prior research on port logistics firms was also approached from financial performance or firm performance. The performance is different with firm performance of international freight forwarders as service firms. Therefore, this research will consider firm performance with customer performance and financial performance of the forwarders.

Third, prior research ascertained the causal relationship between inter-corporate relationships and firm performance. Prior research has

ascertained that the inter-corporate relationships have a positive effect on firm performance but there is no evidence concerned with gaps in performance between the levels of the relationships. Therefore, this research will classify inter-corporate relationships into a high cluster and a low cluster and verify gaps in firm performance between the clusters.

3. The Research Hypotheses and Methodology

3.1. *The Research Hypotheses*

Inter-corporate communication and firm performance: Inter-corporate communication is the key factor to attain effectiveness among participants in supply chain processes. In this regard, an achievement of customer value through inter-corporate communication is a precedent factor for the improvement of performance and it is based on achieving customer performance as well as financial performance.

Communication between international freight forwarders and port logistics service providers is based on attaining shippers' needs as customers in port logistics processes and as a result, the forwarders can enjoy a sustainable competitive advantage (Bae and Ha, 2014). The forwarders should structure international logistics processes that shippers want and they provide port logistics services for shippers through contracts with port logistics service providers. In other words, to provide high quality of port logistics services, the forwarders need to identify the shippers' needs and as a result, they provide port logistics services for shippers through prior communication with port logistics service providers. Inter-corporate communication is based on customer satisfaction from the viewpoint of shippers, and firm performance from the viewpoint of the forwarders.

International freight forwarders who have a high level of communication with port logistics service providers in port logistics processes achieve shippers' needs very well and they adjust their logistics processes to shippers' needs through a high level of inter-corporate communication. The forwarders make strong bonds with shippers compared with competitors. It is possible for them to have a high level of communication with port logistics service providers compared with competitors and as a result, both the forwarders and the service providers enhance the mutual adjustment of logistics processes and the level of collaboration, followed by the high level of firm performance. Therefore, the high level of inter-corporate communication is based on the high level of firm performance. Therefore, this research suggests the hypothesis as follows.

H. 1 If international freight forwarders have a high level of inter-corporate communication, they enjoy high levels of customer performance (H. 1-1) and financial performance (H. 1-2).

Inter-corporate collaboration and firm performance: In port supply chains, inter-corporate collaboration is important from the viewpoint of international freight forwarders and port logistics service providers as well as from the viewpoint of shippers and service providers. Prior research has ascertained gaps in performance between the levels of inter-corporate collaboration. Daugherty et al. (1996) ascertained that integrated firms achieve high performance compared with non-integrated firms. Flynn et al. (2010) verified gaps in performance among different supply chain integration patterns. This means that the high level of supply chain collaboration is connected to the high level of performance. In other words, if firms achieve a high level of supply chain collaboration, they create superior performance. The results are based on strategic choice theory and this means that they acquire a higher performance when managers choose the higher level of supply chain collaboration.

The results of prior research can be directly applied to port logistics firms. International freight forwarders have a role as brokers to create and connect the relationship between shippers and port logistics service providers in port logistics processes. If the forwarders increase the level of collaboration with the service providers, they better achieve shippers' needs and as a result, shippers enhance the relationship with the forwarders, followed by a high level of benefits. Therefore, this research suggests the hypothesis as follows.

H. 2 If international freight forwarders have a high level of inter-corporate collaboration, they enjoy high levels of customer performance (H. 2-1) and financial performance (H. 2-2).

Inter-corporate commitment and firm performance: Commitment among supply chain participants means focusing on common work in mutual relationships to achieve common objectives which exist in work among the participants. In particular, firms which focus on internal objectives of a firm in supply chains do not achieve the objectives of supply chains and this is based on not achieving supply chain performance. In this regard, supply chain participants should achieve supply chain efficiency through commitment to achieving the objectives of supply chains rather than commitment to achieving the internal objectives of a firm. The supply chain efficiency can be achieved by commitment on common work among participants in supply chains. Therefore, from the viewpoint of supply chain management, inter-corporate commitment should be focused on the achievement of supply chain performance as a whole.

