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Strategic Collaboration with Shipping Companies

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Abstract

Transportation network provides the largest contribution to the total logistics cost. Therefore, determination of the transportation network that will be used in logistics system becomes very important. Indonesia is a maritime country, therefore movement of logistics can be done with road mode, rail mode, water mode, and air mode. Based on survey data national transportation, nearly 90% of the logistics transportation system is done by road mode (truck), 7 % by water mode, and the rest by other modes. This research specifically focuses on the collaboration between logistic companies with marine transport companies. Many factors considered by logistic company in choosing a shipping company that will be used. Therefore, this research aims to determine factors that influence collaboration between logistic companies with shipping companies, and how much influence these factors in the decision making to collaborate. This research used Structural Equation Modeling (SEM) method and processed using AMOS 20 software. The result of this research is a model that has met the Goodness of Fit criteria. The conclusions are four hypotheses can be accepted, the total logistics cost, characteristics of the goods, performance of company, and the characteristics of transportation modes have a positive effect on the collaboration.

Keywords: Collaboration, Logistics, Marine, Transportation.

1. Introduction

National development is a process development of the entire system of state administration in order to achieve national goals. One of the government plans is trying to increase productivity of people and international competitiveness. Thus, prepared 11 sub agenda priorities in the National Medium Term Development Plan and the National Long Term Development Plan, where one of sub-item on agenda is to build a national connectivity to achieve balanced development. One of the goals to be achieved in sub- item on the agenda is the integration of multimodal and intermodal transportation system. The integration of transportation system will be able to build if there is a good collaboration between transportation system and its users. Collaboration is a strategy of cooperation between supply chain partners with a common goal to serve customers through an integrated solution that can reduce cost and increase revenue (Simatupang, et al., 2004). Good collaboration between logistics system with transportation system would provide a good impact for the actors concerned. Figure 1 shows the percentage of the average cost elements associated with logistics system, where transportation system has the largest contribution compared with components of other logistics system. Indonesia is a maritime country, so that the movement of logistics can be done with road mode, rail mode, water mode, and air mode. Based on survey data national transportation, nearly 90% of the logistics transportation system is done by road mode (truck), 7 % by water mode, and the rest by other modes. Indonesia has many logistic companies that specifically have function delivery of goods. So, the logistic companies have to consider many factors in selection shipping companies will be used to cooperation. Because Indonesia is an archipelago, transportation line in delivery of goods is usually done through rode mode then followed by sea. So, the selection of shipping company that will be used is a very important thing. Therefore, this research aims to determine factors that influence collaboration between logistic companies with shipping companies, and how much influence these factors in the decision making to collaborate.

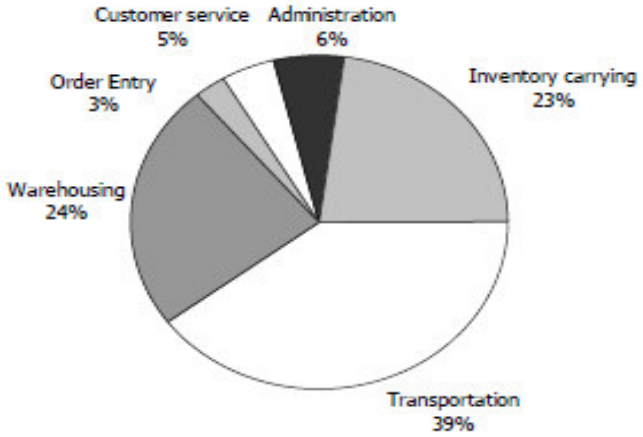

Figure 1. The percentage of the average cost elements associated with total logistics cost