Prior research has analyzed inter-corporate commitment from various viewpoints. There is research on inter-corporate commitment in supply chains (Chu and Fang, 2006; Kwon and Suh, 2005; Wu et al., 2004). In addition, research on the commitment of logistics firms was performed (Bennett and Gabriel, 2001). The results showed that commitment has a positive effect on performance. Most prior research has performed research on the commitment of manufacturing firms. However, there is no research concerned with commitment between international freight forwarders and port logistics service providers: the former provide logistics services with shippers and the latter perform real port logistics services. In this regard, prior research ascertained a causal link between commitment and performance from the viewpoint of supply chain management and the result can be applied to the relationship between inter-corporate commitment and firm performance of the forwarders with the service providers. The forwarders who have a high level of commitment can better satisfy customer needs compared with the forwarders who have a low level of commitment. Therefore, this research suggests the hypothesis as follows.

H. 3 If international freight forwarders have a high level of inter-corporate commitment, they enjoy the high levels of customer performance (H. 3-1) and financial performance (H. 3-2).

3.2. *Research Methodology*

Measurement of variables: To achieve the objective of this research, conceptual and operational definitions of the variables used in this

research come from prior research. Conceptual definitions of measuring variables mean abstract concepts of meanings which the variables have, and operational definitions mean measuring items to estimate the variables. To quantitatively measure abstract concepts, a variable should be estimated as more than three measuring items. The conceptual and operational definitions of measuring items in this research are as follows. The inter-corporate relationships are divided into collaboration, commitment and communication and firm performance is classified into customer performance and financial performance. Inter-corporate communication means the quantity, quality and frequency of information exchange between international freight forwarders and port logistics service providers (Barret et al., 2004). It is measured as the degree of contact and communication with service providers (ICR 1), the degree of sustainable contact concerned with work with service providers (ICR 2), the degree of informal contact concerned with work with service providers (ICR 3) and the degree of smooth contact with service providers (ICR 4).

Inter-corporate collaboration means the degree of operational collaboration concerned with logistics between international freight forwarders and port logistics service providers (Barret et al., 2004; Bae and Ha, 2014). It is measured as the degree of adjustment of logistics work with the service providers (ICR 5), the degree of collaboration for maintaining the flow of logistics with the service providers (ICR 6), the degree of information sharing on logistics with service providers (ICR 7), the degree of smooth information exchange with service providers (ICR 8) and the degree of meeting for collaboration with service providers (ICR 9).

Inter-corporate commitment means staff's intervention, sense of unity and emotional attachment to logistics work between international freight forwarders and port logistics service providers (Barret et al., 2004; Monczka et al., 1998). It is measured as the degree of satisfaction concerned with working with service providers (ICR 10), the degree of discussion concerned with work with service providers (ICR 11), the degree of cooperatively settling logistics problems with service providers (ICR 12), the degree of attachment on mutual work (ICR 13) and the degree of a fellow feeling with service providers (ICR 14). All items are measured as perceptions on a seven Likert scales.

Firm performance is classified into customer performance and financial performance. The former means the degree of securing customers in the market and the latter means the degree of creating a margin by international freight forwarders (Bae, 2012). The former is measured as market share (PER 1), securing customers (PER 2) and maintaining customers (PER3) and the latter is measured as return on investment (PER 4), the sales growth rate (PER5) and operating profit ratio (PER 6). All items are measured as perceptions on a seven Likert scales.

Sampling and data collection methods: The population of this research is international freight forwarders. The sample frame is a membership list of the Korea International Freight Forwarders Association. The questionnaire was sent to all members on the list.

The responder was the staff of the sales department or logistics management department of international freight forwarders. Because they perform direct work with service providers in port logistics processes, they knew real inter-corporate relationships between international freight forwarders and port logistics service providers very well.

The survey was conducted by mail. Before the survey, researchers ascertained whether or not they would respond to the questionnaire by telephone and when they wanted, the questionnaire was sent to them. The period of the survey was from July 2014 to October 2014 and 146 questionnaires were collected (the response rate was 17.9%). 143 data were used for an analysis because three questionnaires had problems, such as the same answers or many missing items.