2. Literature Review

2.1 Logistics System

In the Blueprint for Development of the National Logistics System (Presidential Decree No. 26 of 2012), logistics is defined as part of the supply chain which handles the flow of goods, information and money through the procurement process, warehousing, transportation, distribution, and delivery services. Object of logistic is not limited to the logistics of goods, but including passenger logistics, logistics of disaster, and military logistics (defense and security) undertaken by every business and industry both in the primary sector, secondary sector, or tertiary sector in order to support its operations. Activities of logistics also involve the various stakeholder that can be categorized into five groups, namely:

a. Consumers, logistics users who required goods to be used in the production process or for consumption.
b. Actor logistics, the owner and provider of goods needed by consumers, they are divided into two kinds, namely manufacturers and distributors.
c. Logistics Service Provider, a service provider to deliver the goods (freight forwarder, shipping company, etc) from the origin location of the goods to its destination.
d. Supporting logistics, support the effectiveness and efficiency of logistics activities, and contribute to the settlement in case of problems during logistics activities take place.
e. Government, the roles of government in logistics activities are as regulator, facilitators, and integrator.

2.2 Transportation System

Transportation is the movement of goods or passengers from one place to another place, where the product is moved to the required destination (Bowersox, 2006). Elements of the transportation, include:

a. Loads
b. Vehicles
c. Roads/Paths
d. Origin terminals and destination terminals
e. Human resources and organization

2.3 Collaboration

Collaboration is a process of sharing between two or more departments are working together, which has a mutual vision, shared resources, and achieve common goals (Schrage, 1990). According to Lambert et al (1996), type of collaboration in logistics network is divided into 3 types, among others:

a. Type 1, consist of organizations involved in recognizing each other as co-workers and is limited to coordinate the activities and planning. This cooperation is usually only short term and it involves only one division in each organization.
b. Type 2, a partnership which the organization is involved in the progress of the activities on the coordination of the activities of integration. Although it cannot expect to survive long, this collaboration is a long-term cooperation. Divisions within the company involved in collaboration.

c. Type 3, a collaboration which organizations divides the operating level in the integration.

2.4 State of The Art

Some studies related to this research include:

"Strategy of Selection Transporter and Type Truck Using Linear Programming Model", Djamaris (2011), a study that discussed about the selection of type transportation based on factors that have been set namely planning delivery routes, modes of transport, and cost of transportation, then going on to do calculations using Linear Programming Model.

"The Impact of Using E-Collaboration Tools on Company Performance", Shannak , (2013), a journal that discussed the impact of e-collaboration of the company, which in this journal, researcher took several factors that affect the passage of a company to study and the impact on the hypothesis made.

"Analysis of Freight Movement Mode Factors Choice", University of South Florida (2008), a journal that describes a research university located in South Florida, which in this study, researcher examined the effect of selection of the type of product to an existing transportation. The factors contained in this journal are the size of the goods, type of goods, the density of goods, vehicle type, and vehicle capacity.

"The Impact of Product Life Cycle on Supply Chain Strategy", Aitken (2003), a journal that discussed the impact of the product on supply chain strategy. Where there are several factors that influence the supply chain based on product criteria.

"Measuring Supply Chain Performance Guide to Key Performance Indicators for Public Health Managers", USAID (2010), a journal that discussed indicators to measure the performance of the supply chain. Where these indicators can serve as guidelines for conducting research in measuring the supply chain.

"Analysis of Factors Affecting Consumer Satisfaction Of User Services Transport", Zakaria (2013), a journal that discussed the factors that affect customer satisfaction with the use of transport services which in this journal we can obtain the factors that can influence the selection of transport, namely the price/ cost, assurance, responsiveness (speed of service), and brand.

"Analysis of Performance of Logistics Distributions in Supply of Goods from Distribution Center to Indomart Outlets in Semarang", Alfridel (2013), a journal describing the selection of the location of a Indomart where Indomart has a partnership with a logistics and transportation company. In this case there are several factors which are analyzed both in terms of the Indomart as well as in terms of the transport company. The factors contained in this journal namely the number of vehicles, vehicle quality, human resources and others.

"A Conceptual Model and Analytical Framework for Studying Purchasing & Supply Management within SMEs", Bagchi and Skjott-Larsen's (2003), a journal which discusses the factors to make a collaboration. The journal discussed on a gain factor of the collaboration is influenced by cost factors.