The analytical methods: This research used various analytical methods to verify the relationships between the variables on the basis of collected data as follows. First, non-response bias was verified. It is recommended by Armstrong and Overton (1977) and collected questionnaires are divided into four groups on the basis of the arrived order when a survey is conducted by mail. If there are no gaps in response between the first group and the fourth group, there is no non-response bias. The analysis was performed by ANOVA which ascertains a gap between groups. Second, reliability and validity of the variables are tested by factor analysis and Cronbach's alpha. Reliability means the possibility to get the same result when researchers measure a concept. This research ascertains the reliability of measured concepts through internal consistency of measuring items. It is measured as using a coefficient of Cronbach's alpha recommended by Nunnally (1978) and if the coefficient is over 0.6, there is no problem in the reliability. Validity means whether measuring items correctly reflect a specific concept or characteristic. This research measures validity by using factor analysis. Factor analysis is used to remove the items which distort validity of measurement and there are three criteria: one is over 0.6 in a factor loading coefficient, another is that an item should be included in just one variable (factor cross loading), and the third is over 1.0 in eigenvalue. In addition, the relationships between variables are verified by correlation analysis. There are three aims of the analysis. First, if there are high correlation coefficients between independent variables, this means that multicollinearity is in doubt. In this case, tolerance (> 0.1) and MAX-VIF (< 10.0) should be tested. Second, the high level of a correlation coefficient between an independent variable and a dependent variable means that independent variables and dependent variables have high correlations. Third, high correlations between dependent variables mean that it is unclear whether a gap in a dependent variable is based on independent variables or the other dependent variable. In this case, a dependent variable should be treated as covariate, and pure gaps in the other dependent variable between the levels of independent variables can be verified by ANCOVA.

Next is that gaps in firm performance between the levels of inter-corporate relationships of international freight forwarders are verified by cluster analysis, ANOVA and ANCOVA. The levels of inter-corporate relationships are divided into a high level cluster and a low level cluster to use cluster analysis (K-means). ANOVA verifies gaps in averages between the two clusters. If there is a high level of a correlation coefficient between dependent variables, ANCOVA should be used for analyzing gaps in performance between clusters. This research uses SPSS 21.0 and the results are as follows.

4. The results of empirical tests

4.1. *General Characteristics of responding firms*

To achieve the objective of this research, the questionnaire was sent to international freight forwarders and 143 data were used in the analysis. First of all, non-response bias of the measuring variables is analyzed. There are no problems in communication (F=0.955, p=0.332), collaboration (F=0.927, p=0.339), commitment (F=2.588, p=0.112), customer performance (F=0.781, p=0.380), financial performance (F=0.844, p=0.361), annual turnover (F=0.285, p=0.596), the year of establishment (F=0.170, p=0.682) and the number of staff (F=0.311,

p=0.579). Next is the result of the general characteristics of responding firms.

Table 1
The general characteristics of responding firms

Annual turnover (U$0.1 million)	Frequency (%)	Year of establishment	Frequency (%)
below 1	12 (8.4)	before 1990	18 (12.6)
1 – 3	29 (20.3)	1991 – 2000	66 (45.2)
3 – 5	32 (22.4)	after 2001	53 (37.1)
5 – 10	43 (30.0)	no answer	6 (4.1)
over 10	17 (11.9)	The number of staff	Frequency (%)
no answer	10 (7.0)	below 10	69 (48.2)
		11 – 20	52 (36.4)
Total	143 (100.0)	over 21	15 (10.5)
		no answer	7(4.9)

According to <Table 1>, annual turnover of the responding firms shows 116 firms (81.1%) below U$1 billion and the number of staff shows 69 firms (48.2%) below 10. This reflects the fact that most international freight forwarders are small and medium sized enterprises. This means that they do not have enough internal resources to provide a high quality of international logistics services for shippers. In addition, the year of establishment shows 66 firms (45.2%) between 1991 and 2000 and 53 firms (37.1%) after 2001. This means that four-fifths of them were founded during the two periods and they are providing international logistics services for shippers.

4.2 *The Results of Reliability and Validity*

This research analyzes gaps in performance between the levels of inter-corporate relationships. Before analyzing the relationship between the variables, reliability and validity of the measuring items were tested by factor analysis and Cronbach's alpha coefficients.

Table 2
The results of reliability and validity of inter-corporate relationships

Items	Factor 1	Factor 2	Factor 3	Cronbach
ICR 1	0.284	0.040	0.859	0.802
ICR 2	0.050	0.512	0.682	
ICR 4	0.187	0.477	0.683	
ICR 5	0.458	0.615	0.423	0.910
ICR 6	0.461	0.692	0.238	
ICR 7	0.363	0.776	0.214	
ICR 8	0.115	0.906	0.011	
ICR 9	0.193	0.777	0.291	
ICR 10	0.875	0.057	0.175	0.944
ICR 11	0.906	0.209	0.023	
ICR 12	0.883	0.168	0.058	
ICR 13	0.916	0.158	0.148	
ICR 14	0.778	0.270	0.274	
Eigenvalue	4.540	3.911	2.365	-
Variance (%)	32.428	27.936	16.894	-

Note: KMO: 0.850, Bartlett test: chi=1793.630, df=91, p=0.000

<Table 2> shows the results of factor analysis on inter-corporate relationships. The stability of data is ascertained by KMO (Kaiser-Meyer-Olkin) and the Bartlett test and the result shows that there are no problems. As a result of factor analysis, the inter-corporate relationships are divided into three variables. Factor 1 is inter-corporate commitment which has five items, factor 2 is inter-corporate collaboration which also has five items and factor 3 is inter-corporate communication which has three items. Therefore, there are no problems in the validity of the measuring items. Reliability is tested by Cronbach's alpha coefficients and there are no problems in the results because all variables have over 0.6 in the coefficients. Next are the results of reliability and validity on firm performance.

Table 3
The results of reliability and validity on firm performance

Items	Factor 1	Factor 2	Cronbach
PER 1	0.847	0.408	
PER 2	0.815	0.456	0.933
PER 3	0.818	0.441	
PER 4	0.428	0.834	
PER 5	0.531	0.779	0.931
PER 6	0.407	0.847	
Eigenvalue	2.680	2.616	-
Variance (%)	44.669	43.603	-

Note: KMO=0.906, Bartlett test: Chi-square=880.899, df=15, p=0.000

According to <Table 3>, the results of KMO and the Bartlett test show no problems and there are also no problems in validity. In addition, there are two variables: factor 1 is customer performance and factor 2 is financial performance. Both of them have no problems in reliability. Next is the result of correlation analysis.

Table 4
The result of correlation analysis

Var	ave	sta	uni	oll	mmi	cus	fin
uni	4.625	1.250	1.000				
oll	4.687	1.305	0.661***	1.000			
mmi	5.526	1.350	0.404***	0.530***	1.000		
cus	4.718	1.209	0.465***	0.514***	0.458***	1.000	
fin	4.625	1.339	0.444***	0.460***	0.278***	0.840***	1.000

Notes: ***: p < 0.01, var: variables, ave: average, sta: standard deviation, uni: communication, oll: collaboration, mmi: commitment, cus: customer performance, fin: financial performance

<Table 4> shows the result of correlation analysis. There are three aims of the analysis. The first is the relationship between independent variables. As a result of the analysis, there are high correlation coefficients in the relationships between independent variables and that is why multicollinearity is tested. The results show that there are no problems because inter-corporate communication has 0.560 in tolerance and 1.787 in MAX-VIF, inter-corporate collaboration has 0.481 in tolerance and 2.081 in MAX-VIF and inter-corporate commitment has 0.714 in tolerance and 1.401 in MAX-VIF. Second are the relationships between independent variables and dependent variables. The result shows that there are high correlations between independent variables explain dependent variables. Third is the relationship between dependent variables. The result shows that there is the highest correlation coefficient (0.840) and that is why ANCOVA should be used. Therefore, gaps in performance between the levels of inter-corporate relationship are tested by ANCOVA. The results are as follows.