"Collaborative Logistics and Transportation Networks", Groothedde (2005), a journal that discussed the collaboration between the transport company with its logistics, there are several factors that form the collaboration include the integration of information, facilities, knowledge, and others.

"Measurement and Determinants of Supply Chain Collaboration, Stank et al (2001), a journal which discusses the factors that can form collaborations, namely information or IT (Information Technology).

3. Conceptual Model

3.1 Operational Design

Operational definition of variables and indicators used in this research are shown in Table 1.

Table 1. Operational Design

Variable	Operational Definition	Indicators	Resources
Total Logistics Cost (Y1)	Logistics cost is the total cost that consider all aspects related to logistics cost (McKinnon, 2003)	X1: Shipping Cost X2: Holding Cost X3: Packaging Cost	Robert Spekman (2002) Rifat O.Shannak (2013)
Characteristic of Product (Y2)	Anything that can be offered to the market to satisfy the desires and needs of consumers (Kotler, 2001)	X4: Size of Goods X5: Number of Goods X6: Type of Goods	University of South Florida (2008) James Aitken (2003)
Performance (Logistics Company) (Y3)	The result of the quality and quantity of work that achieved by company in doing their jobs in accordance with the responsibilities (Mangkunegara, 2000)	X7: On-time Delivery X8: Rate of return	Daniel Spina, et al (2013) Dr. Rajwinder Singh (2013)
Performance (Shipping Company) (Y4)	The result of the quality and quantity of work that achieved by company in doing their jobs in accordance with the responsibilities (Mangkunegara, 2000)	X9: Flexibility of Service X10: Guarantee X11: On-time Delivery X12: Transit Time	Gunasekaran (2004) Shandy Ibnu Zakaria (2013) Jana Auramo (2010)
Characteristic of Transportation (Y5)	Activity of the movement of people or goods by road or other mode from and to places that are geographically separated (Steenbrink, 1974)	X13: Number of vessels X14: Capacity of vessels X15: Travel Route	Agus Imam Rifusua (2010) Afridel Chandra (2009)
Collaboration (Y6)	An process of sharing between two or more departments are working together, which has a mutual vision, shared resources and achieve common goals (Schrage, 1990)	X16: Length of Relationship X17: Benefit X18: Skill/knowledge Sharing X19: Information Sharing	Bagchi & Skjott-Larsen's (2003) Stank et al (2001) Bas Groothedde (2005) Shutao et al (2009)