4.3 *The results of ANCOVA*

To achieve the objective of this research, cluster analysis, ANOVA and

ANCOVA are tested. The results are as follows.

Table 5

The results of cluster analysis on inter-corporate communication

variable	cluster 1 (n)	cluster 2 (n)	F
Communication	3.50 (65)	5.56 (78)	295.119***

Note: ***: p < 0.01

<Table 5> shows the result of cluster analysis on inter-corporate communication. Cluster 1 is 3.50 as an average (65 firms) and cluster 2 is 5.56 as an average (78 firms). The result of ANOVA shows that they are different clusters. Next is the result of ANCOVA on inter-corporate communication.

This research analyzes preconditions of ANCOVA which is Levene's test of equality of error variance. The result is that there is no problem because the result shows p=0.976 (F=0.001). Therefore, this research analyzes ANCOVA on gaps in customer performance between the levels of inter-corporate communication.

Table 6

The results of ANCOVA on customer performance

Source	Type III sum of squares	df	Mean square	F	P
Corrected model	150.045a	2	75.022	182.412	0.000
Intercept	19.416	1	19.416	47.209	0.000
Financial	109.316	1	109.316	265.795	0.000
Customer	3.464	1	3.464	8.422	0.004
Error	57.579	140	0.411		
Total	3390.667	143			
Corrected total	207.624	142			

Note: a. R2=0.723 (adj R2=0.719)

<Table 6> shows the result of inter-corporate communication. The result is that there is a gap in customer performance between the high cluster and the low cluster of inter-corporate communication (H. 1-1 is supported). Next is the result of financial performance on inter-corporate collaboration.

The result of Levene's test of equality of error variance is that there is no problem because p value is 0.100 and F value is 2.741. The result of ANCOVA is as follows.

Table 7

The results of ANCOVA on financial performance

Source	Type III sum of squares	df	Mean square	F	P
Corrected model	179.826a	2	141	168.262	0.000
Intercept	0.531	1	89.913	0.994	0.321
Customer	142.031	1	0.531	265.795	0.000
Financial	0.055	1	142.031	0.102	0.750
Error	74.811	140	0.055		
Total	3313.111	143	0.534		
Corrected total	254.637	142			

Note: a. R2=0.706 (adj R2=0.702)

As shown in <Table 7>, a gap in financial performance is affected by customer performance (H. 1-2 is rejected). The reason is that p value is 0.750 and this means that there is no gap in financial performance between the clusters of inter-corporate communication. Next are gaps in firm performance between the clusters of inter-corporate collaboration.

Table 8

The results of cluster analysis on inter-corporate collaboration

Variable	cluster 1 (n)	cluster 2 (n)	F
collaboration	3.52 (65)	5.66 (78)	282.812***

Note: ***: p < 0.01

<Table 8> is the result of cluster analysis on inter-corporate collaboration. Cluster 1 has 3.52 as an average and 65 firms and cluster 2 has 5.66 as an average and 78 firms. As a result of ANOVA, they are different clusters (F=282.812). Next is the result of ANCOVA on inter-corporate collaboration.

This research analyzes preconditions for ANCOVA on customer performance. The result of Levene's test of equality of error variance has no problem because inter-corporate collaboration is 0.512 in p value (F=0.431). Therefore, this research analyzes gaps in customer performance between the levels of inter-corporate collaboration.

Table 9

The results of ANCOVA on customer performance

Source	Type III sum of squares	df	Mean square	F	P
Corrected model	153.929a	2	76.964	200.670	0.000
Intercept	21.567	1	21.567	56.231	0.000
Financial	109.549	1	109.549	285.629	0.000
Customer	7.348	1	7.348	19.158	0.000
Error	53.695	140	0.384		
Total	3390.667	143			
Corrected total	207.624	142			

Note: a. R2=0.741 (adj R2=0.738)

<Table 9> shows the result of ANCOVA on inter-corporate collaboration. There is a gap in customer performance between the high cluster and the low cluster of inter-corporate collaboration (H. 2-1 is supported). Next is the result of ANCOVA on financial performance.

The result of Levene's test of equality of error variance is that there is a problem because p value is 0.049 and F value is 3.959. The result of ANCOVA is as follows.

Table 10

The results of ANCOVA on financial performance

Source	Type III sum of squares	df	Mean square	F	P
Corrected model	180.543a	2	90.272	170.568	0.000
Intercept	0.061	1	0.061	0.114	0.736
Customer	151.167	1	151.167	285.629	0.000
Financial	0.772	1	0.772	1.458	0.229
Error	74.094	140	0.529		
Total	3313.111	143			
Corrected total	254.637	142			

Note: a. R2=0.709 (adj R2=0.705)

The precedent of ANCOVA is not achieved. In addition, <Table 10> shows that there is no gap in financial performance between inter-corporative collaboration. The result represents that p value is 0.229 and

as a result, hypothesis 2-2 is rejected. Next is the result of cluster analysis on inter-corporate commitment.

Table 11

The results of cluster analysis on inter-corporate commitment

Variable	cluster 1 (n)	cluster 2 (n)	F
commitment	3.91 (49)	6.37 (94)	417.842***

Note: ***: p < 0.01

<Table 11> shows the result of cluster analysis on inter-corporate commitment. Cluster 1 is 3.91 (49 firms) as an average and cluster 2 is 6.37 (94 firms) as an average. The result shows that they are different clusters. Next is the result of ANCOVA on inter-corporate commitment.

This research analyzes preconditions for ANCOVA on customer performance. The result of Levene's test of equality of error variance has no problem because inter-corporate commitment is 0.155 in p value (F=3.735). Therefore, this research analyzes gaps in customer performance between the levels of inter-corporate commitment.

Table 12

The results of ANCOVA on customer performance

Source	Type III sum of squares	df	Mean square	F	P
Corrected model	153.810a	2	76.905	200.075	0.000
Intercept	17.910	1	17.910	46.595	0.000
Financial	129.737	1	129.737	337.521	0.000
Customer	7.230	1	7.230	18.809	0.000
Error	53.813	140	0.384		
Total	3390.667	143			
Corrected total	207.624	142			

Note: a. R2=0.411 (adj R2=0.737)

<Table 12> shows the result of ANCOVA on inter-corporate commitment. There is a gap in customer performance between the high cluster and the low cluster of inter-corporate commitment (H. 3-1 is supported). Next is the result of ANCOVA on financial performance.

The result of Levene's test of equality of error variance is that there is a problem because p value is 0.011 and F value is 6.709. The result of ANCOVA is as follows.

Table 13

The results of ANCOVA on financial performance

Source	Type III sum of squares	df	Mean square	F	P
Corrected model	182.596a	2	91.298	177.421	0.000
Intercept	0.059	1	0.059	0.115	0.735
Customer	173.682	1	173.682	337.521	0.000
Financial	2.824	1	2.824	5.488	0.021
Error	72.042	140	0.515		
Total	3313.111	143			
Corrected total	254.637	142			

Note: a. R2=0.709 (adj R2=0.705)

The precedent of ANCOVA is not achieved. As shown in <Table 13>, there is a gap in financial performance between the levels of inter-corporative commitment. The result represents that p value is 0.021 and as a result, hypothesis 3-2 is supported.

As a result of the above analyses, the gap in customer performance between the levels of inter-corporate relationship is not affected by financial performance but the gap in financial performance between the levels of inter-corporate relationship is affected by customer performance. The result explains dimensions between customer performance and financial performance. The former is regarded as a dimension at an operational level and the latter is regarded as a dimension at a firm level. Therefore, international freight forwarders differ in customer performance on the basis of the levels of inter-corporate relationships but there is no gap in financial performance.