3.2 Conceptual Model

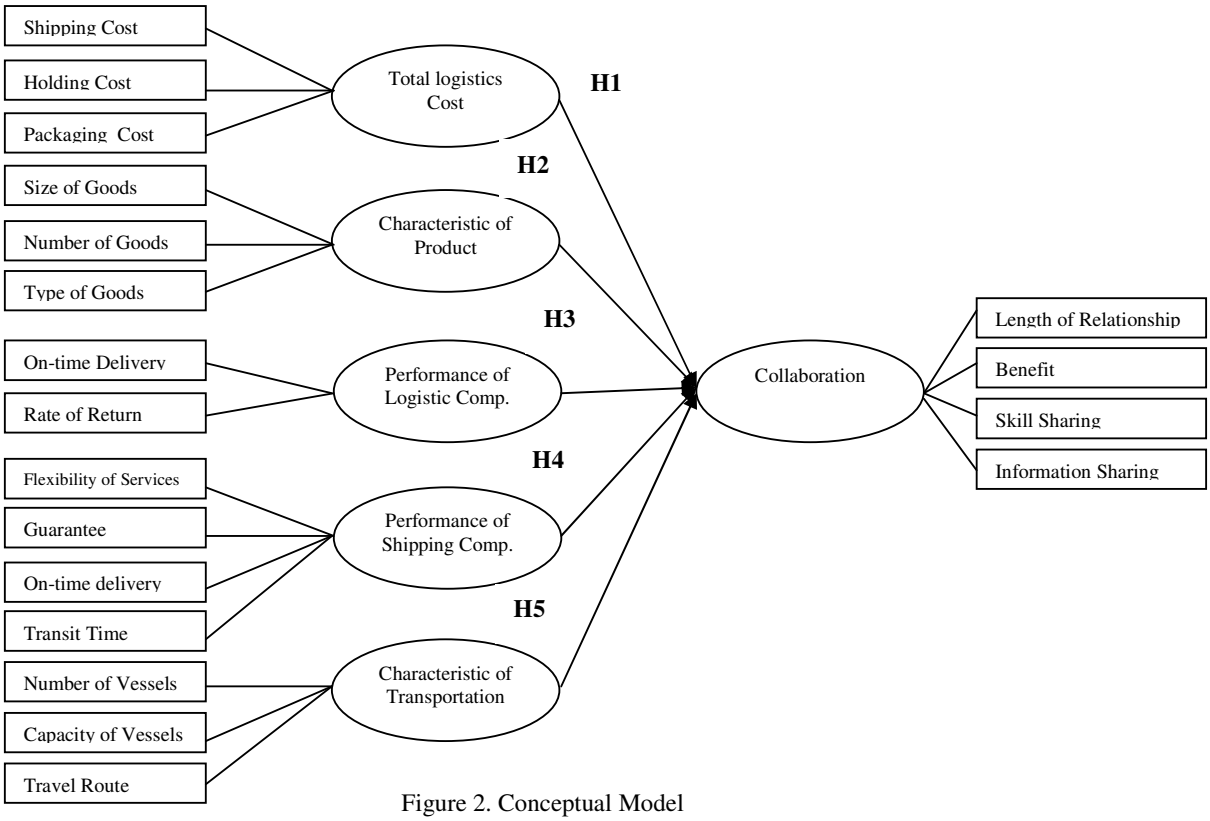

Figure 2. Conceptual Model

The aim of the framework presented above is to develop an understanding factors influence collaboration logistics company with shipping company. There are five hypothesis in this study, namely:

H1: Total logistics cost has positive impact on collaboration

H2: Characteristic of product has positive impact on collaboration
H3: Performance of logistic company has positive impact on collaboration
H4: Performance of shipping company has positive impact on collaboration
H5: Characteristic of transportation has positive impact on collaboration

3. Research Methodology

4.1 Type of Data

Data collection was obtained from secondary data and primary data. Secondary data is data from literature review and data derived from ministry of transportation as well as ministry of trade include list of logistic company and shipping company in Indonesia. While, primary data was obtained by distributing questionnaires directly to logistic company and shipping company.

3.2 Samples

In this research we choose the sample of 200 respondents which is composed of 100 respondents from logistic company and 100 respondents from shipping company in Indonesia area.

4.3 Estimation Techniques

In this study the model is a model of causality (relationship), so to examine the hypothesis used Structural Equation Modeling (SEM) method. SEM is a statistical technique used to examine a series of relationship between multiple variables that formed of factors variables and observed variables that can be analyzed using AMOS program.

The criteria to identify good models of SEM using AMOS, namely:

a. Degree of Freedom (DF) must be positive
b. Chi square above the required (p=0.05) and above the acceptable conservative (p=0.1)
c. Incremental fit above 0.9 for GFI, AGFI, TLI, and NFI
d. Value RMR and RMSEA lower than 0.08

4. Analysis and Discussion

5.1 Descriptive Statistics

First step of statistical result we use SPSS software for data analyses using questionnaire on Likert scale. To determine an item including valid or not, can be seen from the value of significance. If the value of r count $\geq$ r table, then the item can be declared valid. Table 2 shows the results of the validation test using SPSS software.

Table 2. Recapitulation of validity test

Item	r count	r table	Description
X1	0.458	0.279	VALID
X2	0.518	0.279	VALID
X3	0.518	0.279	VALID
X4	0.466	0.279	VALID
X5	0.359	0.279	VALID
X6	0.324	0.279	VALID
X7	0.367	0.279	VALID
X8	0.619	0.279	VALID
X9	0.546	0.279	VALID
X10	0.429	0.279	VALID
X11	0.517	0.279	VALID
X12	0.631	0.279	VALID
X13	0.582	0.279	VALID
X14	0.590	0.279	VALID
X15	0.636	0.279	VALID

X16	0.633	0.279	VALID
X17	0.488	0.279	VALID
X18	0.496	0.279	VALID
X19	0.485	0.279	VALID

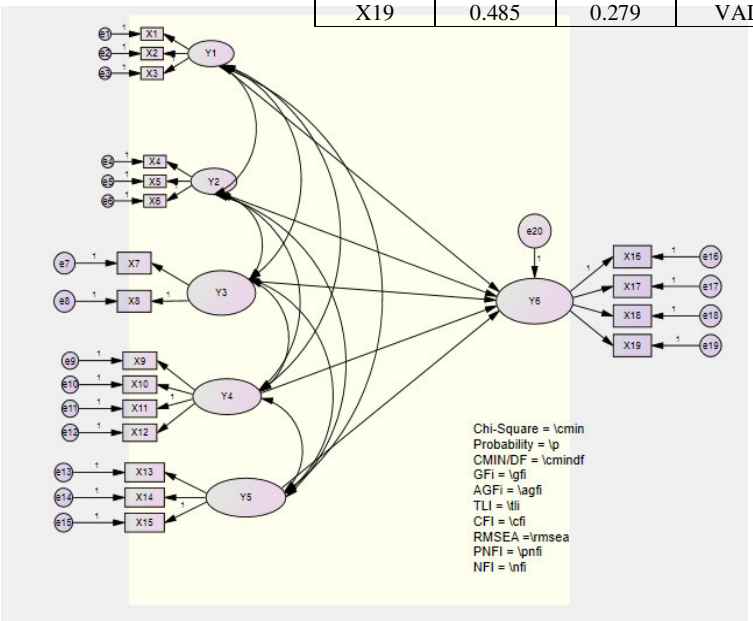

Figure 3. Overall Model with AMOS software

Initial model is made fit to number of manifest variables that exist and is connected with each latent variable. Almost all indicators on output produced in the initial model are still not fit. Therefore, it is necessary to modify the model that begins with testing the relationship between each of the exogenous variables. If the existing model is still not fit to each constructs remaining 3 indicators, the test is continued with full model testing.

Table 3. Recapitulation of validity test

Goodness of Fit	Cut off Value	Result	Model Evaluation
Chi-Square	Small value	248.842	Less Good
Probability	≥ 0.05	0	Marginal
CMIN/DF	≤ 2.00	2.283	Marginal
GFI	≥ 0.9	0.874	Marginal
AGFI	≥ 0.9	0.824	Marginal
TLI	≥ 0.9	0.719	Marginal
CFI	≥ 0.9	0.775	Marginal
RMSEA	≤ 0.08	0.08	Good
PNFI	≥ 0.5	0.538	Good

Research model has met criteria of goodness of fit has been determined as shows in Table 3. Chi-square value of the model is 248.842 with probability value is 0. There is no standard size used by chi-square, then used RMSEA to compensate. Limited in RMSEA is ≤ 0.08, on this model obtained 0.08, so the model is fit. Suitability calculated the weighted proportion of the variance in the sample of covariance matrix using GFI. GFI expected amounts ≥ 0.90, GFI value in this model is 0.874, so that GFI can be said to be marginal. So does the value of AGFI, TLI, and CFI obtained is marginal, while PNFI give good result. From that test results, can be said that the data had been given enough information to receipt hypothesis that these variables can reflect the latent variables are analyzed.