4.4 *Discussion*

The objective of this research is to analyze the gap in firm performance of international freight forwarders on the basis of the levels of inter-corporate relationships between international freight forwarders and port logistics service providers. The discussion, on the basis of the results, is as follows. First, the high levels of inter-corporate communication between the forwarders and the service providers are based on a gap in customer performance. Inter-corporate communication is the cause of quality, quantity and frequency of the high level of information exchange between the forwarders and the service providers. This is explained as strategic choice theory (Bae and Ha, 2014). The forwarders as common carriers make contracts of international logistics services with the service providers on behalf of shippers. The forwarders make port logistics processes for shippers and provide the fittest services for shippers. They deliver shippers' needs to the service providers through a high level of communication, followed by customer satisfaction. The forwarders have a unique characteristic as common carriers and they should communicate with the service providers for customer service rather than from internal viewpoints, followed by the high level of customer performance.

Second, the high level of collaboration between international freight forwarders and port logistics service providers is the cause of the high level of customer performance. Inter-corporate collaboration means operational collaboration concerned with logistics between the forwarders and the service providers and as a result, the forwarders can gather customers, keep customers and create benefits in the market. This is explained as strategic choice theory. The forwarders can make a high level of inter-corporate relationships through collaboration with the service providers. To create the high level of benefits, the relationships with the service providers as well as shippers are important to the forwarders. Therefore, the forwarders who perform the high level of collaboration with the service providers can provide customers with a high level of port logistics services and this is connected with customer satisfaction, followed by a high level of customer performance.

Third, the high level of commitment between international freight forwarders and port logistics service providers is based on the high level of customer performance. On the basis of the high level of inter-corporate commitment, the forwarders provide shippers with a high level of customer services and it is also connected with the high level of customer performance. The forwarders understand shippers' needs, share the needs with their internal departments and make their internal processes fit the needs. In addition, they require the change of the services to fit the needs of the service providers. As a result of the change, the forwarders provide shippers with the high level of port logistics services and shippers achieve a high level of satisfaction. The satisfaction is based on creating new customers through word of mouth and as a result, this is the cause of the high level of customer performance. Therefore, a high level of

commitment between the forwarders and the service providers is based on the high level of customer performance of the forwarders.

5. Conclusion

The objective of this research is to verify a gap in firm performance of international freight forwarders on the basis of the levels of inter-corporate relationships between international freight forwarders and port logistics service providers. To attain the objective, this research developed measuring items through prior research and the data were collected through a survey sent to international freight forwarders. The collected data were verified for reliability and validity by factor analysis and Cronbach's alpha and the hypotheses were proved by cluster analysis, ANOVA and ANCOVA. The theoretical implications on the analytical results were shown in the discussion above and managerial implications, limitations and future research directions are as follows.

Managerial implications on the basis of the analytical results are as follows. First, managers of international freight forwarders should enhance the level of communication with port logistics service providers. They need to increase the frequency of contacts for mutual communication, enhance the frequency of sustainable contacts concerned with mutual work and perform smooth mutual contacts. This is connected with the high level of market share, securing customers and maintaining customers.

Second, managers should raise the level of collaboration with port logistics service providers. They need to smoothly change information and share mutual information to achieve customer needs. In addition, they need to perform collaboration for adjustment of mutual logistics work and maintain logistics flow through a formal meeting of information exchange. This is the cause of achieving improved customer performance and making sustainable competitive advantages in the market.

Third, managers should increase the level of commitment with port logistics service providers. They need to have an emotional attachment and a sense of unity on mutual work. In addition, they need to cooperatively solve problems through discussion on mutual work and as a result, satisfaction on mutual work is increased. This is connected with a high level of customer performance.

Despite the implications as above, there are limitations. First, inter-corporate relationships can be approached from various viewpoints. This research approached it from inter-corporate commitment, collaboration and communication. However, it can be approached from inter-corporate negative factors such as conflict and competitiveness as well as the positive factors. Second, according to the result of ANCOVA, financial performance is affected by customer performance. This is different from the results of prior research. This research explained the result as a dimension between customer performance and financial performance but an addition analysis is required to explain the result. These limitations consist of future research directions.

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