4.2 Hypothesis

Table 4. Regression Weights

	Estimate	S.E	C.R	P
Collaboration ← Total Logistic Cost	-.242	.189	-1.280	.201
Collaboration ← Characteristic of Product	-.475	.716	-.663	.507
Collaboration ← Performance (Shipping Comp.)	.451	.305	1.479	.139
Collaboration ← Characteristic of Transportation	.162	.276	.586	.558
X3 ← Total Logistic Cost	1.000			
X2 ← Total Logistic Cost	1.378	.224	6.163	***
X1 ← Total Logistic Cost	1.185	.216	5.490	***
X6 ← Total Logistic Cost	1.000			
X5 ← Characteristic of Product	1.668	.739	2.257	.024
X4 ← Characteristic of Product	2.732	1.139	2.398	.016
X11 ← Characteristic of Product	1.000			
X10 ← Performance of Transportation	.705	.174	4.054	***
X9 ← Performance of Transportation	.780	.191	4.080	***
X15 ← Characteristic of Transportation	1.000			
X14 ← Characteristic of Transportation	.649	.131	4.971	***
X13 ← Characteristic of Transportation	.902	.171	5.271	***
X16 ← Collaboration	1.000			
X17 ← Collaboration	.753	.145	5.176	***
X18 ← Collaboration	.957	.165	5.811	***
X12 ← Performance of Transportation	.811	.170	4.758	***
X19 ← Collaboration	.801	.151	5.304	***

Hypothesis 1: Total logistics cost has positive impact on collaboration
Based on the results obtained from testing the overall model which can be seen in table 5.1 regression weight, gained value P (Probability) = 0.201 greater than 0.05 and the value of C.R (Critical Ratio) = -1.280 smaller than 1.96 so that **H0 is accepted** and H1 rejected and stated that the total logistic cost has a positive impact on collaboration.

Hypothesis 2: Characteristic of product has positive impact on collaboration
Based on the results obtained from testing the overall model which can be seen in table 5.1 regression weight, gained value P (Probability) = 0.507 greater than 0.05 and the value of C.R (Critical Ratio) = -0.663 smaller than 1.96 so that **H0 is accepted** and H1 rejected and stated that characteristic of product has a positive impact on collaboration.

Hypothesis 3: Performance of logistic company has positive impact on collaboration
Based on the results obtained from testing exogenous model, the one of indicator performance of logistic company is eliminated because the value is below 0.5. So that there is only one indicator of this variable, therefore the **variable is removed** because this indicator is less and can make the value of modeling to be ugly.

Hypothesis 4: Performance of shipping company has positive impact on collaboration
Based on the results obtained from testing the overall model which can be seen in table 5.1 regression weight, gained value P (Probability) = 0.139 greater than 0.05 and the value of C.R (Critical Ratio) = 1.479 smaller than 1.96 so that **H0 is accepted** and H1 rejected and stated that performance of shipping company has a positive impact on collaboration.

Hypothesis 5: Characteristic of transportation has positive impact on collaboration
Based on the results obtained from testing the overall model which can be seen in table 5.1 regression weight, gained value P (Probability) = 0.558 greater than 0.05 and the value of C.R (Critical Ratio) = 0.586 smaller than 1.96 so that **H0 is accepted** and H1 rejected and stated that characteristic of transportation has a positive impact on collaboration.

5. Conclusion and Recommendation

Logistic companies maintain long-term relationship with their shipping company due to the benefits they can expect from long-term, mutually beneficial relationship with them. Regarding the research, the logistic companies strongly collaborate with shipping company in length of relationship, benefit, skill sharing, and information sharing. Eight indicators on logistic company (total logistic cost, characteristic of product, performance of logistic company) and seven indicators on shipping company (performance of shipping company, characteristic transportation) were used to measure their collaboration. On all the indicators, the levels of improvement of both were high. In characteristic of product, size of products has the higher level of improvement than the other indicators, while in total logistic cost, holding cost has the higher level of improvement than the other indicators. In characteristic of transportation, travel route has the higher level of improvement than the other indicators, while in performance of transport, transit time has the higher level of improvement than the other indicators. Companies may increase their level of collaboration, considering the total logistic cost, characteristic of product, performance of transportation, and characteristic of transport as a result of strategic collaboration.

Future research may use larger samples to improve the stability of the final model. Then more unidentified covariance structures between the variables could be found, and more detailed relationship between the performance indicators could be explained. Transportation conditions of other countries may not be like those in Indonesia, thus, the variables and research constructs used in this research may not be applied to other countries.

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